Environment Plan

BassGas Offshore Operations

Review record (record the last 3 revisions here or the revisions required to achieve current approval version)

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THE THREE WHATS
What can go wrong?
What could cause it to go wrong?
What can I do to prevent it?

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Acronyms

Terms/acronym	Definition/expansion
AEP	Australian Energy Producers (formerly APPEA)
ALA	Atlas of Living Australia
ALARP	As Low As Reasonably Practicable
AHTS	Anchor Handling Tug Supply vessel
AMA	Alternative Muster Area
AMOSC	Australian Marine Oil Spill Centre
AMP	Australian Marine Park
AMSA	Australian Maritime Safety Authority
AMSA JRCC	Australian Maritime Safety Authority Joint Rescue Coordination Centre
ANZECC	Australian and New Zealand Environment and Conservation Council
APASA	Asia-Pacific Applied Science Associates
APIA	Australian Pipeline Industry Association
AQIS	Australian Quarantine Inspection Service
ARI	Average Recurrence Interval
BARC	BirdLife Australia Rarities Committee
Bar(g)	Gauge pressure
BAT	Best Available Technique/s
BIA	Biologically important areas
BOD	Basis of Design
BTEX	Benzene, Toluene, Ethylbenzene, and Xylenes
CAMBA	China-Australia Migratory Bird Agreement
CAF	Capital Assurance Framework
CBS	Central Bass Strait
CCPS	Critical Control Performance Standard
CCR	Central Control Room
CCTV	Closed Circuit Television
CEFAS	Centre for Environment, Fisheries and Aquaculture Science
CERI	Collaborative Environmental Research Initiative
CFSR	Climate Forecast System Reanalysis
CFT	Critical Function Testing
CMMS	Computerised Maintenance Management System
CMR	Commonwealth Marine Reserve
CMT	Crisis Management Team
CO_2	Carbon dioxide
CoEP	Code of Environmental Practice

Terms/acronym	Definition/expansion
CP	Cathodic Protection
CRA	Corrosion Resistant Alloy
CRG	Community reference group
Cth	Commonwealth
CVI	Close Visual Inspection
d	Day
DAWE	Department of Agriculture, Water and the Environment (Cth)
DC	Direct current
DCS	Distributed Control System
DEECA RVRO	Department of Energy, Environment & Climate Action, Resources Victoria Regulatory Operations
DN	Nominal diameter
DNV	Det Norske Veritase
DoEE	Department of the Environment and Energy (Cth) (former)
EAC	East Australian Current
EARPL	Esso Australia Resources Pty Ltd
EEZ	Exclusive Economic Zone
EIA	Environment Impact Assessment
EIS	Environmental Impact Statement
EMAC	Eastern Maar Aboriginal Corporation
EMBA	Environment that May Be Affected
EMT	Emergency Management Team
EOFL	End of Field Life
EP	Environment Plan
EPA	Environmental Protection Authority (Vic)
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999 (Cth)
EPIRB	Emergency Position Indicating Radio Beacon
EPO	Environmental Performance Objectives
EPS	Environmental Performance Standard
ERA	Environmental Risk Assessment
ERP	Emergency Response Plan
ESD	Emergency Shutdown
ESDV	Emergency Shutdown Valve
FFG Act	Flora and Fauna Guarantee Act 1988 (Vic)
GAB	Great Australian Bight
GLDA	Tetrasodium Glutamate Diacetate

Terms/acronym	Definition/expansion
GVI	General Visual Inspection
HAZID	Hazard Identification
HFL	Hydraulic Flying Lead
HPU	Hydraulic Power Unit
HSE	Health Safety and Environment
HSEMS	Health, Safety and Environment Management System
HVAC	Heating, ventilation and air-conditioning
HYCOM	Hybrid Coordinate Ocean Model
IAP	Incident Action Plan
IBC	Intermediate Bulk Container
ICS	Integrated Control System
ID	Inside Diameter
IMCRA	Interim Marine and Coastal Regionalisation for Australia
IMO	International Maritime Organisation
ISO	International Standards Organisation
ISPP	International Sewage Pollution Prevention
JAMBA	Japan-Australia Migratory Bird Agreement
JSA	Job Safety Analysis
KEF	Key Ecological Features
KPI	Key Performance Indicator
LiDAR	Light Detection and Ranging
LLGP	Lang Lang Gas Plant
LoC	Loss of Containment
LoWC	Loss of Well Control
LPG	Liquefied Petroleum Gas
MAOP	Maximum Allowable Operating Pressure
MARPOL	IMO International Convention for the Prevention of Pollution from Ships (MARPOL 73/78)
MEG	Mono-Ethylene Glycol
MDO	Marine Diesel Oil
MMO	Marine Mammal Observer
MMSCFD	Million Standard Cubic Feet per Day
MNES	Matter of National Environmental Significance
MNP	Marine National Park
MOC	Management of Change
MODU	Mobile Offshore Drilling Unit
MOV	Manual Operated Valve

Terms/acronym	Definition/expansion
MP	Marine Park
MPa	Megapascal(s)
MSDS	Material Safety Data Sheet
NC	No contact
NCVA	National Conservation Values Atlas
NCEP	National Centre for Environment Prediction
NDT	Non-destructive Testing
NEBA	Net Environmental Benefits Analysis
NIW	Nationally Important Wetlands
NNTT	National Native Title Tribunal
NOEC	No Observed Effect Concentration
NOPSEMA	National Offshore Petroleum Safety and Environmental Management Authority
NOPTA	National Offshore Petroleum Titles Administration
NORM	Naturally Occurring Radioactive Materials
NP	National Park
NUI	Normally Unmanned Installation
OCNS	Offshore Chemical Notification Scheme
OEM	Original Equipment Manufacturer
OIW	Oil In Water
OPEP	Oil Pollution Emergency Plan
OPGGS Act	Offshore Petroleum and Greenhouse Gas Storage Act 2006 (Cth) & 2009 (Vic)
OPGGS(E)	Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth)
OPGGS Regulations	Offshore Petroleum and Greenhouse Gas Storage Regulations 2014 (Vic)
OSMP	Operational and Scientific Monitoring Plan
OSPAR	Oslo and Paris Commission
OSRA	Oil Spill Response Atlas
OSTM	Oil Spill Trajectory Modelling
OSV	Offshore support vessel
OWR	Oiled Wildlife Response
PA/GA	Public Address and General Alarm
PCM	Pipeline Corrosion Monitoring
PCS	Process Control System
PFW	Produced Formation Water
PIC	Person In Charge
PL	Pipeline licence
PLONOR	Pose Little or No Risk

Terms/acronym	Definition/expansion
PMP	Primary Muster Point
PMS	Planned Maintenance System
PMST	Protected Matters Search Tool
PMV	Production Master Valve
PPE	Personal Protective Equipment
PPL	Petroleum Production Licence
PTS	Permanent Threshold Shift
PTW	Permit To Work
PSV	Pressure Safety Valve
PWV	Production Wing Valve
RBI	Risk Based Inspection
RESDV	Riser Emergency Shutdown Valve
RGP	Raw Gas Pipe
RO	Reverse Osmosis
ROKAMBA	Republic of Korea–Australia Migratory Birds Agreement
ROV	Remote/ly Operated Vehicle
RWP	Relief Well Plan
RWT	Rhodamine WT
SCM	Subsea Control Module
SCSSV	Surface Controlled Subsurface Safety Valve
SDU	Subsea Distribution Unit
SEL	Sound Exposure Level
SEMR	South-East Commonwealth Marine Region
SESSF	Southern and Eastern Scalefish and Shark Fishery
SHK	Species or habitat known to occur in the area
SHM	Species or habitat may occur in the area
SHX	Subsea Heat Exchanger
SITHP	Shut-in Tubing Head Pressure
SIS	Safety Instrumented System
SMC	Subsea Manifold Cooler
SMPEP	Shipboard Marine Pollution Emergency Plan
SOPEP	Shipboard Oil Pollution Emergency Plan
SPCU	Subsea Power and Control Unit
SPL	Sound Pressure Level
SPRAT	Species Profile and Threats (database)
SQG	Sediment Quality Guidelines

Terms/acronym	Definition/expansion
SSSV	Sub-Surface Safety Valve
SST	Sea Surface Temperature
SVS	Subsea Valve Skid
TEC	Threatened Ecological Community
TEMPSC	Totally Enclosed Motor Propelled Survival Craft
TOLC	Top of Line Corrosion
TPC	Third Party Contractor
TPH	Total Petroleum Hydrocarbons
TRH	Total Recoverable Hydrocarbons
TTS	Temporary Threshold Shift
TUTU	Topside Umbilical Termination Unit
TRSC-SSSV	Tubing Retrievable Surface Controlled Sub-Surface Safety Valve
UHF	Ultra-High Frequency
UTA	Umbilical Termination Assembly
VFA	Victorian Fisheries Authority
VBA	Victorian Biodiversity Atlas
VCS	Vertical Connection System
VHF	Very High Frequency
Vic	Victoria
VoO	Vessel/s Of Opportunity
WET	Whole Effluent Toxicity
WOMP	Well Operations Management Plan

Unit Abbreviation	Definition
‘	Foot/Feet
“	Inch(es)
°C	Degrees Celsius
bbl	Barrel
cui	Cubic Inches
dB	Decibel(s)
g	Gram/s
ha	Hectare/s
hr	Hour/s
kJ	Kilojoule(s)

km	Kilometre
km/hr	Kilometres per hour
kPa	Kilopascal(s)
kPaG	Kilopascal(s) – gauge pressure
L	Litre(s)
m	Metre(s)
m^2	Square metres
m^3	Cubic metres
mL	Millilitre(s)
MM	Million
MMbbl	Million barrels
MMscf	Million Standard Cubic Feet
nm	Nautical Mile(s)
ppb	Parts per billion
ppm	Parts per million
s	Second(s)
scf	Standard Cubic Foot/Feet
t	Tonne(s)
TJ	Terajoule(s)
V	Volt(s)
µg	Microgram(s)

1 Introduction

1.1 Background

Beach Energy (Operations) Ltd (Beach) is the Operator of the BassGas Development. The BassGas Development consists of gas and liquids produced from the Yolla gas field, located 147 km south of Kilcunda (Victoria) in Bass Strait (Figure 1.1), that are transported via a subsea pipeline to the Victorian mainland via a coastal crossing near Kilcunda. Commercial gas production started in June 2006.

1.2 Environment Plan Summary

Table 1.1 provides a summary of this Environment Plan (EP) as required by Regulation 35(7) of the Commonwealth Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (herein referred to as the OPGGS(E)).

Table 1.1: EP Summary of material requirements

EP Summary requirement	Relevant EP section
Details of the titleholder's nominated liaison person for the activity	Section 1.4
The location of the activity	Section 3.2
A description of the activity	Section 3
Consultation already undertaken and plans for ongoing consultation	Section 4
A description of the receiving environment	Section 5
Details of the environmental impacts and risks	Section 0
The control measures for the activity	Section 0
The arrangements for ongoing monitoring of the titleholder's environmental performance	Section 8
Response arrangements in the oil pollution emergency plan (OPEP)	Refer to OPEP

1.3 Scope

This EP includes a description of:

- The nature of the activity (location, layout, operational details);
- The legislative framework relevant to the activity;
- Stakeholder consultation activities;
- The environment affected by the activity;
- Environmental impacts and risks;
- Mitigation and management measures;
- Environmental performance outcomes, standards and measurement criteria;
- How impacts and risks will be reduced to be an acceptable level and be As Low As Reasonably Practicable (ALARP);

- The implementation strategy to ensure that the environmental impacts and risks are managed in a systematic manner; and
- Reporting arrangements.

1.3.1 Definition of the Activity

In accordance with Regulation 5 of the OPGGS(E), this EP applies to a defined 'petroleum activity' (the 'Activity'). The Activity in Commonwealth waters is defined as:

> *Operation and maintenance activities related to the production and flow of gas and condensate through the Yolla-A platform and wells (in Production Licence T/L1) and subsea pipeline (pipeline licences Vic/PL34 and T/PL2) in Commonwealth waters.*

In accordance with the Victorian Offshore Petroleum and Greenhouse Gas Storage (OPGGS) Regulations 2021 (herein referred to as the OPGGS Regulations) Regulation 6, the Activity is defined as the:

> *Operation and maintenance activities related to the flow of gas and condensate through the pipeline in state waters (licence Vic/PL34(V)).*

More specifically, the activity is defined as the operation and maintenance for the next five years of the:

- Yolla-A manned platform (in Production Licence T/L1).
- Yolla-3, -4, -5 and -6 wells.
- Offshore Raw Gas Pipeline (RGP) (Pipeline Licences PL34 and PL34(V)).

The onshore components of the project excluded from the scope of this EP include the:

- Onshore RGP.
- Lang Lang Gas Plant (LLGP).
- Sales Gas Pipeline.

1.3.2 Jurisdiction

Because the activity occurs in both Commonwealth and Victorian waters, this EP has been prepared to satisfy the requirements of Commonwealth and Victorian legislation, namely:

- Part 2 of the OPGGS(E) Regulations, administered by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA). This regulates the following physical components of the petroleum activity;
  - The Yolla-A platform.
  - The portion of the RGP in Commonwealth waters (141.4 km of its 147 km, 96% of its length).

- Part 2.2 of the OPGGS Regulations, administered by Resources Victoria Regulatory Operations (RVRO) within the Victorian Department of Energy, Environment and Climate Change (DECCA). This regulates the following aspects of the petroleum activity;
    - The portion of the RGP in Victorian state waters (5.6 km, 4% of its length).

This single EP has been submitted to both regulators for assessment and acceptance. The regulatory jurisdictions of the BassGas offshore facilities are detailed further in Section 2.2.

1.3.3 Interfaces with Other Documents

This EP interfaces with several other plans, including the:

- BassGas Offshore Facilities Safety Case (CDN/ID19061536);
- Lang Lang Gas Plant Safety Case (CDN/ID 5214692);
- Victorian Onshore Pipelines Safey Management Plan (CDN/ID 19060213);
- Yolla-A Platform Well Operations Management Plan (WOMP) (CDN/ID 3972817);
- BassGas Site Emergency Response Plan (SERP) (CDN/ID 3974548);
- Victoria Offshore Oil Pollution Emergency Plan (CDN/ID 18986979); and
- Offshore Victoria Operational and Scientific Monitoring Plan (OSMP) (CDN/ID 18689009 (S4100AH717908)).

These documents describe in detail the facilities, health and safety risks associated with their operation, emergency management arrangements and the systems in place to manage these risks.

1.4 The Titleholder and Liaison Person

Beach Energy (Operations) Limited (Beach), a company wholly owned by Beach Energy Limited, is the titleholder and operator of the BassGas production and associated facilities in T/L1 and associated pipeline licences T/PL2, Vic/PL34 and Vic/PL34(V).

The titleholder and the liaison person detail applicable to the Operations activity are listed in Table 1.2.

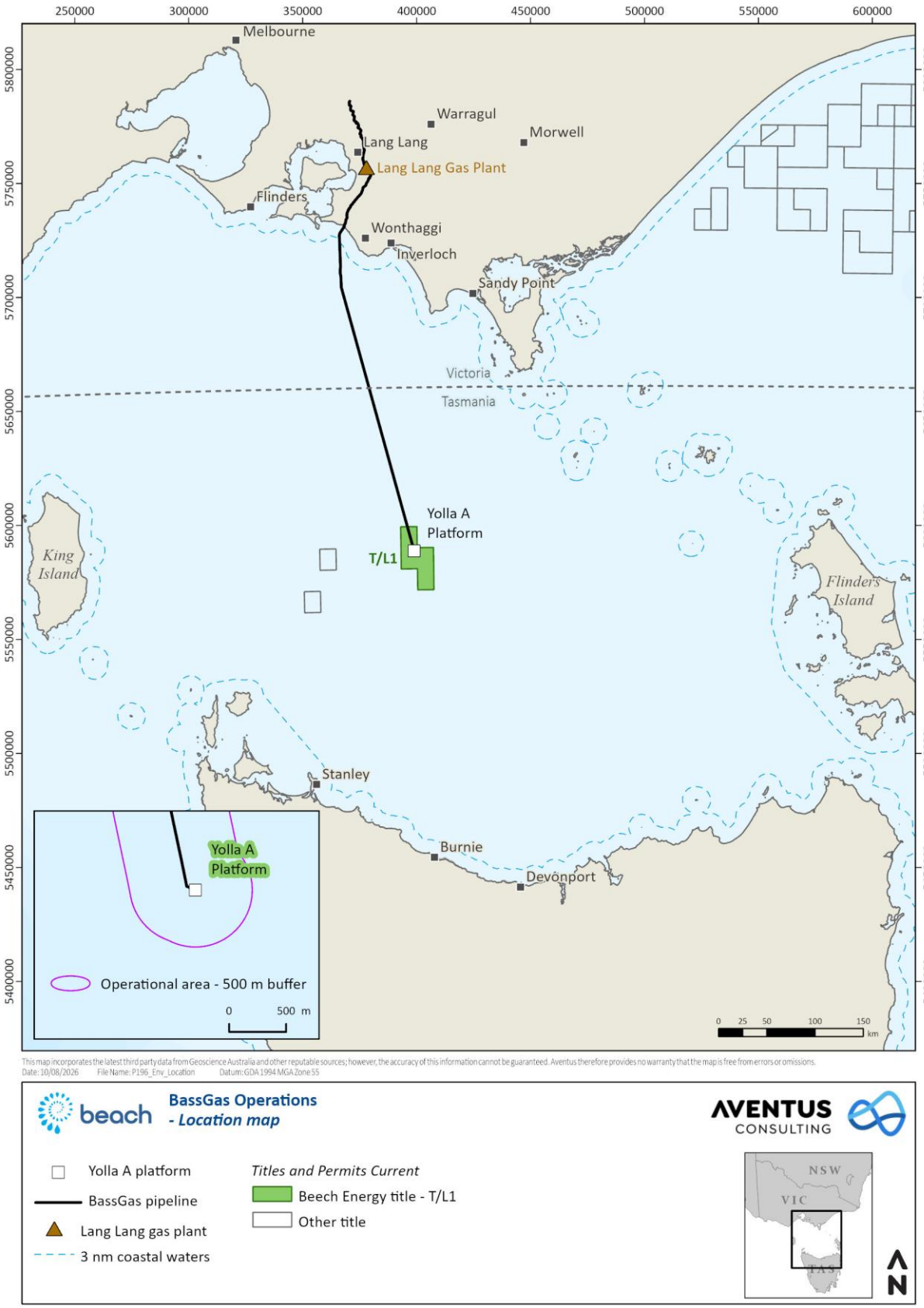


Figure 1.1: BassGas location map and operational area

Table 1.2: Details of Titleholder and Liaison Person

Titleholder Details	Beach Energy (Operations) Ltd
Business address	Level 8 80 Flinders Street Adelaide, South Australia, 5000
Telephone number	(08) 8338 2833
Email address	info@beachenergy.com.au
Australian Company Number	007 845 338
Titleholder Liaison Person	Kevin Galea
	General Manager Offshore

Beach was formed in 1961 and is an Australian Stock Exchange-listed oil and gas, exploration and production company headquartered in Adelaide, South Australia. It has operated and non-operated onshore and offshore oil and gas production from five petroleum basins across Australia and New Zealand and is a key supplier to the Australian east coast gas market. Beach's asset portfolio includes ownership interests in strategic oil and gas infrastructure, as well as a suite of high potential exploration prospects. Beach's gas exploration and production portfolio includes acreage in the Otway, Bass, Cooper/Eromanga, Perth, Browse and Bonaparte basins in Australia, as well as the Taranaki and Canterbury basins in New Zealand (Figure 1.2).

Beach will notify NOPSEMA and DECCA (RVRO) of any change in titleholder, a change in the titleholder's nominated liaison person, or a change in the contact details for either the titleholder or the liaison person as soon as practicable after such a change takes place.

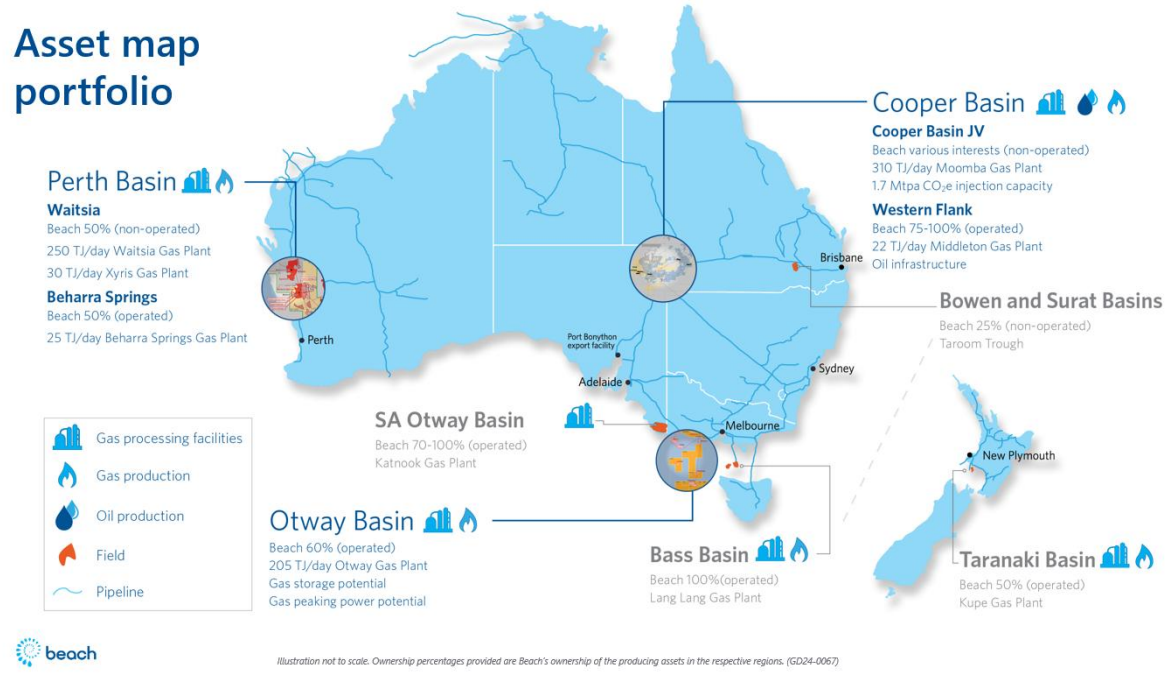


Figure 1.2: Location of Beach's assets

1.5 Objectives of the EP

As required by Regulation 41(1) of the OPGGS(E) Regulations and Regulation 22(1) of the OPGGS Regulations, an EP must be revised and resubmitted every five (5) years. This EP aims to secure acceptance to continue operating the activity for an additional five years by demonstrating that Beach is managing the environmental impacts and risks of the activity to ALARP and to an acceptable level.

Of particular focus with this five-yearly EP revision is:

- Updating the Titleholder details (in accordance with Regulation 39(3) of the OPGGS(E) Regulations and Regulation 20(4) of the OPGGS Regulations);
- Applying new EP guidance provided by NOPSEMA since the EP's last acceptance in December 2020, including:
    - Expanding on the demonstrations of ALARP and acceptability.
    - Describing the existing environment within an Environment that May Be Affected (EMBA), as determined by oil spill trajectory modelling (OSTM) undertaken using revised hydrocarbon spill scenarios and thresholds.
    - Integration of the description and impact assessment of Matters of National Environmental Significance (MNES) under the EPBC Act resulting from the streamlining process (see Section 2.2.1 for more detail).
- Updating the description of Beach's Operations Excellence Environmental Management System (OEMS) and how it applies to the implementation strategy for this EP (Chapter 8);
- Including assessments of environmental impacts and risks against the management plans of Australian Marine Parks (AMPs), state marine parks and species recovery plans within the EMBA; and
- Distinguishing between issues pertinent to NOPSEMA (Commonwealth waters) and DECCA (Victorian state waters).

2 Environmental Regulatory Framework

In accordance with Regulation 21(4) of the OPGGS(E) Regulations and Regulation 15(3)(a) of the OPGGS Regulations, this chapter describes the legislative requirements that apply to the activities described in this EP.

2.1 Beach Environmental Policy

In accordance with Regulation 24(a) of the OPGGS(E) Regulations and Regulation 19(a) of the OPGGS Regulations, Beach's Environment Policy is provided in Figure 2.1. The policy provides a public statement of the company's commitment to minimise adverse effects on the environment and to improve environmental performance.

Beach operates under its Operations Excellence Environmental Management System (OEMS) for offshore operations to minimise and manage the impacts on employees, contractors, the environment and the communities in which the company operates. The OEMS is described further in Chapter 8.

2.2 Legislative Framework

Because the activity occurs in both Commonwealth and Victorian waters, this EP has been prepared in accordance with:

- Part 2 of the OPGGS(E) Regulations; and
- Part 2.2 of the OPGGS Regulations.

NOPSEMA is the designated regulator for petroleum activities in Commonwealth waters (3 nm to 200 nm from land) and the DECCA RVRO is the designated regulator for petroleum activities in Victorian State waters (from the high-water mark to 3 nm from land).

Figure 2.2 provides a simplified representation of the jurisdictions for the BassGas Development, with Table 2.1 outlining the geographic coordinates for the same.

Table 2.1: Geographic coordinates and jurisdiction of assets

Asset	Licence	Section	Regulations
Yolla-A platform	T/L1	Centred on 145° 48′ 26″ E and 39° 50′ 14″ S	OPGGS(E)
RGP	T/PL2	From the Yolla platform to the Victorian/Tasmanian administrative boundary in Commonwealth waters at 39° 11′ 55″ S	OPGGS(E)
	Vic/PL34	From the Victorian/Tasmanian administrative border to 38° 37′ 09″ S and 145° 27′ 48″ E (Victorian 3 nm limit)	OPGGS(E)
	Vic/PL34(V)	From the low water mark to 38° 37′ 09″ S and 145° 27′ 48″ E (Victorian 3 nm limit)	OPGGS Regulations

Environment Policy

Objective

Beach is committed to conducting operations in an environmentally responsible and sustainable manner.

Strategy

To achieve this, Beach will:

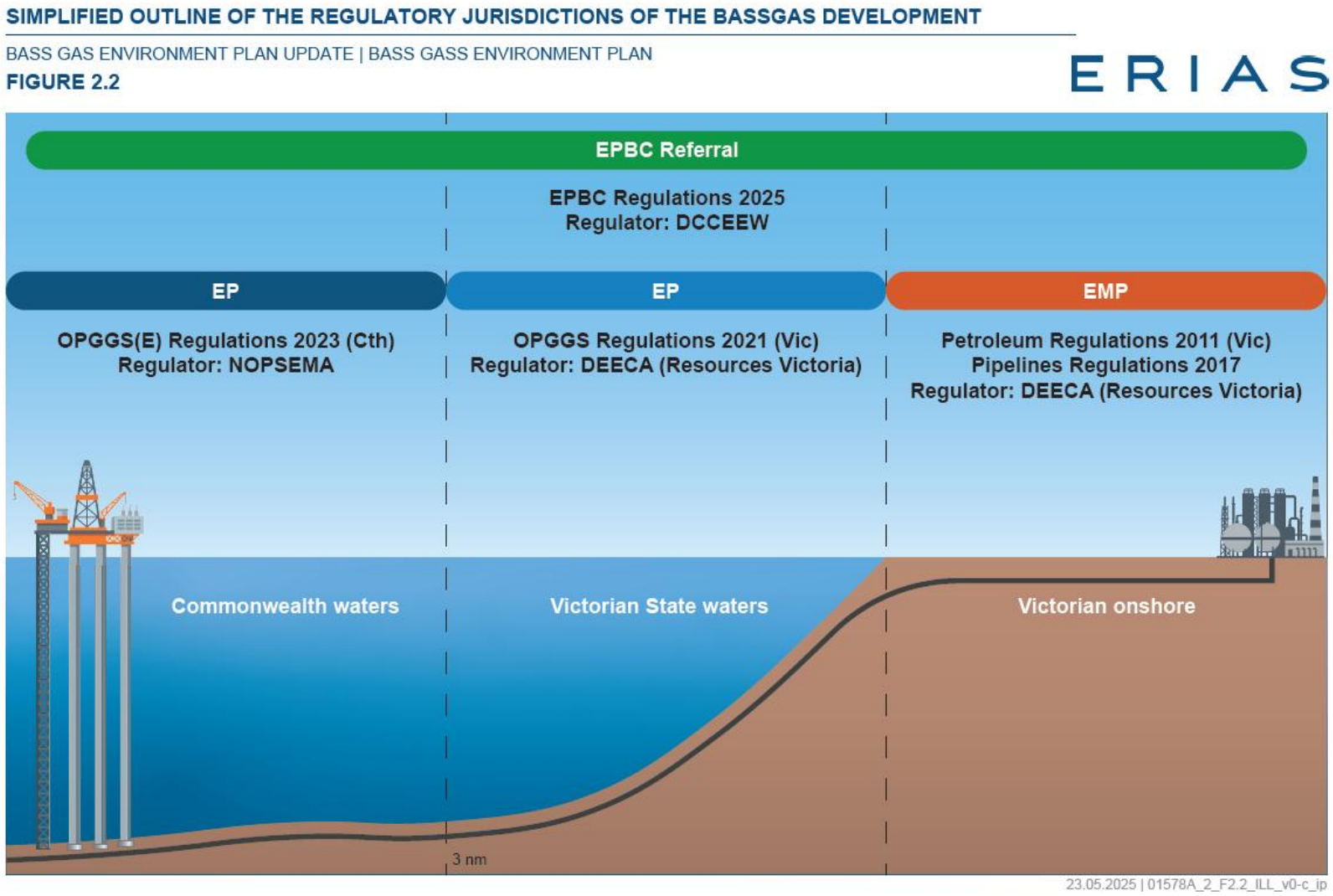
- Comply with relevant environmental laws, regulations, and the Beach Operations Excellence Management System which is the method by which Beach identifies and manages environmental risk.
- Establish environmental objectives and targets, and implement programs to achieve them that will support continuous improvement;
- Identify, assess and control environmental impacts of our operations by proactive management of activities and mitigation of impacts;
- Ensure that incidents, near misses, concerns and complaints are reported, investigated and lessons learnt are implemented;
- Inform all employees and contractors of their environmental responsibilities including consultation and distribution of appropriate environmental management guidelines, regulations and publications for all relevant activities;
- Efficiently use natural resources and energy, and engage with stakeholders on environmental issues; and
- Publicly report on our environmental performance.

Application

This policy applies to all personnel associated with Beach activities.

April 2023

Figure 2.1: Beach Environmental Policy



Note: The EPBC Referral was relevant to the original development application and does not apply to ongoing operations.

Figure 2.2: Simplified outline of the regulatory jurisdictions of the BassGas Development

2.2.1 Commonwealth Legislation

Table 2.2 presents a summary of the key Commonwealth legislation and regulations relevant to the environmental management of the activity, with detail to the most pertinent legislation and regulations provided below.

Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023

The OPGGS(E) Regulations address all licensing and environmental issues for offshore petroleum and greenhouse (GHG) activities in Commonwealth waters. The OPGGS(E) requires the preparation of an EP prior to conducting a petroleum activity for acceptance by NOPSEMA. The EP is an activity-specific document that provides a detailed impact and risk assessment and explains how identified risks will be managed. Upon EP acceptance, the activity may commence (or continue, as is the case for ongoing operations), and the EP is accessible on the NOPSEMA website.

Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act* 1999 (EPBC Act) is the key legislation regulating projects that may have an impact on MNES. The Commonwealth Department of Climate Change, Energy, Environment and Water (DCCEEW) (formerly the Department of Agriculture, Water and the Environment (DAWE))) is the Regulator of the EPBC Act.

In February 2014, NOPSEMA became the sole designated assessor of petroleum and GHG activities in Commonwealth waters in accordance with the Minister for the Environment's endorsement of NOPSEMA's environmental authorisation process under Part 10, section 146 of the EPBC Act. Under the streamlined arrangements, impacts on the Commonwealth marine area by petroleum and GHG activities are assessed solely through NOPSEMA. As such, an EPBC Act Referral has not been prepared and submitted to the DCCEEW for the continuation of BassGas operations.

The development's Environmental Impact Statement (EIS) and resulting EPBC Decision 2001/321 gave Origin approval, with conditions, to construct and operate the production wells in the Yolla gas field, the Yolla offshore production facility, the onshore and offshore pipelines, an onshore gas treatment and compression plant and an onshore pipeline. None of the conditions associated with the development's original EPBC approval relate to ongoing operations and as such the approval is not relevant to this EP.

2.2.2 Victorian Legislation

Table 2.3 presents a summary of the key Victorian legislation and regulations relevant to the environmental management of the activity, with detail to the most pertinent legislation and regulations provided below.

Offshore Petroleum and Greenhouse Gas Storage Regulations 2021

The OPGGS Act 2010 (and associated OPGGS Regulations 2021) is the key legislation regulating petroleum activities in Victorian state waters and mandates that environmental considerations should be integrated into decision-making with regard to the administration of the Act. In this regard, an EP must be prepared and submitted to the Regulator for assessment and acceptance.

This Act and its Regulations (Chapter 2 – Environment) essentially mirror those of the Commonwealth Act and Regulations of the same name, however, have not been modified to align with most recent revisions of the Commonwealth Act and regulations (streamlining amendments made in 2014 and transparency amendments made in 2019) and hence variations between jurisdictions exist.

Table 2.2: Summary of key Commonwealth environmental legislation relevant to the activity

Legislation/Regulation	Scope	Related International Conventions	Administering Authority
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) (& Regulations 2025)	Protects MNES, provides for Commonwealth environmental assessment and approval processes and provides an integrated system for biodiversity conservation and management of protected areas. The nine MNES are: 1. World heritage properties. 2. National heritage places. 3. Wetlands of international importance (Ramsar wetlands). 4. Nationally threatened species and ecological communities. 5. Migratory species. 6. Commonwealth marine environment. 7. The Great Barrier Reef Marine Park. 8. Nuclear actions (including uranium mining). 9. A water resource, in relation to coal seam gas development and large coal mining development. **Relevance to this activity**: This EP includes a description and assessment of the MNES that may be impacted by the activity (principally items 4 and 5 in this list).	• Convention on Biological Diversity and Agenda 21 1992. • Convention on International Trade in Endangered Species of Wild Fauna and Flora 1973 (CITES). • Agreement between the Government and Australia and the Government of Japan for the Protection of Migratory Birds and Birds in Danger of Extinction and their Environment 1974 (JAMBA). • Agreement between the Government and Australia and the Government of the People's Republic of China for the Protection of Migratory Birds and their Environment 1986 (CAMBA). • Republic of Korea Migratory Birds Agreement 2006 (ROKAMBA). • Convention on Wetlands of International Importance especially as Waterfowl Habitat 1971 (RAMSAR). • International Convention for the Regulation of Whaling 1946. • Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention) 1979.	National Environmental Protection Agency (NEPA) (until 1st July 2026, this was the Department of Climate Change, Energy, the Environment and Water, DCCEEW). (NOPSEMA in the case of this activity)
OPGGS Act 2006 and OPGGS (Environment) Regulations 2023	The Act addresses all licensing and HSE issues for offshore petroleum and GHG activities extending beyond the 3 nm limit. The Regulations (Part 2) specify that an EP must be prepared for any GHG activity and that activities are undertaken in an ecologically sustainable manner.	Not applicable.	NOPSEMA

Legislation/Regulation	Scope	Related International Conventions	Administering Authority
	Relevance to this activity: The preparation and acceptance of this EP satisfies the key requirements of this legislation.		
Australian Maritime Safety Authority Act 1990 (AMSA Act)	Facilitates international cooperation and mutual assistance in preparing and responding to major oil spill incidents and encourages countries to develop and maintain an adequate capability to deal with oil pollution emergencies. Requirements are implemented through AMSA. AMSA is the lead agency for responding to oil spills in the Commonwealth marine environment and is responsible for implementing the Australian National Plan for Maritime Environmental Emergencies (NatPlan). **Relevance to this activity**: In the event of a Level 2 or 3 hydrocarbon spill to sea from the wells, pipeline or vessels in Commonwealth waters, AMSA may take over from Beach as the Combat Agency and implement the NatPlan.	• International Convention on Oil Pollution Preparedness, Response and Cooperation 1990 (OPRC). • Protocol on Preparedness, Response and Cooperation to Pollution Incidents by Hazardous and Noxious Substances 2000. • International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties 1969. • United Nations Convention on the Law of the Sea 1982 (UNCLOS) (articles 198 & 221).	AMSA
Ozone Protection and Synthetic Greenhouse Gas Management Act 1989 and Regulations 1995	Regulates the manufacture, importation and use of ozone depleting substances. **Relevance to this activity**: The platform does not have a register of ozone-depleting substances (ODS), but vessels may do.	• Montreal Protocol on Substances that Deplete the Ozone Layer 1987. • United Nations Framework Convention on Climate Change (UNFCCC) 1994.	DCCEEW
Navigation Act 2012 (& Regulations 2013)	This Act regulates ship-related activities in Commonwealth waters and invokes certain requirements of the International Convention for the Prevention of Pollution from Ships (MARPOL 73/78) relating to equipment and construction of ships. Several Marine Orders (MO) are enacted under this Act relating to the environmental and social management offshore petroleum activities, including: • MO Part 21: Safety and emergency arrangements. • MO Part 30: Prevention of collisions. • MO Part 50: Special purpose vessels.	• United Nations Convention on the Law of the Sea 1982 (UNCLOS). • International Convention for the Safety of Life at Sea 1974 (SOLAS). • Convention on the International Regulations for Preventing Collisions at Sea 1972 (COLREG). • International Convention for the Prevention of Pollution from Ships 1973, as modified by the Protocol of 1978 (MARPOL).	AMSA

Legislation/Regulation	Scope	Related International Conventions	Administering Authority
	Relevance to this activity: The platform, support and maintenance vessels will adhere to the relevant MOs while operating within Commonwealth waters.	• International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) as amended, 1995.	
Protection of the Sea (Prevention of Pollution from Ships) Act 1983 Protection of the Sea (Prevention of Pollution from Ships) (Orders) Regulations 1994	Regulates ship-related operational activities and invokes certain requirements of the MARPOL Convention relating to discharge of noxious liquid substances, sewage, garbage, air pollution etc. Requires that ships >400 gross tonnes to have pollution emergency plans. Several MO are enacted under this Act relating to offshore petroleum activities, including: • MO Part 91: Marine Pollution Prevention – Oil • MO Part 93: Marine Pollution Prevention – Noxious Liquid Substances • MO Part 94: Marine Pollution Prevention – Packaged Harmful Substances • MO Part 95: Marine Pollution Prevention – Garbage • MO Part 96: Marine Pollution Prevention – Sewage • MO Part 97: Marine Pollution Prevention – Air Pollution • MO Part 98: Marine Pollution Prevention – Anti-fouling Systems. **Relevance to this activity**: Supply, support and maintenance vessels >400 gross tonnes will adhere to the relevant MOs by having a SMPEP, Oil Record Book and Garbage Management Plan in place and implemented, along with international pollution prevention certificates verifying compliance with oil, air pollution and sewage measures. See also Table 2.7 for further information.	Various parts of MARPOL.	AMSA
Protection of the Sea (Shipping Levy) Act 1981	Provides that where, at any time during a quarter when a ship with tonnage length of no less than 24 m was in an Australia port, there was on board the ship a quantity of oil in bulk weighing more than 10 tonnes, a levy is imposed in respect of the ship for the quarter. **Relevance to this activity:** Supply, support and maintenance vessels will adhere to the shipping levy, as required.	Not applicable.	AMSA

Legislation/Regulation	Scope	Related International Conventions	Administering Authority
Protection of the Sea (Civil Liability for Bunker Oil Pollution Damage) Act 2008	Sets up a compensation scheme for those who suffer damage caused by spills of oil that is carried as fuel in ships' bunkers. There is an obligation on ships >1,000 gross tonnes to carry insurance certificates when leaving/entering Australian ports or leaving/entering an offshore facility within Australian coastal waters. **Relevance to this activity**: Supply, support and maintenance vessels will hold the necessary insurance certificates, as required.	International Convention on Civil Liability for Bunker Oil Pollution Damage 2001.	AMSA
Protection of the Sea (Harmful Antifouling Systems) Act 2006	Creates an offence for a person to engage in negligent conduct that results in a harmful anti-fouling compound being applied to a ship. Also provides that Australian ships must hold 'anti-fouling certificates', provided they meet certain criteria. **Relevance to this activity**: Supply, support and maintenance vessels will hold valid anti-fouling certificates, as required.	International Convention on the Control of Harmful Anti-fouling Systems on Ships 2001.	AMSA
National Greenhouse and Energy Reporting Act 2007 (NGER) and associated instruments	Establishes the legislative framework for the NGER Scheme, which is a national framework for reporting GHG emissions and energy consumption and production by corporations in Australia. Associated instruments include the NGER Regulations 2008 and the NGER (Measurement) Determination 2008. The Safeguard Mechanism is defined by the NGER (Safeguard Mechanism) Rule 2015. **Relevance to this activity**: Beach is a registered reporter under this Act (ABN 200 076 179 69).	UNFCCC 1994.	Clean Energy Regulator
Biosecurity Act 2015 (& 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 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. Offshore petroleum installations outside of 12 nm are located outside of Australian territory for the purposes of the Act. While these installations are not subject to biosecurity control, aircraft and vessels (not subject to biosecurity control) that leave Australian territory and are exposed to	• International Convention for the Control and Management of Ships Ballast Water & Sediments 2004. • World Trade Organization Agreement on the Application of Sanitary and Phytosanitary Measures (SPS agreement). • World Organisation for Animal Health and the International Plant Protection Convention.	Department of Agriculture, Fisheries and Forestry (DAFF)

Legislation/Regulation	Scope	Related International Conventions	Administering Authority
	the installations are subject to biosecurity control when returning to Australian territory. When a vessel or aircraft leaves Australian territory and interacts with an installation or petroleum industry vessel it becomes an 'exposed conveyance' and is subject to biosecurity control when it returns to Australian territory unless exceptions can be met. The person in charge of an exposed conveyance carries the responsibility for pre-arrival reporting under the Act and must arrive at a first point of entry. This Act includes mandatory controls in the use of seawater as ballast in ships and the declaration of sea vessels voyaging into and out of 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. **Relevance to this activity**: Supply, support and maintenance vessels sourced from foreign ports will adhere to the DAWE guidelines regarding quarantine clearance to enter Australian waters.		
Marine Safety (Domestic Commercial Vessel) National Law Act 2012 (& Regulations 2013)	This Act provides for a national system for Domestic Commercial Vessels (DCV) between states and territories to ensure their safe operation. This system provides for MO and National Standards to be adopted for DCVs of different classes. Current MO include: • MO 501 (Administration – National Law) 2013. • MO 502 (Vessel Identifiers – National Law) 2013. • MO 503 (Certificates of Survey – National Law) 2013. • MO 504 (Certificates of Operation and Operational Requirements – National Law) 2013. • MO 505 (Certificates of Competency – National Law) 2013. • MO 507 (Load Line Certificates – National Law) 2013. This law does not over-ride state legislation with respect to marine environmental management, dangerous goods management, speed limits, navigation aids, rules for prevention of collisions, monitoring of	Not applicable.	AMSA

Legislation/Regulation	Scope	Related International Conventions	Administering Authority
	marine communications systems, workplace health and safety or emergency management and response. **Relevance to this activity**: Applies to DCV used as supply, support or maintenance vessels at the platform or along the RGP in Commonwealth waters.		
Climate Change Act 2022 and *Climate Change (Consequential Amendments)* Act 2022	The Act sets out Australia's greenhouse gas emissions reduction targets. It outlines Australia's greenhouse gas emissions reduction targets of a 43% reduction from 2005 levels by 2030 and net zero by 2050; requires the Minister to prepare and table an annual climate change statement; requires the Climate Change Authority to give the Minister advice in relation to the annual statement and future greenhouse gas emissions reduction targets; and provides for periodic reviews of the operation of the Act. The Act operates as 'umbrella' legislation to implement Australia's net-zero commitments and codifies Australia's net 2030 and 2050 GHG emissions reductions targets under the Paris Agreement. **Application to activity:** GHG requirements are detailed in Section 7.	The Act itself does not impose obligations directly on companies, but its passage into law sets the scene for sector-based reforms to implement the 2030 target and emissions budget, which will impact businesses. The Safeguard Mechanism is one such measure.	Climate Change Authority
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 Australia, are protected from the harmful effects of the waste **Application to activity:** To ensure that hazardous waste as prescribed in the Act (i.e. – exhibiting one or more of the following characteristics: ignitability, corrosivity, reactivity, toxicity, mutagenic, teratogenic, infectious, irritant, carcinogenic, bioaccumulate/bio magnify, flammable or explosive), are documented, segregated from other waste streams and stored in suitable containers ahead of transport and disposal at a suitably licensed onshore facility.	The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal.	DCCEEW

Legislation/Regulation	Scope	Related International Conventions	Administering Authority
Non-routine & emergency events			
Aboriginal and Torres Strait Islander Heritage Protection Act 1984	This Act enables the Australian Government to protect important Indigenous areas and objects under immediate threat, if it appears that state or territory laws have not provided effective protection. Areas or objects protected under this Act are included in the National Heritage List and Commonwealth Heritage List. **Application to activity:** Areas or objects protected under this Act may be present within the operational areas as detailed in Section 5.6.	• Not applicable.	DCCEEW
Environment Protection (Sea Dumping) Act 1981 (& Regulations 1983)	Aims to prevent the deliberate disposal of wastes (loading, dumping, and incineration) at sea from vessels, aircraft, and platforms. **Relevance to this activity**: There will be no dumping at sea within the meaning of the legislation that would require a sea dumping permit to be obtained.	• Convention on the Prevention of Marine Pollution by Dumping of Waste and Other Matter 1972 [London Convention] • Protocol on the Prevention of Marine Pollution by Dumping of Waste and Other Matter 1996 [London Protocol]	NEPA
Fisheries Management Act 1991 (& Regulations 2019)	This Act aims to implement efficient and cost-effective fisheries management on behalf of the Commonwealth, ensure that the exploitation of fisheries resources and the carrying on of any related activities are conducted in a manner consistent with the principles of Ecologically Sustainable Development (ESD), maximise the net economic returns to the Australian community from the management of Australian fisheries, ensure accountability to the fishing industry and to the Australian community in AFMA's management of fisheries resources, and achieve government targets in relation to the recovery of the costs of AFMA. **Relevance to this activity**: Provides the regulatory and other mechanisms to support any necessary fisheries management decisions in the event of a hydrocarbon spill in Commonwealth waters.	Not applicable.	Australian Fisheries Management Authority (AFMA), DAFF
Native Title Act 1993 and *Native Title Legislation Amendment Act* 2021	Allows for recognition of native title through a claims and mediation process and also sets up regimes for obtaining interests in lands or waters where native title may exist. The main objects of this Act are:	Not applicable.	Attorney-General's Department

Legislation/Regulation	Scope	Related International Conventions	Administering Authority
	(a) to provide for the recognition and protection of native title; and (b) to establish ways in which future dealings affecting native title may proceed and to set standards for those dealings; and (c) to establish a mechanism for determining claims to native title; and (d) to provide for, or permit, the validation of past acts, and intermediate period acts, invalidated because of the existence of native title. **Relevance to this activity:** Native Title Determination area does not cover the offshore area in which the activities will be undertaken, and therefore there is no relevance to this activity.		
Underwater Cultural Heritage Act 2018	Protects the heritage values of shipwrecks, sunken aircraft and relics (older than 75 years) in Australian Territorial waters below the low water mark to the outer edge of the continental shelf (excluding the State's internal waterways. It is an offence to interfere with a shipwreck covered by this Act. **Relevance to this activity**: No historic shipwrecks, sunken aircraft or relics are mapped to occur near the Yolla-A platform, and there is only one in close proximity to the RGP in Commonwealth waters. In the event of the discovery of, and damage to previously unrecorded wrecks, this legislation may be triggered.	Agreement between the Netherlands and Australia concerning old Dutch Shipwrecks 1972.	DCCEEW
South-east Marine Parks Network Management Plan 2025	This Management Plan strengthens protection across the south-east marine park network by updating zoning and regulating permitted activities, in response to the risks anticipated for the south-east region over the next decade. It aims to safeguard and enhance park values by addressing current pressures while preventing the emergence of new ones. **Relevance to this activity**: Triggered in the unlikely event of a hydrocarbon spill that enters Australian marine parks.	Not applicable.	DCCEEW

Table 2.3: Summary of key Victorian environmental legislation relevant to the activity

Legislation/Regulation	Scope	Relevance to activity	Administering Authority
Offshore Petroleum and Greenhouse Gas Storage Act 2010 (& Regulations 2021)	Addresses all licensing, health, safety and environmental issues for offshore petroleum and GHG activities in Victorian coastal waters (between the low water mark and the 3 nm limit). This Act and its Regulations (Chapter 2 – Environment) mirror those of the Commonwealth Act and Regulations of the same name in most aspects. Section 61 of the Act (Principles of sustainable development) states that the administration of the Act should take into account the principles of sustainable development. These principles include involving the community in issues that affect them.	The RGP traverses Victorian waters.	DECCA (RVRO)
Climate Action Act 2017	The Act is the Victorian legislation that provides the legal framework for managing climate change, setting net-zero emissions by 2045 as a goal, establishing emissions reduction targets, requiring regular climate strategies, and fostering a resilient economy and community by addressing risks and building adaptive capacity. It mandates periodic reporting, develops adaptation plans, and requires decision-makers to consider climate impacts.	Provides a legislative framework for achieving net-zero emissions by 2045 and is linked to the 2023 reforms for the Commonwealth Safeguard Mechanism, introducing a ceiling on actual, absolute emissions from facilities that reduce over time. This Act provides the state-based framework requiring offshore operations to consider the impact of its carbon emissions on Victorian targets.	DEECA
Marine (Drug, Alcohol and Pollution Control) Act 1988 (& Regulations 2012)	This Act provides for the prohibition of masters and other persons involved in vessel operations from being under the influence of prescribed drugs or alcohol, defines prohibited discharges (refer to POWBONS), and allocates roles, responsibilities and liabilities to ensure there is a capacity and obligation (i.e., Director – Transport Safety, public statutory body) to respond to marine incidents which have the potential, or do, result in pollution. The Victorian Marine Pollution Contingency Plan (EMV, 2016) is prepared under this Act.	Applies to vessel masters, owners, crew operating vessels in Victorian waters. Provides the Victorian Government response structure and contingency planning arrangements for marine pollution incidents in	Maritime Safety Victoria

Legislation/Regulation	Scope	Relevance to activity	Administering Authority
		Victorian waters that must be implemented for vessel incidents.	
Marine Safety Act 2010 (and Regulations 2023*)*	Act provides for safe marine operations in Victoria, including imposing safety duties on owners, managers and designers of vessels, marine infrastructure, and marine safety equipment; marine safety workers, masters and passengers on vessels; regulation and management of vessel use and navigation in Victorian State waters; and enforcement provisions of Police Officers and the Victorian Director of Transport Safety. This Act reflects the requirements of international conventions - Convention on the International Regulations for Preventing Collisions at Sea and International Convention for the Safety of Life at Sea. The Act also defines marine incidents and the reporting of such incidents to the Victorian Director of Transport Safety.	Applies to vessel masters, owners, crew operating vessels in Victorian State waters whilst undertaking emergency response activities. Vessel safe operations during the activity and/or spill response are managed as detailed in Section 7.	Safe Transport Victoria
Non-routine & emergency events			
Emergency Management Act 2013	Provides for the establishment of governance arrangements for emergency management in Victoria, including the Office of the Emergency Management Commissioner and an Inspector-General for Emergency Management. Provides for integrated and comprehensive prevention, response and recovery planning, involving preparedness, operational co-ordination and community participation, in relation to all hazards. These arrangements are outlined in the Emergency Management Manual Victoria.	Emergency response structure for managing emergency incidents within Victorian waters. Emergency management structure would be triggered in the event of a Level 2 or 3 MDO spill that extends into Victorian waters.	Department of Justice and Regulation (Inspector General for Emergency Management)
Flora and Fauna Guarantee Act 1988 (FFG Act) (& Regulations 2020)	The purpose of this Act is to protect rare and threatened species and enable and promote the conservation of Victoria's native flora and fauna and to provide for a choice of procedures that can be used for the conservation, management or control of flora and fauna and the management of potentially threatening processes. Where a species has been listed as threatened, an Action statement is prepared setting out the actions that have been or need to be taken to conserve and manage the species and community.	Triggered in the unlikely event of the injury or death of an FFG Act-listed species (e.g., collision with a whale) in Victorian waters.	Victoria Department of Energy, Environment and Climate Action (DEECA)

Legislation/Regulation	Scope	Relevance to activity	Administering Authority
Seafood Safety Act 2003 (& Regulations 2014)	The purpose of this Act is to provide a regulatory system under which all sectors in the seafood supply chain are required to manage food safety risks.	Triggered in the unlikely event that a hydrocarbon spill results in impacts to commercial fisheries or the prevention of sale of seafood caught in waters affected by a spill.	Victorian Fisheries Authority (VFA)
Environment Protection Act 1970 (& various regulations including Environmental Protection Regulations 2021)	This is the key Victorian legislation that controls discharges and emissions (air, water) to the environment within Victoria (including state and territorial waters). It gives the Environment Protection Authority (EPA) powers to control marine discharges and to undertake prosecutions. Provides for the maintenance and, where necessary, restoration of appropriate environmental quality. The State Environment Protection Policy (Waters of Victoria) designates: • Spill response responsibilities by Victorian Authorities to be undertaken in the event of spills (DECCA) with EPA enforcement consistent with the Environment Protection Act 1970 and the Pollution of Waters by Oil & Noxious Substances Act 1986. • Requires vessels not to discharge to surface waters sewage, oil, garbage, sediment, litter or other wastes which pose an environmental risk to surface water beneficial uses. Since 2017, the EPA no longer regulates domestic ballast water management in Victoria. This has been taken over by the Commonwealth government. This means vessels visiting a Victorian port no longer need to provide ballast water documentation to EPA Victoria, and that ballast water must be managed in accordance with the Commonwealth Biosecurity Act 2015 (see Table 2.2).	Triggered in the unlikely event of a hydrocarbon spill that occurs within or extends to Victorian waters. All support and maintenance vessels working on the RGP within State waters must abide by the ballast water management requirements (see note regarding Commonwealth jurisdiction of ballast water management).	EPA
Pollution of Waters by Oil and Noxious Substances Act 1986 (POWBONS Act) (& Regulations 2022)	The purpose of the POWBONS Act is to protect the sea and other waters from pollution by oil and noxious substances. This Act implements MARPOL Annex I in State waters. This Act restricts the discharge of treated oily bilge water according to vessel classification, discharge of cargo substances or mixtures, garbage disposal and packaged harmful substances, and sewage. The Act requires mandatory reporting of marine pollution incidents. See also Table 2.7 for further information.	Triggered in the unlikely event of a hydrocarbon spill that originates within or extends to Victorian waters that requires a vessel- based response.	Jointly administered by DEECA and EPA

Legislation/Regulation	Scope	Relevance to activity	Administering Authority
National Parks Act 1975	This Act established a number of different types of reserve areas onshore and offshore, including Marine National Parks and Marine Sanctuaries. A lease, licence or permit under the OPGGS Act 2010 that is either wholly or partly over land in a marine national park or marine sanctuary is subject to the National Parks Act 1975 and activities within these areas require Ministerial consent before activities are carried out. Several marine national parks occur within the amalgamated oil spill EMBA (see Section 5.5).	Triggered in the unlikely event of a hydrocarbon spill that enters Victorian marine parks.	DEECA
Wildlife Act 1975 (and Regulations 2013) and Wildlife (Marine Mammals) Regulations 2019	The purpose of this Act is to promote the protection and conservation of wildlife, prevents wildlife from becoming extinct and prohibit and regulate persons authorised to engage in activities relating to wildlife (including incidents). The regulations prescribe minimum distances to whales and seals/seal colonies, restrictions on feeding/touching and restriction of noise within a caution zone of a marine mammal (dolphins (150m), whales (300m) and seals (50m)).	Triggered if the unlikely event of injury or death of whales, dolphins or seals in Victorian waters (e.g., during response to a MDO spill).	DEECA
Heritage Act 2017	The purpose of the Act is to provide for the protection and conservation of historic places, objects, shipwrecks and archaeological sites in state areas and waters (complementary legislation to Commonwealth legislation). Part 5 of the Act is focused on historic shipwrecks, which are defined as the remains of all ships that have been situated in Victorian waters for 75 years or more. The Act addresses, among other things, the registration of wrecks, establishment of protected zones, and the prohibition of certain activities in relation to historic shipwrecks.	May be triggered in the event of impacts to a known or previously un-recorded shipwreck in Victorian waters (along the pipeline route).	Heritage Victoria (DTP)
Aboriginal Heritage Act 2006 and Aboriginal Heritage Regulations 2018	The Act acts primarily to provide for the protection of Aboriginal cultural heritage in Victoria. It does this through: • Establishing the Victorian Aboriginal Heritage Council. Council provides a state-wide voice for Aboriginal people and advises the Minister for Aboriginal Affairs on cultural heritage management. • Establishing Registered Aboriginal Parties. This allows Aboriginal groups with connections to country to be involved in cultural heritage decision	There is the potential for aboriginal heritage and Registered Aboriginal Parties within the Operational Area.	First Peoples State Relations

Legislation/Regulation	Scope	Relevance to activity	Administering Authority
	making. Establishing the Victorian Aboriginal Heritage Register. The register records details about Aboriginal places, objects, and knowledge. • Cultural Heritage Management Plans (CHMPs) and Cultural Heritage Permit processes, to manage activities that may impact Aboriginal cultural heritage. • Providing sanctions and penalties to prevent harm to Aboriginal cultural heritage. • Powers for Authorised Officers and Aboriginal Heritage Officers, and increased fees and charges for breaches of the Act. The Regulations) give effect to the Act. The Regulations prescribe standards, set out the circumstances in which a CHMP should be prepared and set fees and charges.		
Fisheries Act 1995 (and Regulations 2019)	Provides legislative framework for the regulation, management and conservation of Victorian fisheries including aquatic habitats.	Victorian commercial and recreational fishing occur within the Operational Area. Impacts and risks to commercial and recreational fishing are assessed in Section 0.	VFA.
Traditional Owner Settlement Act 2010	The purposes of this Act are to advance reconciliation and promote good relations between the State and traditional owners and to recognise traditional owner groups based on their traditional and cultural associations to certain land in Victoria.	There is the potential for aboriginal heritage and Registered Aboriginal Parties within the Operational and Planning Areas. Section 5.7 identifies aboriginal heritage sites and Registered Aboriginal Parties within the Operational and Planning Areas.	Department of Justice and Community Safety

2.2.3 Tasmanian Legislation

The *Petroleum (Submerged Lands) Act* 1982 (Tas) provides for the exploration for petroleum and other resources in areas adjacent to the coast of Tasmania and for the sustainable exploitation of these resources.

None of the BassGas Development occurs within Tasmanian state waters and as such, no environmental approvals for ongoing operations are required from the Tasmanian government. Tasmanian legislation is relevant to BassGas operations in the case of a large hydrocarbon release, as the EMBA intersects areas of Tasmanian waters (around some Bass Strait islands and the northwest coast, see Figure 5.1).

The key Tasmanian legislation relevant to marine pollution in Tasmanian state waters includes:

- *Marine-related Incidents (MARPOL Implementation) Act* 2020 – designed to protect State waters from pollution by oil and other substances and to give effect to certain parts of the MARPOL convention;
- *Environmental Management and Pollution Control Act* 1994 – provides for the management of the environment and the control of pollution;
- *Emergency Management Act* 2006 – provides for the protection of life, property and the environment in a declared State emergency by outlining prevention, preparedness, response and recovery procedures;
- *Tasmanian Ports Corporation Act* 2005 – sets out administrative arrangements for the Tasmanian Ports Corporation Pty Ltd; and
- *Marine and Safety Authority Act* 1997 – sets out powers to ensure the safe operation of vessels in Tasmanian state waters.

2.3 Government Guidelines

Although the activity takes place within Victorian state waters and Commonwealth waters, this EP has been developed in accordance with the NOPSEMA Guidance Note for *Environment Plan Content Requirements* (N04750-GN1344, A339814, January 2024) in the absence of equivalent Victorian guidelines. This document provides guidance to the petroleum industry on NOPSEMA's interpretation of the OPGGS(E) to assist Titleholders in preparing EPs and ensures that regardless of jurisdiction, the content of this EP is of the standard required at the Commonwealth level.

Other relevant government guidelines that have been incorporated or taken into consideration during the preparation of this EP include:

EP

- Environment Plan decision making (NOPSEMA Guideline N-04750-GL1721, A524696, January 2024).
- EPBC Act Policy Statement 1.1 – Significant Impact Guidelines – Matters of National Environmental Significance (DCCEEW, 2021).

- Application of oil spill modelling in Environment Plans (NOPSEMA Information Paper N-04750-IP2376, A1289237, December 2025).

OPEP

- Oil pollution risk management (NOPSEMA Guidance Note N-0470-GN1488, A382148, March 2026).

OSMP

- Operational and scientific monitoring programs (NOPSEMA Information Paper, N-04750-IP1349, A343826, January 2024).

2.4 Government Management Plans

The control measures and environmental performance standards (EPS) provided throughout Chapter 7 of this EP have taken into account various government management plans, generally under the categories of:

- AMP management plans;
- State coastal park management plans; and
- Recovery Plans, Conservation Plans and Conservation Advice for species threatened at the Commonwealth and/or state levels.

Table 2.4 lists the objectives of the AMP and state marine reserve management plans relevant to BassGas operations.

Table 2.4: AMP and state marine reserves objectives of relevance to BassGas operations

Park Management Plan	Management Objectives	Relevance to Operations
South-east Marine Parks Network Management Plan 2023-2033	Addresses knowledge and protection of conservation values, approval decision-making, facilitating education, supporting indigenous people, promoting community understanding of the reserve and evaluating the effectiveness of the management plan.	Management objectives for each reserve may only be at risk in the event of a large hydrocarbon release.
Bunurong Marine National Park (MNP)/Marine Park (MP)/Coastal Reserve (CR) and Kilcunda-Harmers Haven Coastal Reserve	Addresses landscape, seascape, geological features, water quality, hydrodynamics, marine habitats and communities, indigenous cultural heritage, public education and recreational park usage (e.g., boating, fishing, camping).	
Marengo Reefs Marine Sanctuary Management Plan	Addresses geomorphology, water quality, hydrodynamics, habitat and communities, seascape, marine pests, indigenous and maritime cultural heritage, education and interpretation and recreational park usage (e.g., snorkelling, swimming, shore-based activities).	
Mushroom Reef Marine Sanctuary Management Plan	Addresses geological, catchment, water quality, hydrodynamics, habitat, communities, seascape, marine pests, indigenous cultural heritage, maritime history and recreational park usage (e.g., snorkelling, diving, dog walking).	

Park Management Plan	Management Objectives	Relevance to Operations
Yaringa, French Island and Churchill Island MNP Management Plan	Addresses geological, catchment, water quality, hydrodynamics, habitat, communities, seascape, landscape, marine pests, indigenous cultural heritage, maritime history, education and recreational park usage (e.g., boating, swimming, tourism).	
Wilsons Promontory MNP, MP and Marine Reserve	Addresses landscape, seascape, geological features, water quality, hydrodynamics, marine habitats and communities, indigenous cultural heritage, public education and recreational park usage (e.g., boating, fishing, camping).	
Cape Howe MNP	Addresses geological features, water quality, hydrodynamics, habitats, seascape, marine pests, indigenous and maritime cultural heritage, education, information, access, recreational activities and tourism services.	
Point Hicks MNP Management Plan	Addresses geological, catchment, hydrodynamics, habitat and communities, seascape, marine pests, indigenous and maritime cultural heritage, education and interpretation and recreational park usage (e.g., snorkelling, swimming, intertidal activities).	

Commonwealth-listed threatened species Conservation Advice and Recovery Plans applicable to BassGas operations are listed in Table 2.5 and these species are described in Chapter 5.

Table 2.5: Objectives of Commonwealth-listed threatened species management plans of relevance to BassGas operations

Recovery Plan/Advice	Management Objectives	Relevance to the Activity
Seabirds		
National Recovery Plan for Albatrosses and Petrels 2022	Details research, monitoring and education strategies for albatross species and giant petrels.	Marine pollution: Evaluate risk of oil spill impact to feeding grounds and, if required, implement appropriate mitigation measures (nesting sites not impacted). Marine debris: Evaluate risk of oil spill (including risk of entanglement and/or ingestion) and, if required, implement appropriate mitigation measures.
National Recovery Plan for Gould's Petrel (*Pterodroma leucoptera leucoptera*)	The conservation of Gould's petrel.	Marine pollution: Oil spills in the vicinity of the island are not considered a threat because the Gould's Petrel does not feed in coastal waters however, oceanic oil spills may pose some risk.
Approved Conservation Advice for the Blue Petrel (*Halobaena caerulea*)	The conservation of the blue petrel.	None identified.
Approved Conservation Advice for *Pterodroma mollis* (Soft-plumaged Petrel)	Monitoring and threat abatement strategies to ensure the conservation of the soft-plumaged petrel.	None identified.
Approved Conservation Advice for *Pachyptila tutur*	Surveying, monitoring and threat abatement strategies to ensure	None identified.

Recovery Plan/Advice	Management Objectives	Relevance to the Activity
subantarctica (Fairy Prion (southern))	conservation of the fairy prion (southern).	
Shorebirds		
Approved Conservation Advice for *Sternula nereis nereis* (Fairy tern)	The conservation of the fairy tern.	Marine pollution: Evaluate risk of oil spill impact to nest locations and, if required, implement appropriate mitigation measures.
Approved Conservation Advice for *Calidris canutus* (Red knot)	The conservation of the red knot.	Marine pollution: Evaluate risk of oil spill impact to nest locations and, if required, implement appropriate mitigation measures.
Approved Conservation Advice for *Botaurus poiciloptilus* (Australasian Bittern) and the National Recovery Plan for the Australasian Bittern (*Botaurus poiciloptilus*)	The conservation requirements and identify the actions to be taken to ensure the Australasian bittern's long-term viability in nature.	Marine pollution: Evaluate risk of oil spill impact to nest locations and, if required, implement appropriate mitigation measures.
National Recovery Plan for the Orange- bellied Parrot (*Neophema chrysogaster*)	Achieve stable wild and captive populations and protect and enhance remaining habitat.	Illuminated boats and structures: Evaluate risk of lighting on vessels and offshore structures.
National Recovery Plan for the Swift Parrot *(Lathamus discolor*)	The conservation requirements and identify the actions to be taken to ensure the swift parrot's long-term viability in nature	None identified.
Wildlife Conservation Plan for Migratory Shorebirds – 2015	Sustain populations of migratory shorebirds across their range and diversity in Australia and throughout the East Asian-Australasian Flyway.	None identified.
Approved Conservation Advice for *Calidris tenuirostris* (Great knot)	The conservation of the fairy tern.	None identified.
Approved Conservation Advice for *Charadrius leschenaultii* (Great sand plover)	The conservation of the greater sand plover.	Illuminated boats and structures: Evaluate risk of lighting on vessels and offshore structures.
Approved Conservation Advice for *Charadrius mongolus* (Lesser sand plover)	Mitigate against key threats and aims to ensure the conservation of the lesser sand plover.	Marine pollution: Evaluate risk of oil spill impact to nest locations and, if required, implement appropriate mitigation measures.
Approved Conservation Advice for *Numenius madagascariensis* (Eastern Curlew)	Achieve a stable population, maintain important habitat, reduce disturbance and raise awareness for the eastern curlew, ensuring its conservation.	None identified.
Approved Conservation Advice for *Rostratula australis* (Australian painted snipe)	Minimise the impact of anthropogenic threats to conserve the Australian painted snipe.	Marine pollution: Evaluate risk of oil spill impact to nest locations and, if required, implement appropriate mitigation measures.

Recovery Plan/Advice	Management Objectives	Relevance to the Activity
Conservation Advice for *Thinornis rubricollis rubricollis* (hooded plover (eastern))	Identify and mitigate against threats in order to conserve the hooded plover.	None identified.
Cetaceans		
Conservation Management Plan for the Blue Whale, 2015-2025	Minimise anthropogenic threats to allow for their conservation status to improve so they can be removed from the EPBC Act threatened species list.	Noise interference: Evaluate the risk of noise impacts to cetaceans and, if required, implement appropriate mitigation measures. Vessel disturbance: Evaluate risk of vessel strikes and, if required, implement appropriate mitigation Habitat degradation, pollution and noise interference: Evaluate the risk of habitat degradation (both structure and noise pollution) and oil spill impacts
Approved Conservation Advice for *Balaenoptera borealis* (Sei Whale)	Provides threat abatement activities that can be undertaken to ensure the conservation of the sei whale.	
Listing Advice for *Megaptera novaeangliae* (Humpback Whale)	Provides threat abatement activities that can be undertaken to ensure the conservation of the humpback whale.	
National Recovery Plan for the Southern Right Whale	Provides threat abatement activities that can be undertaken to ensure the conservation of the southern right whale.	
Approved Conservation Advice for *Balaenoptera physalus* (Fin Whale)	Conservation advice provides threat abatement activities that can be undertaken to ensure the conservation of the southern right whale.	
Marine Reptiles		
Recovery Plan for Marine Turtles in Australia, 2017-2027	Minimise anthropogenic threats to allow for the conservation status of marine turtles to improve so they can be removed from the EPBC Act threatened species list.	Marine pollution Light pollution Vessel disturbance Noise interference Vessel strike
Fish		
Recovery Plan for the White Shark (*Carcharodon carcharias*)	Mitigate key threats to the white shark and to assist the recovery of the white shark throughout its range in Australian waters.	None identified.
National Recovery Plan for the Australian Grayling (*Prototroctes maraena*)	Restore habitat, identify key populations, mitigate anthropogenic threat and increase public awareness to conserve the Australian grayling.	None identified.
National Recovery Plan for the Dwarf Galaxias (*Galaxiella pusilla*) and the Conservation Advice for *Galaxiella pusilla* (dwarf galaxias)	Minimise the probability of extinction and ensure long-term survival of the species in the wild and to increase the probability of important populations becoming self-sustaining in the long term.	None identified.

Recovery Plan/Advice	Management Objectives	Relevance to the Activity
Approved Conservation Advice for *Epinephelus daemelii* (black cod)	Identify and mitigate key threats to the black cod and undertake priority research actions.	None identified.
Recovery Plan for the Grey Nurse Shark (*Carcharias Taurus*)	Improve the population status of the grey nurse shark to remove from threatened species list and ensure anthropogenic activities do not hinder the species recovery in the near future.	Pollution and disease as a result of habitat modification.
Algae		
Conservation Advice for the *Nereia lophocladia* (*Marine Brown Algae)*	Provides research priorities and actions that can be undertaken to ensure the conservation of marine brown algae	None identified.
Threatened Ecological Communities		
Approved Conservation Advice for Giant Kelp Marine Forests of South East Australia	Provides research priorities and actions that can be undertaken to ensure the conservation of the giant kelp marine forest communities.	None identified.
Approved Conservation Advice for the assemblages of species associated with open-coast salt-wedge estuaries of western and central Victoria ecological community	Provides research priorities and actions that can be undertaken to ensure the conservation of open-coast salt-wedge estuaries.	None identified.
Conservation Advice for Subtropical and Temperate Coastal Saltmarsh	Provides research priorities and actions that can be undertaken to ensure the conservation of subtropical and temperate coastal saltmarsh.	None identified.

The Victorian Action Statements for threatened species relevant to this activity are provided in Table 2.6 details. Additional species information is addressed in Chapter 5.

Table 2.6: Objectives of Victorian-listed threatened species action statements of relevance to BassGas operations

Action Statement	Management Objectives	Relevance to the Activity
Seabirds		
Buller's albatross (*Thalassarche bulleri*)*	Supports national approaches to minimising impacts on the listed seabird species and to implement Victorian management arrangement consistent with the national approach.	Marine Pollution: Evaluate risk of oil spill impact to nest locations and, if required, implement appropriate mitigation measures.
Southern Royal Albatross (*Diomedea epomophora*)*		
Sooty Albatross (*Phoebetria fusca*)*		
Wandering Albatross (*Diomedea exulans*)		

Action Statement	Management Objectives	Relevance to the Activity
Grey-headed Albatross (*Thalassarche chrysostoma*)		
Northern giant petrel (*Macronectes halli*)*		
Southern giant petrel (*Macronectes giganteus*)*		
White-bellied Sea-eagle (*Haliaeetus leucogaster*)	Identify all breeding populations within Victoria, protect nesting habitat and ultimately increase the population size and genetic viability of the White- bellied Sea-eagle.	Marine Pollution: Evaluate risk of oil spill impact to nest locations and, if required, implement appropriate mitigation measures.
Shorebirds		
Great Egret (*Ardea alba*)	Restore breeding sites, support the restoration of degraded wetlands and monitor egret populations.	None identified.
Hooded Plover (*Charadrius rubricollis*)*	Protect existing Victorian populations by maintaining habitat and ensuring that the hooded plover can breed successfully.	Marine Pollution: Evaluate risk of oil spill impact to shoreline breeding locations and, if required, implement appropriate mitigation measures.
Orange-bellied Parrot (*Neophema chrysogaster*)*	Supports national approaches to minimising anthropogenic impacts and to achieve a stable, viable wild population of birds.	Illuminated boats and structures: Evaluate risk of lighting on vessels and offshore structures.
Swift Parrot (*Lathamus discolour*)*	Maximise protection and retention of wintering habitat throughout Victoria to ensure that habitat availability will cater for a significant population of birds.	None identified.
Cetaceans		
Blue Whale (*Balaenoptera musculus*)*	Ensure that the species can survive, flourish and retain its potential for evolutionary development in the wild by minimising human impacts and supporting national and international approaches to recovery.	Noise interference: Evaluate the risk of noise impacts to cetaceans and, if required, implement appropriate mitigation measures. Vessel disturbance: Evaluate risk of vessel strikes and, if required, implement appropriate mitigation measures. Marine pollution: Evaluate risk of oil spill impact to nest locations and, if required, implement appropriate mitigation measures.
Humpback Whale (*Megaptera novaeangliae*)*		
Southern Right Whale (*Eubalaena australis*)		
Marine Reptiles		
Leatherback turtle (*Dermochelys coriacea*)*	Ensure that the species can survive, flourish and retain its potential for evolutionary development in the wild by minimising human impacts and supporting national and	Vessel disturbance/strike: Evaluate risk of vessel strikes and, if required, implement appropriate mitigation measures.

Action Statement	Management Objectives	Relevance to the Activity
	international approaches to recovery.	Marine pollution: Evaluate risk of oil spill impact to nest locations and, if required, implement appropriate mitigation measures. Illuminated boats and structures: Evaluate risk of lighting on vessels and offshore structures.
Fish		
Australian Grayling (*Prototroctes maraena*)*	Ensure the species can survive, flourish and retain its potential for evolutionary	None identified.
Dwarf Galaxias (*Galaxiella pusilla*)*	development in the wild. This is achieved through maintaining the extent of existing habitat and increasing community awareness and support.	
White Shark (*Carcharodon carcharias*)*	Implements appropriate Victorian arrangements to support the national approach for minimising impacts on great white sharks.	

* Species also have an EPBC Recovery Plan or Commonwealth Approved Conservation Advice.

2.5 International Industry Codes of Practice and Guidelines

A number of international codes of practice and guidelines are relevant to environmental management of the activity. Those of most relevance are described in this section. The Commonwealth legislation described in Table 2.2 lists the conventions and agreements that are enacted by, or whose principles are embodied in, that legislation.

While none of the codes of practice or guidelines described in this section have legislative force in Australia (with the exception of MARPOL), they are considered to represent best practice environmental management (BPEM). Aspects of each code or guideline relevant to the impacts and risks presented by the activity are outlined throughout Chapter 0.

2.5.1 MARPOL

The key international convention relating to marine environmental matters is the International Convention for the Prevention of Pollution from Ships (MARPOL). This convention was adopted in November 1973 by the International Maritime Organisation (IMO), with ongoing additions and amendments. MARPOL aims to prevent and minimise pollution (routine discharges and accidents) from ships. It contains six annexes and as of 2026, is in force in 150 countries, representing greater than 98% of global merchant shipping tonnage. It is relevant to the vessels attending to the Yolla-A platform. It is also relevant to the Yolla-A platform itself, as several annexes expressly extend application to offshore platforms.

In Australian Commonwealth waters, MARPOL is given effect through the *Protection of the Sea (Prevention of Pollution from Ships) Act* 1983 (via Marine Orders made under the *Navigation Act* 2012) and is administered by AMSA. In Victorian waters, MARPOL is given effect mainly through the

POWBONS Act 1986 (Vic) and is administered by the Victorian EPA. Table 2.7 lists the annexes of the Convention and identifies how they are given effect under Commonwealth legislation (with Victorian legislation also included in the event of ingress into State waters being required in an emergency situation).

MARPOL is given effect in Tasmania by the POWBONS Act 1987 (Tas) and in NSW by the *Marine Pollution Act 1987* (NSW).

2.5.2 Environmental Management in the Upstream Oil and Gas Industry (2020)

These guidelines were released in August 2020 by the International Association of Oil & Gas Producers (IOGP) and the International Petroleum Industry Environmental Conservation Association (IPIECA). They supersede the United Nations Environment Programme Industry and Environment (UNEP IE) Environmental Management in Oil and Gas Exploration and Production guidelines released in 1997 prepared by the International Exploration and Production Forum (E&P Forum), the precursor to the IOGP.

These guidelines provide descriptions of upstream oil and gas activities environmental management practices. Chapter 4 of the guidelines lists the environmental impacts and mitigation measures associated with offshore activities, and provide a useful benchmark for BPEM for this activity.

2.5.3 Best Available Techniques Guidance Document on Upstream Hydrocarbon Exploration and Production (2019)

The Best Available Techniques Guidance Document on Upstream Hydrocarbon Exploration and Production (European Commission, 2019) aims to identify best available techniques (BAT) and best risk management approaches for key environmental issues associated with onshore and offshore oil and gas exploration and production activities. The BATs included are not prescriptive nor exhaustive but included as a point of comparison with documents such as this EP to ensure the desired environmental outcomes commensurate with BAT can be achieved for the European context.

2.5.4 World Bank Group EHS Guidelines (2015)

The Environmental, Health and Safety Guidelines for Offshore Oil and Gas Development (World Bank Group, 2015) is a technical reference document with general and industry-specific examples of good international industry practice. These guidelines are applied when one or more members of the World Bank Group are involved in a project.

The document contains measures considered to be achievable in new facilities, using existing technology, at reasonable costs. The guidelines are designed to be tailored to the applicable hazards and risks established for a given project.

While the World Bank Group is not involved in financing or assessing this activity, control measures adopted for this activity that adhere to these guidelines can be referenced as examples of BPEM.

2.5.5 IOGP: Best Practice Guidelines

The International Association of Oil & Gas Producers (IOGP) has a membership including companies that produce more than one-third of the world's oil and gas. The IOGP provides a forum where members identify and share knowledge and good practices to achieve improvements in health, safety, environment, security and social responsibility. The IOGP's aim is to work on behalf of oil and gas

exploration and production companies to promote safe, responsible and sustainable operations. The IOGP's work is embodied in publications that are made freely available on its website (www.iogp.org).

The IOGP's members comprise oil and gas exploration and production companies, associations and contractors.

2.5.6 IPIECA Best Practice Guidelines

IPIECA is the International Petroleum Industry Environmental Conservation Association, established in 1974 (since 2002, IPIECA stopped using the full title). IPIECA's members comprise oil and gas exploration and production companies, associations and contractors.

IPIECA's vision is for an oil and gas industry whose operations and products meet society's environmental and social performance expectations, with a focus on the key areas of climate and energy, environment, social and reporting. It develops, shares and promotes good practices and knowledge to help the industry improve its environmental and social performance. IPIECA's work is embodied in publications that are made freely available on its website (www.ipieca.org).

Although Beach is not an IPIECA member, relevant guidelines have been referenced in this EP (and associated OPEP) as relevant, primarily in the areas of atmospheric emissions and oil spill response and preparedness.

Beach has applied IPIECA's Mapping the Oil and Gas Industry to the Sustainable Development Goals: An Atlas (July 2017) to its BassGas operations. Goal 14 (Conserve and sustainably use the oceans, seas and marine resources for sustainable development) is the most relevant to the offshore operations of the development, and has been met by fulfilling the following:

- Incorporating environmental assessments into management plans – this EP satisfies this sub-goal; and

- Accident prevention, preparedness and response – the OPEP and OSMP demonstrate that Beach takes prevention, preparedness and response seriously and is well prepared to act in the event of an environmental emergency.

2.5.7 ITOPF Oil Spill Response Technical Information Papers

The International Tanker Owners Pollution Federation Limited (ITOPF) was established in 1968 to promote effective response to marine spills of oil, chemicals and other hazardous substances by providing five core services (spill response, claims analysis and damage assessment, information services, contingency planning and advice and training and education). Membership of ITOPF comprises owners or demise charterers of tankers, defined as any ship (whether or not self-propelled) designed, constructed or adapted for the carriage by water in bulk of crude petroleum, hydrocarbon products or other liquid substances. While this definition excludes MODU and MODU operators becoming members of ITOPF, owners of support vessels servicing MODUs may become members.

More broadly, ITOPF's series of Technical Information Papers relate to marine pollution, including the effects of oil pollution, contingency planning for marine oil spills and responding to oil spills assist the upstream petroleum industry in preparing for and responding to oil spills.

In this EP (and associated OPEP), these ITOPF guidelines have been referenced to support the oil spill response strategies

Table 2.7: Commonwealth and Victorian legislation enacting the MARPOL Convention

MARPOL Annex (entry into force in Australia)	Commonwealth waters (Protection of the Sea (Prevention of Pollution from Ships) Act 1983 & Navigation Act 2012)	Victorian waters (POWBONS 1986)	General requirements for operating in Commonwealth and Victorian state waters
I Regulations for the Prevention of Pollution by Oil (1988)	AMSA Marine Orders Part 91; Marine pollution prevention – oil.	Part 3, Division 2 – Prevention of pollution from ships Convention (ships carrying or using oil).	Addresses measures for preventing pollution by oil from regulated Australian vessels or foreign vessels, and specifies that: • An International Oil Pollution Prevention (IOPP) certificate is required. • A Shipboard Marine Pollution Emergency Plan (SMPEP) is required. • An oil record book must be carried. • Oil discharge monitoring equipment must be in place. • Incidents involving oil discharges are reported to AMSA.
II Regulations for the Control of Pollution by Noxious Liquid Substances in Bulk (1988)	AMSA Marine Orders Part 93; Marine pollution prevention – noxious liquid substances.	Part 3, Division 3 – Prevention of pollution from ships Convention (ships carrying noxious liquid substances in bulk).	Addresses measures for preventing pollution by 250 noxious liquid substances carried in bulk from regulated Australian vessels or foreign vessels, and specifies that: • An International Pollution Prevention (IPP) certificate is required. • A SMPEP is required. • A cargo record book must be carried. • Incidents involving noxious liquid substance discharges are reported to AMSA. • The discharge of residues is allowed only to reception facilities until certain concentrations and conditions (which vary with the category of substances) are complied with. • No discharge of residues containing noxious substances is permitted within 12 nm of the nearest land.

MARPOL Annex (entry into force in Australia)	Commonwealth waters (Protection of the Sea (Prevention of Pollution from Ships) Act 1983 & Navigation Act 2012)	Victorian waters (POWBONS 1986)	General requirements for operating in Commonwealth and Victorian state waters
III Prevention of Pollution by harmful Substances Carried by Sea in Packaged Form (1995)	AMSA Marine Orders Part 94; Marine pollution prevention – packaged harmful substances.	Part 3, Division 4 – Ships carrying harmful substances.	Addresses measures for preventing pollution by packaged harmful substances (as defined in the International Marine Dangerous Goods (IMDG) code, which are dangerous goods with properties adverse to the marine environment, in that they are hazardous to marine life, impair the taste of seafood and/or accumulate pollutants in aquatic organisms) from regulated Australian vessels or foreign vessels, and specifies that: • The packing, marking, labelling and stowage of packaged harmful substances complies with Regulations 2 to 5 of MARPOL Annex III. • A copy of the vessel manifest or stowage plan is provided to the port of loading prior to departure. • Substances are only washed overboard if the Vessel Master has considered the physical, chemical and biological properties of the substance. • Incidents involving discharges of dangerous goods are reported to AMSA.
IV Prevention of Pollution by Sewage from Ships (2004)	AMSA Marine Orders Part 96; marine pollution prevention – sewage.	Part 3, Division 5 – Sewage pollution prevention certificates.	Addresses measures for preventing pollution by sewage from regulated Australian vessels or foreign vessels, and specifies that: • An International Sewage Pollution Prevention (ISPP) is required. • The vessel is equipped with a sewage treatment plant (STP), sewage comminuting and disinfecting system and a holding tank approved by AMSA or a recognised organisation. • The discharge of sewage into the sea is prohibited, except when an approved STP is operating or when discharging comminuted and disinfected sewage using an approved system at a distance of more than 3 nm from the nearest land. • Sewage that is not comminuted or disinfected has to be discharged at a distance of more than 12 nm from the nearest land.

MARPOL Annex (entry into force in Australia)	Commonwealth waters (Protection of the Sea (Prevention of Pollution from Ships) Act 1983 & Navigation Act 2012)	Victorian waters (POWBONS 1986)	General requirements for operating in Commonwealth and Victorian state waters
V Prevention of Pollution by Garbage from Ships (1990)	AMSA Marine Orders Part 95; marine pollution prevention – garbage. * Not made under the *Navigation Act 2012*.	Part 2, Division 2A – Prevention of pollution by garbage.	Addresses measures for preventing pollution by garbage from regulated Australian vessels or foreign vessels, and specifies that: • Prescribed substances (as defined in the IMO 2012 Guidelines for the Implementation of MARPOL Annex V) must not be discharged to the sea. • A Garbage Management Plan must be in place. • A Garbage Record Book must be maintained. • Food waste must be comminuted or ground to particle size <25 mm while enroute and no closer than 3 nm from the nearest land (or no closer than 12 nm if waste is not comminuted or ground); and it is prohibited to discharge wastes including plastics, cooking oil, packing materials, glass and metal.
VI Prevention of Air Pollution from Ships (2007)	AMSA Marine Orders Part 97; marine pollution prevention – air.	Indirectly through the State Guideline for assessing and minimising air pollution in Victoria (February 2025) under the *Environment Protection Act 2017*.	Addresses measures for preventing air pollution from regulated Australian vessels or foreign vessels, and specifies that: • An International Air Pollution Prevention (IAPP) certificate is in place. • An Engine International Air Pollution Prevention (EIAPP) certificate is in place for each marine diesel engine installed. • An International Energy Efficiency (IEE) certificate is in place. • Specifies that incineration of waste is permitted only through a MARPOL-compliant incinerator, with no incineration of Annex I, II and III cargo residues, polychlorinated biphenyls (PCBs), garbage containing traces of heavy metals, refined petroleum products and polyvinyl chlorides (PVCs). • Marine incidents are reported to AMSA. • Sulphur content of fuel oil is no greater than 3.5% m/m. • A bunker delivery note must be provided to the vessel on completion of bunkering operations, with a fuel oil sample retained. • Emissions of ODS must not take place and an ODS logbook must be maintained.

2.5.8 The Paris Agreement

Australia is party to the Paris Agreement[1], a pact which aims to strengthen the global response to the threat of climate change.

Australia's commitment to the Paris Agreement is legislated in the *Climate Change Act 2022* (Cth). The objects of this act include:

"(a) to set out Australia's greenhouse gas emissions reduction targets which contribute to the global goals of:

(i) holding the increase in the global average temperature to well below 2°C above pre-industrial levels; and

(ii) pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels".

Under the Paris Agreement, Australia and all other parties must submit emissions reduction commitments to the United Nations Framework Convention on Climate Change every five years. These international commitments are known as the Nationally Determined Contribution (NDC). NDCs are nationally determined and non-binding as to outcomes, but the procedural obligations to submit, update, and report on NDCs are legally binding under the Paris Agreement.

Australia's commitments to reduce net GHG emissions to 43% below 2005 levels by 2030 and reach net zero by 2050, are described in the *Climate Change Act 2022* (Cth).

In September 2025, Australia announced its NDC for 2035; to reduce net emissions by 62-70% below 2005 levels by 2035. At the time of writing, this has not been reflected in the *Climate Change Act 2022* (Cth).

The Safeguard Mechanism, described in the *NGER (Safeguard Mechanism) Rule 2015*, requires Australia's highest GHG emitting facilities to reduce their emissions in line with Australia's emission reduction targets of 43% below 2005 levels by 2030 and net zero by 2050. Responsible emitters of facilities that exceed their baselines must manage any excess emissions, and those that do not exceed their baselines may be eligible to receive Safeguard Mechanism credit units (SMCs). The Safeguard Mechanism is designed to deliver emissions reductions consistent with Australia's NDC under the Paris Agreement (DCCEEW, 2023)[2].

The Federal government will review Safeguard Mechanism policy settings in 2026–27, to ensure they are appropriately calibrated. This review provides an opportunity for adjustments to the mechanism to ensure that Australia is on track to meet the emissions reduction commitments.

Australia's international climate commitments are implemented through domestic legislation and policies. Greenhouse gas emissions from the activity are managed and reported in accordance with applicable Australian laws. This is discussed further in Section 7.4.

[1] United Nations Framework Convention on Climate Change. (2015). *Paris Agreement*. https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement

[2] Safeguard Mechanism Reforms – Position Paper – January 2023, Australian Government Department of Climate Change, Energy, the Environment and Water

2.6 Australian Industry Codes of Practice and Guidelines

There are few Australian industry codes of practice or guidelines regarding environmental management for offshore petroleum operations. Those that do apply to this activity are briefly discussed in this section.

None of these codes of practice or guidelines have legislative force in Australia, but are considered to represent BPEM. Aspects of each code or guideline relevant to the impacts and risks presented by the activity are described in the 'demonstration of acceptability' throughout Chapter 0.

2.6.1 National Strategy for Ecologically Sustainable Development (1992)

The National Strategy for Ecologically Sustainable Development (ESDSC, 1992) defines the goal of Ecologically Sustainable Development (ESD) as "development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends." Section 3A of the EPBC Act defines the principles of ESD as:

- Decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations;
- 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;
- 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;
- The conservation of biological diversity and ecological integrity should be a fundamental consideration in decision-making; and
- Improved valuation, pricing and incentive mechanisms should be promoted.

The ESD concept has been taken into consideration in the development of the environmental performance standards outlined in this EP.

2.6.2 APPEA Code of Environmental Practice (2008)

In Australia, the petroleum exploration and production industry operates within an industry code of practice developed by the Australian Petroleum Production and Exploration Association (APPEA) (now Australian Energy Producers, AEP); the APPEA Code of Environmental Practice (CoEP) (2008). This code provides guidelines for activities that are not formally regulated and have evolved from the collective knowledge and experience of the oil and gas industry, both nationally and internationally.

The CoEP covers general environmental objectives for the industry, including planning and design, assessment of environmental risks, emergency response planning, training and inductions, auditing and consultation, and communication. For the offshore sector specifically, it covers issues relating to geophysical surveys, drilling and development and production.

The CoEP has been used as a reference for the impact and risk assessment (Section 0 of this EP) to ensure that all necessary environmental issues and controls for petroleum production have been incorporated into the management of this activity.

2.6.3 Australian Ballast Water Management Requirements (2020)

The Australian Ballast Water Management Requirements (DAFF, 2020, v8) detail the mandatory ballast water management requirements and provide information on ballast water pump tests, reporting and exchange calculations. The measures outlined in this EP are designed to minimise the risk of introducing harmful aquatic organisms into Australian waters. This guideline is relevant to the supply, support and maintenance vessels attending to Yolla-A and the pipeline.

2.6.4 National Biofouling Management Guidance for the Petroleum Production and Exploration Industry (2009)

The National Biofouling Management Guidance for the Petroleum Production and Exploration Industry (DAFF, 2009) provides a generic approach to a biofouling risk assessment and practical information on managing biofouling on hulls and niche areas.

The measures outlined in this EP are designed to minimise the risk of introducing harmful aquatic organisms into Commonwealth or Victorian waters from the support and maintenance vessels attending to the Yolla-A platform and pipeline.

2.6.5 Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2018)

The Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG, 2018) are based on the philosophy of ESD and provide water and sediment quality guidelines designed to protect and manage the environmental values supported by fresh and marine water resources.

The guidelines are designed to help users assess whether the water quality of a water resource is good enough to allow it to be used for environmental values (humans, food production or aquatic ecosystems). If the water quality does not meet the water quality guidelines, the waters may not be safe for those environmental values and management action could be triggered to either more accurately determine whether the water is safe for that use or to remedy the problem.

In marine environments, the guidelines are generally applied to permanent point source discharges such as those from platform discharges (rather than to temporary vessel-based activities). For the BassGas operations, these guidelines are most relevant to produced formation water (PFW) discharges (see Section 7.6).

2.6.6 Future Gas Strategy

The Future Gas Strategy maps the Australian Government's plan for how gas will support the economy's transition to net zero. It considers the trade-offs present in the energy market, which is the so-called 'energy trilemma'. This refers to the challenge of simultaneously: having affordable energy; building a reliable energy system; and reducing emissions to achieve net zero targets.

The strategy's objectives are to:

- Support decarbonisation of the Australian economy;
- Safeguard energy security and affordability;
- Entrench Australia's reputation as an attractive trade and investment destination; and
- Help our trade partners on their own paths to net zero.

The strategy is Australia's plan for gas production and consumption in Australia and explains the principles the Australian Government will use to guide policymaking about gas to support the transition to net zero.

Beach is aligned with the Future Gas Strategy, striving to deliver new gas into the market while maintaining its commitment to support emissions reductions. This supports the security and availability of affordable energy for Australia. Section 7.4 describes how Beach will work to reduce emissions, including minimisation of routine venting and flaring.

2.6.7 Australian Energy Markert Operator (AEMO) Guidance

The Integrated System Plan (ISP), published by AEMO, is a roadmap for the transition of the National Electricity Market (NEM) power system over at least the next 20 years.

A key requirement of each ISP is the Optimal Development Path (ODP) which outlines the mix of generation, storage and network investments required to meet both consumer needs and government energy and emissions targets. It assesses the options available and identifies the lowest-cost, resilient, pragmatic path to the NEM's energy future of net zero by 2050. It is then used by governments and industry to progress investment in energy infrastructure and to inform policy.

In the most recent ISP (2024), AEMO described the ODP as "Renewable energy connected by transmission and distribution, firmed with storage and backed up by gas-fired generation is the lowest-cost way to supply electricity to homes and businesses as Australia transitions to a net zero economy."

Natural gas continues to play a critical role in Australia's evolving energy mix. As recognised by AEMO, gas remains essential in supporting electricity system reliability, particularly as coal-fired generation retires and variable renewable generation grows. With renewables delivering nearly 40% of electricity in the NEM[3], firm and dispatchable sources such as gas remain vital to grid stability and energy security.

AEMO also publish annual Gas Statements of Opportunities for the East and West Coast Gas markets. AEMO forecasts risks of peak day shortfalls from 2028 in the East Coast gas market, with structural supply gaps emerging from 2029[4]. Widening supply gaps in the West Coast gas market are expected to emerge from 2030[5].

While there is some inherent uncertainty in gas consumption forecasts in the various energy transition pathways, all scenarios identify the need for new supply investments to maintain supply adequacy. Beach is actively progressing new supply projects to help close forecast gaps and support energy security, while maintaining alignment with strategic priorities.

[3] 2024 Integrated System Plan (ISP) published by the Australian Energy Market Operator, 2024
[4] 2025 Gas Statement of Opportunities (GSOO), published by the Australian Energy Market Operator, 2025
[5] 2025 Western Australia Gas Statement of Opportunities (WA GSOO), published by the Australian Energy Market Operator, 2025

3 Activity Description

This chapter provides a description of BassGas operations in accordance with Regulation 21(1) of the OPGGS(E) (2023) (Commonwealth) Regulations and Regulation 15(1) of the OPGGS (2021) Regulations (Victoria).

In this EP, the following terms are used to describe the BassGas operations depending on the context:

- Assets – refers to physical equipment (e.g., platform, pipeline, wells or related components);
- Development – the development is a collective of physical assets that allow hydrocarbons to flow from the wells to be processed on the platform and to flow through the raw gas pipeline; and
- Operations – the activities involved in operating (and maintaining) the development.

The definition of the petroleum activity is provided in Section 1.3.1.

Additionally, the term 'operational area' (Figure 1.1) is used to describe the area that is or may be subject to operations, and is spatially defined as:

- A 500-m radius around the Yolla platform, because activities occurring within a 500-m radius of Yolla-A come under the control of the Person-in-Charge (PIC) on the platform.
- For inspection, maintenance and repair (IMR) activities, a 500 m radius applies to the offshore RGP.

3.1 Facilities Outline

The offshore portion of the BassGas development consists of the following:

- Yolla-A Platform - a normal basic manned operation with typically 7 persons on board (POB) for basic operations and routine maintenance activities on a two weeks on/two weeks off rotation located in 80 m water depth with wellheads and topside gas and condensate processing facilities. It is located in Production Licence T/L1, approximately 93 km southwest of Wilson's Promontory in Victoria and 109 km northwest of the Tasmanian mainland. The term 'platform' may be used interchangeably with 'Yolla-A' throughout the EP.
- Offshore RGP – a 350 mm diameter pipeline consisting of a 147 km subsea section from the Yolla-A Platform and a 1.4 km underground shore crossing section near Kilcunda. The term 'offshore RGP' may be used interchangeably with the simpler term 'offshore pipeline'.

The onshore parts of the development are listed below and excluded from the scope of this EP:

- Onshore RGP – a 32.4 km pipeline from the shore crossing at Kilcunda to the LLGP;
- LLGP – a gas processing facility near Lang Lang with a nameplate capacity of 67 TJ/day sales gas; and
- Sales Gas Pipeline - a 35 km 250 mm diameter underground pipeline transferring processed gas from the LLGP to the Victorian Principal Gas Transmission Pipeline near Pakenham.

3.2 Location

Table 2.1 in Section 2.2 provides the geographic coordinates for the Yolla-A platform and the key points of the offshore RGP. Table 3.1 provides the distances from the Yolla-A platform and offshore RGP to nearby features.

Table 3.1: Distances to key features from Yolla-A platform and the RGP

Feature	Distance and direction from Yolla-A to the nearest point of the feature	Distance and direction from the nearest point of the offshore RGP to nearest point of the feature
Towns		
Tidal River (Vic)	99 km northeast	60 km east
Cape Paterson (Vic)	130 km north	9 km west
Narracoopa (Tas – King Island)	144 km west	
Wynyard (Tas)	127 km south	
Kilcunda (Vic)	145 km north	0.63 km west
Cape Woolamai (Vic – Phillip Island)	150 km north-northwest	13 km northwest
Whitemark (Tas – Flinders Island)	191 km southeast	
Natural Features		
Curtis Island (Tas)	82 km northeast	
Wilsons Promontory (Vic)	92 km northeast	61 km west
Tasmanian Mainland	109 km southeast	
Kent Group of Islands (Tas)	131 km west	
King Island (Tas)	143 km west	
Flinders Island (Tas)	166 km east	
Marine Protected Areas		
Commonwealth		
Boags Australian Marine Park (AMP)	66 km southwest	
Beagle AMP	70 km east	
Franklin AMP	142 km southwest	
Victorian - marine		
Wilsons Promontory Marine National Park (MNP)	86 km northeast	51 km east
Wilsons Promontory Marine Park	91 km northeast	53 km east

Feature	Distance and direction from Yolla-A to the nearest point of the feature	Distance and direction from the nearest point of the offshore RGP to nearest point of the feature
Cape Liptrap Coastal Park	102 km northeast	28 km east
Bunurong MNP	124 km north	10 km east
Bunurong Marine Park	126 km north	5 km east
Victorian – coastal (onshore)		
Kilcunda – Harmers Haven Coastal Reserve	132 km north	0.2 km west of HDD section
Kilcunda Coastal Reserve	145 km north	Intersected by HDD section
Punchbowl Coastal Reserve	145 km north	2 km west
Phillip Island Nature Park	146 km north-northwest	2km west
San Remo Coastal Reserve	146 km north-northwest	10 km west
Phillip Island Coastal Reserve	148 km north-northwest	13 km west
Tasmania - marine		
Kent Group Marine Reserve	126 km east	
Petroleum Infrastructure		
Tasmanian Gas Pipeline	104 km east	
Nearest oil or gas producing well (Perch oil field, monotower)	192 km northeast	156 km east
Other Infrastructure		
Subsea telephone cable – Bass Strait 1 (Sandy Point to Boat Harbour)	7 km east	
Subsea telephone cable – Bass Strait 2 (Inverloch to Stanley)	28 km west	Cross over at KP 70.8
Basslink subsea electricity cable	95 km east	
Victorian desalination plant – intake tunnel point	139 km north	3.4 km east
Victorian desalination plant – outlet tunnel exit	139 km north	3.3 km east

3.3 Overview of Major Components of the Offshore BassGas Development

The Yolla-A platform was installed in 2004 and the offshore RGP was constructed and installed in 2003 and 2004. Yolla-A is a steel gravity based, self-installed platform that was originally designed for unmanned operations (and operated as such). The Yolla field has been in production since 2006, except for a period between December 2011 and September 2012 when the Mid-Life Enhancements

(MLE) were implemented (including installation of an accommodation module and an upgrade of the safety system) following which the platform was manned continuously on a 2 week roster.

The key elements of the offshore facilities are described in Table 3.2.

Since 2024, the Yolla-A platform has moved to a normally manned operation with typically 7 persons on board (POB) for basic operations and routine maintenance activities, for at least two weeks of every 4-week period. This change is the result of reduced throughput due to reduced production from existing Yolla wells resulting in:

- Reduced well shut-in tubing head pressures (SITHP) and shut-in tubing head temperatures (SITHT) such that some hazards are no longer credible major accident hazards (MAH) (BassGas Offshore Facilities Safety Case, March 2025, CDN/ID 19061536, Beach Energy); and
- Reduced operational and maintenance demands for the platform.

Table 3.2: BassGas offshore facilities specifications

Aspect	Summary of purpose and specification
Wells	
Subsurface	• Four producing wells (Yolla-3, Yolla-4, Yolla-5 and Yolla-6). • Tubing Retrievable Surface Controlled Sub-Surface Safety Valve (TRSC-SSSV) located down hole in each well. • Wireline Retrievable Surface Controlled Sub-Surface Safety Valve (WRSSV) installed in Yolla-6. • Permanent downhole pressure/temperature gauge in each well to allow real time acquisition of pressure and temperature data.
Yolla-A platform (from lowest to highest deck)	
Sea deck	A stairway from the well bay provides access to a small sea deck landing on the east side of the jacket 7.5 m above MSL. A fixed sea escape ladder terminates 5.5 m below the sea deck.
Well bay	The well bay is approximately 20 m x 24 m and is located within the jacket 8.5 m below the main deck level and is accessed by two stairs to the main deck and a stairway to the sea deck. Equipment in the well bay includes: • Jacket leg deck connections. • Eight well slots. • Four wellheads and corresponding choke valves. • Production flowlines and manifold. • Process piping to export raw gas - pipeline riser and Last Valve Off (LVO). • Well service pump facilities. • Main firewater pump. • Seawater lift pump. • Sewage caisson. • Produced water dump caisson.

Aspect	Summary of purpose and specification
Main deck – production equipment	Production facilities for separation and dehydration of gas and liquids: • Production cooler - receives the hot well fluids and cools them from 90 – 100 °C to 45 °C. • Production separator – separates liquids (condensate and water) from gas. • Triethylene glycol (TEG) contactor and regeneration unit. • Condensate dehydration. • Stripping gas dryer. • Two-stage gas driven export compressor. • Two condensate export pumps for pressure boosting prior to dehydration and export.
Main deck - utilities	• Main power supply is provided by two gas turbine driven generators (1,400 kW each) each capable of supplying 100 % of the electrical power demand. A diesel driven emergency generator (640 kW) provides back-up. Batteries provide emergency 240 V AC uninterruptable power supply (UPS) and 24V DC power supplies for loss of both main and emergency power generation. • Fuel gas skid - provides fuel gas for the main generators, purge gas and pilot gas, stripping gas for TEG regeneration and the dump caisson pump. • Instrument/plant air package – consists of two electrically driven, oil-lubricated compressors, filters, air dryers and an air reservoir vessel. • Fresh water system – pumps seawater via a filter through the reverse osmosis unit and into the treated water tank. • Sewerage system – treats domestic waste from the accommodation module with a macerator and discharges the effluent into the sewerage caisson.
Main deck – other	• Wellhead control panel. • Chemical injection and storage. • Diesel storage and distribution system. • Diesel firewater pumps and tanks. • Mechanical and instrument/electrical workshops. • Pedestal crane – diesel-powered and hydraulically operated. Pedestal is used for diesel storage. • Flare boom structure. • Telemetry facilities - to enable remote collection of process data and allow process control from LLGP. • 22-person totally enclosed mobile propelled survival craft (TEMPSC). • Safety equipment. • Navigational aids.

Aspect	Summary of purpose and specification
Accommodation module	The accommodation module is cantilevered off the north face of the platform jacket and has four levels: • Level 1 - instrument equipment room, electrical equipment room, emergency generator, and heating, ventilation and air conditioning (HVAC). • Level 2 - day room, galley, first aid, permit office, dirty change area and electrical switch room and main temporary refuge (TR) muster area. • Level 3 - cabin deck level for 22 persons. • Level 4 - utilities deck.
Helideck	The helideck is located above the accommodation module in the north-west corner of the platform.
Offshore RGP	
Export riser LVO	The raw gas pipeline and riser can be isolated from the platform by the LVO. A fail-closed valve is located on its own mounting below the well bay. The LVO is function tested at least every six months and is subject to visual inspection annually. Periodic leak tests are also performed.
Pig launcher	The pig launcher is located on the main deck.
Pipeline	The 13¾" (350 mm) offshore RGP is 147 km long and exports dehydrated gas and condensate from the Yolla-A platform to the onshore LLGP.

3.4 Wells

There are currently four producing wells: Yolla-3, Yolla-4, Yolla-5 and Yolla-6. The platform can accommodate up to seven production wells.

Christmas trees are fitted to each well, including hydraulically controlled fail-safe upper master and wing valves that close on loss of hydraulic pressure. Choke valves are fitted to each well to allow flow control, operated by remote manual setting, with feedback to confirm the setting. An alarm is initiated if the position registered is different to that set. There is a fail-safe TRSC-SSSV located down hole for each well, held open under hydraulic pressure and close when the hydraulic pressure drops below a threshold pressure (specific to the valve installed). Loss of hydraulic control pressure is generally due to a surface signal controlled by the Emergency Shutdown System (ESS) or routine function testing. A pneumatically operated hydraulic high-pressure (HP) pump is used on each well to operate the TRSC-SSSVs. The pumps operate automatically by pressure control.

In February 2020, the Yolla-6 TRSC-SSSV failed to meet acceptable performance criteria during testing and a WR-SSCSV was installed.

The design total throughput will be unchanged following the unlikely introduction of any further wells (any future drilling activity will be covered in a separate EP).

Further details are provided in the Yolla-A WOMP (CDN/ID 3972817).

3.4.1 Reservoir Fluids

The reservoir fluid produced to surface (raw gas) by the four Yolla wells consists of hydrocarbon gas and liquids, condensed water vapour and formation water. The Yolla gas field reservoir contains 65-70% methane (C_1), 17-20% carbon dioxide (CO_2), 5-8% ethane (C_2) and smaller quantities of heavier hydrocarbons. Reservoir fluid composition for each well is detailed in Table 3.3. Yolla condensate is low in viscosity and has a high proportion (98.5%) of non-persistent components. Table 3.4 presents the physical characteristics of the Yolla condensate, verifying its highly volatile nature (i.e., it is quick to weather). Condensate assay 28 Nov 2023 showed 98.9 vol % boiling point <280 degrees Celcius.

Well fluid contaminants include hydrogen sulphide (H_2S), mercury (Hg), radon (Rn) and CO_2. Maximum H_2S levels in the well fluids are approximately 40 parts per million (ppm) and the range for mercury is 100-1,000 microgram per standard cubic metre (µg/sm^3). The last formal radioactivity survey was conducted in 2024. The results of this survey indicate that NORMs are not a significant issue in the BassGas process, though more testing will be conducted in the future during inspection shutdowns. Conclusions from the report provided by SGS Radiation Services include elevated gamma count rates were identified only on gas processing equipment at the propane circuit of the Lang Lang plant compared to natural background levels.

Procedures are in place for the management of these contaminants, which are generally only required during major shutdowns; the last major shutdown was in 2021 and the next is forecast for late 2027. Decontamination facilities are set up as required on the platform and consist of decontamination wash facilities and storage for waste where personal protection equipment (PPE) is used.

Decontamination flushing fluid is classed as prescribed industrial waste and is transported to shore and disposed of in accordance with the BassGas Waste Management Plan (CDN/ID 3974553).

3.4.2 Wellheads and Production Manifold

The arrangement for each wellhead is a 20" (508 mm) conductor housing, a 13⅜" (340 mm) integral compact housing for hanging off the 9⅝" (244 mm) casing and production tubing and a 5,000 PSI API production tree. As the well fluids flow from the wells they enter the production trees which consist of a lower and upper master valve, wing valve and a choke valve to allow flow control into the production manifold. The fail-safe master and wing valves are hydraulically controlled by the wellhead hydraulic control panel (WHCP) and close when there is a loss of hydraulic pressure.

The flow lines downstream of the choke valves include a full flow relief valve. Each relief valve is sized for the flowing capacity of a single well at relieving conditions with the relief valve inlet and pilot both heat traced. The relief valve is connected to the platform flare system and has a manual bypass. A pneumatically operated hydraulic medium pressure (MP) pump is used on each well to operate the master and wing valves.

Material selection for the 25-year design life of the facility considered the high concentration of carbon dioxide in the well fluids with suitable corrosion-resistant materials specified for equipment and lines upstream of the gas and condensate dehydration units.

The production manifold may be readily extended to accommodate up to seven wells and the design total throughput will be unchanged with the introduction of future wells.

Table 3.3: Yolla reservoir fluids composition

Well	**Yolla-3**	**Yolla-4**	**Yolla-5**	**Yolla-6**
Sample date	08/09/2004	02/08/2007	21/07/2015	18/06/2015
Composition (mol%)				
CO_2 (carbon dioxide)	18.86	20.33	20.47	20.34
N_2 (nitrogen)	0.16	0.22	0.19	0.24
C_1 (methane)	67.16	67.27	66.45	66.72
C_2 (ethane)	6.49	6.38	6.79	6.59
C_3 (propane)	2.76	2.59	2.97	2.75
iC_4	0.48	0.42	0.46	0.48
nC_4	0.77	0.67	0.72	0.76
iC_5	0.26	0.20	0.21	0.25
nC_5	0.27	0.20	0.22	0.26
C_6	0.43	0.29	0.24	0.32
C_7	0.70	0.39	0.37	0.44
C_8	0.65	0.25	0.26	0.26
C_9	0.36	0.22	0.24	0.23
C_{10}	0.19	0.12	0.13	0.14
C_{11}	0.10	0.07	0.07	0.07

Well	Yolla-3	Yolla-4	Yolla-5	Yolla-6
C_{12}+	0.36	0.38	0.22	0.15
Total	**100**	**100**	**100**	**100**

Analysis conducted by PetroLab. From sand 2755.

Table 3.4: Physical characteristics of Yolla condensate

	Volatiles	Semi-volatiles	Low Volatiles	Residual Oil (%)	Density (kg/m³ at 15°C)	Dynamic viscosity (cSt at 20°C)
Boiling Point (°C)	< 190	190-250	250-280	> 280	-	-
Yolla condensate (% mass)	90	7	2	1	728.7	1.0380
Persistence	Non-persistent			Persistent		

Sample 21 December 2023 (Caleb Brett, 2023. Yolla Condensate 1023-PTAD-001024, 21 December 2023).

3.4.3 Well Intervention Operations

The Yolla-A platform does not have drilling and workover facilities, however the platform was specifically designed to allow well workovers by a hydraulic workover unit as well as well intervention operations (e.g., coiled tubing or wireline operations). The main deck level over the well bay has been specifically designed to support well intervention and equipment including a power pack, reel, control cabin and associated equipment.

Reservoir management wireline work on the wells is carried out on an as required basis and is likely to occur once per well during the life of this EP (5 years). A specialist wireline crew typically includes 6-8 personnel (24-hour operations) who visits the platform to set-up and execute the intervention activities, taking approximately 4-5 days per well. Well intervention operations are undertaken using the accommodation available on the platform.

Further details on well intervention operations are included in the Yolla-A Platform WOMP (CDN/ID 3972817) and the BassGas Offshore Facilities Safety Case (CDN/ID 19061536). Drilling activities and workovers requiring additional support vessels are outside of the scope of this EP.

3.5 Yolla-A Platform

The Yolla-A platform (Plate 3.1) is four-legged tubular steel jacket, integrated into a gravity base structure that has a footprint of approximately 50 m x 50 m. It has the following pipework:

- 1 x 350 mm production riser;
- 2 x 350 mm riser slots;
- 8 x 500 mm well conductors;
    - Four for Yolla-3, -4, -5 and -6.
    - Two for seawater.

- One for sewage disposal.
- One vacant.

- 1 x 750 mm dump caisson for PFW discharge and deck drainage.

The export pipeline riser has been installed within the jacket structure, close to a jacket leg to provide protection from vessel impact.

The deck is a fully enclosed barge-like structure that provides support for the topsides structures and equipment. The deck is in the form of a rectangular box with an inner rectangle cut out to accommodate the well bay. The deck is approximately 8.5 m deep with the primary steel structure located between the upper and lower decks. The upper and lower decks, and the inner and outer perimeter vertical surfaces are all fully steel plated and painted on exterior surfaces.

Inspection, maintenance and repair of the steel surfaces is discussed in Section 3.7.3 and there is an Integrity Management Program (Structural Integrity, Offshore) for inspection of the unpainted interior surfaces (CDN/ID 11395877).

The general layout of Yolla-A is illustrated in Figure 3.1. The following sections provide a detailed description of the platform's components and functions.

3.5.1 Topsides – Overview of Hydrocarbon Processing Equipment

The main deck of Yolla-A is approximately 42 m x 50 m in size (2,100 m^2). The majority of the hydrocarbon containing equipment is located on the south side of the deck with the utilities and accommodation module located on the north side.

The Christmas trees, flowlines and manifolds are located in the well bay.

Hydrocarbon processing is designed to separate the raw gas into three streams: gas, condensate and produced formation water (PFW). The gas and condensate are then comingled and exported to the LLGP. The treated PFW is discharged to sea (see Section 3.5.6 for more information on PFW management).

The following major systems form the basis of the processing:

- Production cooling – to reduce the raw gas temperature from ~ 90 – 100°C to ~ 45°C to allow the gas and liquids to be separated;
- Production separation – separation of the gas, condensate and PFW;
- Gas compression – compression of the separated gas;
- Gas dehydration – removal of residual water from the gas for export;
- Condensate pumping – boost pressure prior to further dehydration of the condensate prior to export;

- PFW treatment – the PFW from the production separator is degassed to remove dissolved gas from the PFW. The treated PFW is then passed through a produced water filter prior to discharge to sea. Gas is flared via the flare header with oily water passing to the flare knockout (FKO) drum.

- Flaring, venting and drainage – there is no routine venting on the platform (there are safety valves that can vent if necessary). The flare is connected to the degasser and the TEG regeneration package. It is also the primary safety system so gas and condensate can be diverted to the flare system in the case of a non-routine or emergency event. The drainage system consists of an open and closed system. The open system discharges brine from the RO system, PFW and treated sewage to sea via a discharge caisson. The closed drainage system is contained and not discharged.

The normal basic manned operation is with typically 7 POB for basic operations and routine maintenance activities, and from 2024 there have been some limited periods for which the platform is a non-manned operation. The platform is non-manned approximately 45% of the time; it is manned 50% per the roster however there are ad-hoc flights and campaigns that mean it is manned more often than not. POB can be increased to 22 for maintenance (with a maximum of 37 POB). A wireline crew of up to 8 personnel will occasionally be on board (Section 3.4.3) (see Plate 3.1 and Figure 3.1).



Plate 3.1: The Yolla-A platform



Figure 3.1: The Yolla-A platform general layout

3.5.2 Gas Dehydration

The platform processing plant dehydrates the well fluids for export to the LLGP to prevent internal corrosion of the carbon steel raw gas pipeline. The main process steps for gas and condensate dehydration are:

- Cooling and three-phase separation;
- Dehydration of the total gas stream in the TEG Contactor;
- Dehydration of the total condensate stream by contact with stripping gas (a side stream from the dehydrated gas) in the condensate dewatering column;
- Re-dehydration of the wetted stripping gas in the stripping gas dryer;
- Recombination of the gas and condensate streams for export via raw gas pipeline; and
- TEG regeneration equipment serving both the TEG contactor and the stripping gas dryer.

3.5.3 Process Control System

The process equipment on the platform is controlled by the process control system (PCS) located on the platform that is connected by a satellite link to a companion unit at LLGP. This enables the platform to be controlled and monitored from the LLGP. If satellite communications fail, the PCS can be controlled by the offshore operator via a remote PCS station on the platform. The following remote-control functionality is provided:

- Adjustment of well flow rates using stepping actuators;

- Adjustment of chemical injection rates;
- Modulating control, monitoring and recording of process conditions throughout the process system;
- Opening/closing individual wells;
- Monitoring of wellhead pressures and temperatures;
- Start-up and shutdown of gas turbine generators; and
- On/off operation of valves and pumps.

3.5.4 Compression

The compressor is a single train, two-stage tandem dry-sealed centrifugal compressor in compliance with API 616:2011 (Gas turbines for the petroleum, chemical and gas industry services) and API 617:2016 (Axial and centrifugal compressors and expander-compressors). The two-stage export compressor is driven by a gas turbine and designed to ensure deliverability of gas to the LLGP as the reservoir pressure declines. The turbine compressor control panel is located on Yolla-A and at the LLGP.

Gas from the production separator is routed to the first-stage compressor suction scrubber and then enters the first stage of the two-stage export compressor where it is compressed and cooled in the intercooler before passing through the second stage compressor suction scrubber. After entering the second stage of the compressor and following compression, it is further cooled in the after-cooler before entering the TEG contactor.

Any water or condensate removed from the scrubbers is routed to the FKO drum. Condensate and water diverted to the FKO drum is then re-routed to the inlet separator to go through the process again. The condensate separated in the production separator is directed to two centrifugal export pumps for pressure boosting prior to dehydration and export.

3.5.5 Condensate Pumps

Condensate is separated in the production separator and directed to two 100% vertical type centrifugal condensate export pumps for pressure boosting prior to dehydration and export. The pumps are provided with variable speed drives to allow for turndown. At low flow rates, a minimum flow recycle returns condensate upstream of the production separator. The pumps have tandem seals with an API 610 (Standard pumps) flush plan and a separate common seal system skid.

3.5.6 Produced Formation Water Treatment

Production fluids from the wells are passed through the production separator where the gas is separated from the oil and water mixture. The oil separated from the PFW is recirculated to the raw gas stream before being sent to the LLGP through the RGP.

Dissolved gas and traces of dispersed condensate/oil are then removed in the degasser with the PFW passing through a filter to remove any particulates remaining in the stream.

The PFW is then discharged through the dump caisson (Plate 3.2) at a depth of 45 m below mean sea level (35 m above seabed). Separated oil is recovered from top of the dump caisson. A schematic of the PFW treatment process is shown in Figure 3.2.

The volume of total PFW discharge since debottlenecking is designed to a maximum of 300 m^3 /day. The average and maximum daily PFW discharge rates per year for 2021 to 2025 are shown in Table 3.5.

Table 3.5: PFW discharge flow rate 2021-2025

Production Year	Max (m^3d)	Average (m^3/d)
2021	274	115
2022*	321	140
2023	319	110
2024	284	54
2025	291	92

* Excluding data from 22 and 23 March.

Beach expects an increase in the PFW discharge rate per day as wells produce less gas and more water in the lead up to the cessation of production (CoP).

A side-stream of the discharge pipe is routed to two parallel analysers that continuously measure the TPH concentration before it is discharged to the caisson.



Plate 3.2: Views of the dump caisson

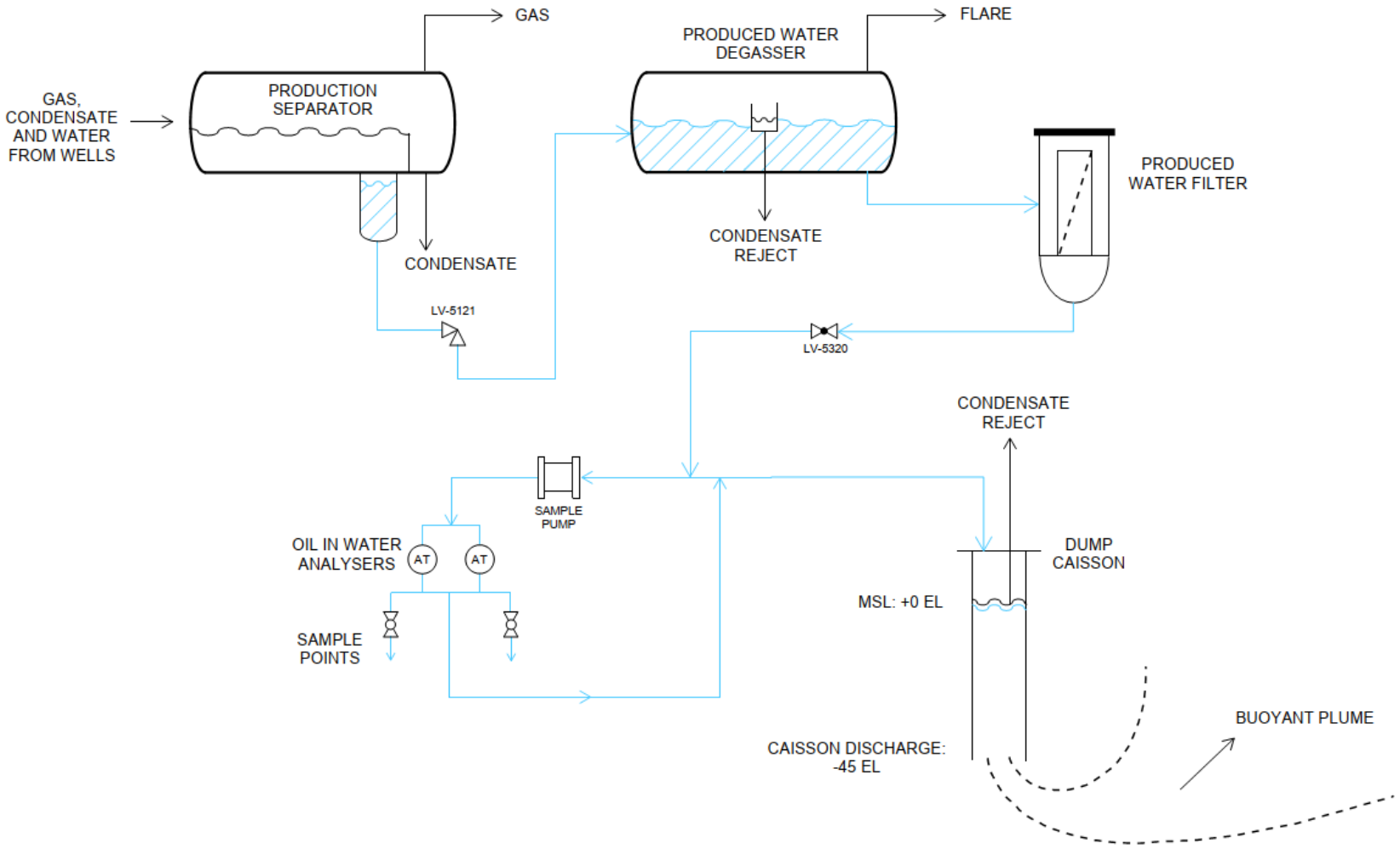


Figure 3.2: The PFW treatment process

PFW is continuously discharged unless the platform is shut in. As such, a PFW treatment and monitoring regime is in place to ensure that the PFW discharged remains within the acceptable oil concentration limits (detailed in Chapter 7.6).

A TPH trigger level of 90 mg/L has been set to enable a reasonable margin for troubleshooting and initiation of actions to mitigate and control the potential increasing levels of TPH. The TPH level of 90 mg/L has an alarm configured that alerts the control room operator of an elevated TPH reading and to respond accordingly. The continuous reading of TPH also enables continuous monitoring of changes in TPH levels, which enhances the ability to act and optimise ahead of any adverse changes in TPH caused by process or environmental conditions.

As additional precautions, the PFW system has also been configured with a number of automated shutdowns that will activate if the TPH concentration reaches 127 mg/L and the PFW flow rate reaches 300 m3/day; or the TPH concentration exceeds 127 mg/L for a period of 60 minutes.

Alarms are set at trigger points to alert the platform operations personnel to be able to take preventative action before any limits are breached. The TPH limits haves been set by undertaking chemical characterisation of the PFW and applying this to whole-of-effluent-toxicity (WET) testing, which analyses the impact of the PFW on the receiving environment.

The PFW discharge limits are listed below with continuous monitoring in place to minimise the risk of breaching these limits:

- TPH – does not exceed 127 mg/L at any time; and
- Total PFW volume – does not exceed 300 m^3/day.

See Section 7.6 for a definition of the PFW mixing zone. Four produced water samples per month (in line with platform manning) are collected and analysed to verify that the continuous monitoring results are accurate.

The water cut of the wells will increase to closer to the maximum 300 m^3/day design limit over the coming years as the reservoir depletes. This has the potential to increase the TPH levels due to the reduced residence time of the PFW in the process. The current goal is to maintain TPH at these levels, therefore a lower limit of 90 mg/L has been set. The retention time in the caisson based on the current flow rate is around two hours and this provides additional PFW quality improvement such as flotation of free hydrocarbon with associated skimming and potentially some volatilisation.

Operating conditions such as pumping liquid from the KO flare drum may see TPH spikes or fluctuations not caused by the PFW discharge; these will be monitored and investigated to ensure the cause of the spike is known and is recorded in the Laboratory Information Management System (LIMS) database. If the causes of TPH spikes are not known and cannot be rectified, then actions will be undertaken as per the Adaptive Management Framework (AMF) (see Section 7.6). As outlined in Section 7.6, the PFW mixing zone and impact assessment are based on the worst-case PFW flow rate of 300 m^3/day and TPH concentrations up to 127 mg/L (based on the concentrations in the PFW samples collected for the WET testing). Therefore, the upper TPH limit is 127 mg/L. Beach is committed to maintaining TPH levels to concentrations as low as possible and will continuously monitor this.

Since the previous revision of this EP, Beach has introduced the use of a chelating descalent (currently Tetrasodium Glutamate Diacetate, known as GLDA) to the well management activities. The following information is relevant to the use of GLDA:

- Trigger – descaling is a trigger-based activity that is triggered when scale induced restriction or production impairment is confirmed in the Tolla wells via surveillance data. At current downhole conditions, scale is expected to continue to persist, with the potential to escalate as the reservoir pressure declines.
- Sequencing – the operation is a single well basis only, with no concurrent well descaling operations undertaken.
- Frequency – up to 14 events per annum (eight events per annum historically).
- Volumes of descaling – the target downhole concentration of GLDA is ~40% based on the efficacy of the chemical to dissolve downhole scale. The typical dose if 1-3 m^3 GLDA/water mix, with a maximum credible scenario of 7-10 m^3 GLDA/water mix.
- Duration – typical downhole soak period of 12-24 hours. Flowback is controlled with observed data from continuous online analysers, indicating that as return to baseline/normal operating conditions occurs in the range of 6-40 hours depending upon a range of factors.

The impacts associated with the use of GLDA are described in Section 7.6.

3.5.7 Open Drains

The open drain system primarily captures rainwater and washdown water; the system also captures any loss of containment (LOC) that may occur on the platform decks. Drains are classified as either hazardous or non - hazardous based on the area of collection, as outlined in Table 3.6. The hazardous and non-hazardous area drains are segregated to prevent migration of hydrocarbon vapours into safe areas especially in the event of a spill.

Table 3.6: Open drain collection and discharge details

System	Hazardous	Non-hazardous
Collection area	Process facilities Wellhead service pump	Deck drains
Open drain header	Two	One
Drains to	Dump caisson below water level	

To maintain the segregation between the drain headers and to prevent any vapour that may accumulate in the dump caisson from migrating back along drains, each of the drain headers terminates in the dump caisson below the water level. Further segregation is provided for each drain header by a 450 mm minimum liquid seal upstream of the dump caisson. A vent is provided between the liquid seal and caisson to allow for the pressure changes caused by wave action. Each vent is fitted with flame arrestors and routed to a safe location.

All areas on the platform where there is potential for hydrocarbon liquid release (e.g., during maintenance draining) have bunds/drip trays for drain collection. Skids have open drains that are collected and routed to the drain system.

3.5.8 Closed Drains

The closed drain system collects liquids from process vessels and routes the liquid through headers back to the FKO drum. These drains are used when pressure in the process vessels has been reduced to 1,000 kPag or lower and pressure drive can transfer fluid into headers, some of which are elevated. The main header transfers slope downwards to drain to the FKO drum.

3.5.9 Dump Caisson

The dump caisson was constructed as part of the platform jacket and provides for recovery of hydrocarbon liquid that may be present in PFW in the stream from the open drain system, or from a spill. Hydrocarbon liquid is captured by gravity separation and accumulates at the top of the caisson and can be pumped to the flare knockout drum or into containers for transport onshore. Water flows from the open bottom of the dump caisson at a depth of 45 m below sea level (see Plate 3.3).



Plate 3.3: Yolla-A Platform dump caisson

The open drain and PFW feeds to the caisson are discharged below the minimum sea level so vapours can be controlled and released to a safe location through designated atmospheric vents. The caisson is also fitted with a vent to a safe location in the well bay that has a flame arrestor.

The dump caisson has a pneumatically-operated pump to recover oil and condensate. Level indication alarms (set at 10 m) assist with the operation of the dump caisson pump and provide indication of the liquid hydrocarbon level within the caisson. The pump has flexible connections and can deliver a nominal flow rate of 1 m^3/h from the surface of the water within the dump caisson and pump the fluid into the flare knockout drum for reprocessing. The caisson pump operates at least once every 24 hours.

The pump is operated by fuel gas and can be controlled remotely from the LLGP.

3.5.10 Flare System

The platform has a cantilevered flare boom. Extraction processes such as fuel gas, process pressure control valves, closed drain system and TEG regeneration package on the platform generate hazardous hydrocarbon gas emissions that are flared. A continuous low volume flame is maintained to ensure stable combustion of the flare purge. The flaring rate is continuously monitored and minimised as far as possible. The flare system capacity is approximately 171,000 kg/h of flow and comprises:

- A flare header network feeding into the FKO drum.
- A 50 m-long flare boom located in the southwest corner of the platform.
- A sonic type flare tip for abnormal operation (major flaring incidents) designed to minimise smoke.
- Continuous flare tip pilots, flare electronic ignition package and flame detectors. The flare electronic ignition package will re-ignite a pilot flame when a loss of flame is detected.
- Ultrasonic flow meter.

The FKO drum receives vapours and liquids from pressure safety valves (PSVs), blowdown valves, TEG flash gas, closed drains and liquid return headers. There is continuous liquid flow to the FKO drum from the PFW degasser and the TEG contactor columns. The FKO drum is fitted with an electric immersion heater to maintain the temperature of the liquid phase above 5ºC. During normal operations, the liquids are pumped into the production separator for reprocessing. During periods of shutdown and/or restart, the liquids can be pumped directly into the raw gas pipeline. Gases within the flare system are directed through the FKO drum and are combusted at the flare tip.

In FY23, a project was completed to reduce the amount of flare purge gas required for safe operation. This purge gas is reasonably consistent, regardless of the production rates, but only accounts for a small portion of flared volumes across the year. Flared volumes are most significantly influenced by periodic spikes arising from operational management of the platform. Nonetheless, work was undertaken to safely reduce the flare purge gas rate to reduce routine emissions. It is expected that future flared volumes will be relatively consistent as long as Yolla continues to operate, given the configuration of the flare system.

Emissions from the flare are reported annually to the CER. Recent performance of the flare is shown in Table 3.7.

Table 3.7: Flare emissions at Yolla-A

Reporting year	Flared emissions (tCO_2e)
FY22	9,700
FY23	10,800
FY24	12,100
FY25	11,000
FY26*	10,700

* Emissions data subject to confirmation following audit by a qualified third party.

Vents are directed to the flare header (i.e., there is no open venting) and there is no routine venting. Information regarding GHG emissions, including from the flare, is presented in Section 7.4.

3.5.11 Diesel Storage and Distribution

Diesel is provided by the platform supply vessel and stored in the diesel storage tank built into the crane pedestal that has a total working capacity of 8.4 m^3. The diesel is transported to the platform by supply vessel in a 4 m^3 ISO container, which is then decanted into the crane pedestal tank. Bunkering diesel directly by hose can also be conducted.

The tank operates at atmospheric pressure and ambient temperature and is equipped with two level instruments: one for diesel level indication with a high-level and low-level alarm, the other for low-level shutdown. An audible alarm at high-level assists with preventing tank overfill during bunkering of diesel. During bunkering, it is a requirement that the tank level is constantly monitored by operations personnel on the platform. An overflow line is directed to the non-hazardous area open drain, and the tank vents to atmosphere, with a flame arrestor in the vent line.

Using pumps, diesel is distributed from the diesel storage tank to platform equipment including the crane diesel day tank, survival craft refuelling stations, well head service pump, fire water pumps and the emergency diesel generator package. With the exception of the wellhead service pump, diesel is filtered. Under normal conditions, the pressure drop across the filter is around 10 kPag and when the pressure drop is greater than 50 kPag the fouled filter element is replaced. A full flow bypass around the filter allows the element to be changed out without interrupting the flow of diesel to equipment.

3.5.12 Chemical Injection

The main chemicals used on the platform are corrosion inhibitor and hydrate inhibitor, and occasional use of descalent chemical injected into the wells. The chemical injection packages are located on the west side of the well bay. These and other hazardous materials are used on demand and are described in Table 3.8. All of the chemicals are used in closed systems, thereby reducing the risk of accidental spills and discharge. The chemicals are all stored in bunded areas with drainage to the open drain system. From the main deck of the platform, methanol is injected into the process (well stream, production coolers and RGP) and corrosion inhibitor is injected into the RGP.

- Corrosion inhibitor - well hydrocarbon fluids are dehydrated for transfer to the RGP to prevent the elevated CO_2 levels present in the hydrocarbon fluids combining with water to form a steel-corrosive acid. There remains a risk of residual water being present in the gas, therefore corrosion inhibitor is continuously injected into the pipeline upstream of the LVO. The inhibitor is pumped from a transportable tote tank that uses a dry break coupling between the tote tank and the single skid-mounted injection package to prevent spills.

- Hydrate inhibitor - hydrates are crystals that form when the gas/condensate cools or rapidly reduces in pressure. These crystals can form blockages in the process. Hydrate inhibitors are injected at the wellhead to prevent hydrate formation. The main hydrate inhibitor on the platform is tri-ethylene glycol (TEG). This is injected into the raw gas and then recovered in the TEG Regeneration Unit during start-up and shutdown. A hydrate inhibitor (methanol) is injected into the flowlines immediately downstream of the wellheads and upstream of the chokes during start-up and shut-down by remote manual operation from the LLGP (to start the methanol pump and open the appropriate actuated valve). Methanol injection is typically undertaken 5-10 times each year. Provision is also included for injection upstream of the

production cooler to prevent potential hydrate blockage as a result of over-cooling. Methanol can be injected into the RGP when hydrate formation occurs in the pipeline if the pipeline contents cool to seabed temperature. Injection of methanol into the pipeline only occurs during a planned shutdown, as continuous methanol injection into the pipeline during production potentially causes onshore processing difficulties.

3.5.13 Hazardous Substances

The main hazardous substances and typical inventories that may be stored on the platform are shown in Table 3.8. Other hazardous substances may be present on the platform in smaller quantities (e.g., cleaning/maintenance chemicals, lubricant/gear oils, etc.) and these are stored either on deck or in the flammable liquids cupboard where there is containment.

Safety Data Sheets (SDS) for all hazardous substances are available on board the platform in the permit to work hut and electronically via 'ChemAlert'.

Chemicals including methanol, TEG, corrosion inhibitor and descalent are transported to the platform in sealed containers. Hazardous substances and chemicals are shipped to the platform in accordance with International Maritime Organisation (IMO) codes and requirements and included on the hazardous materials register. Management of hazardous materials is guided through the Hazardous Chemicals Management Procedure (CDN 18985401).

In addition to the hazardous substances usually on board the platform, the substances that may be stored on board during well intervention operations are listed in Table 3.9. Other activities that require chemicals or volumes beyond what is available on the platform will be brought to the platform after a risk assessment is conducted in line with the Hazardous Material and Secondary Containment Directive (CDN 14176239) and added to the hazardous materials register.

Table 3.8: Hazardous substances stored on the Yolla-A platform

Substance	Storage volume	Location
Corrosion Inhibitor	2 m^3	Stored in a 1 m^3 tote tank as part of the self-contained and bunded Corrosion Inhibitor Package, which can be drained into the open drain system if required. Located on the west side of the main deck, with a further 1 m^3 in storage on the southern infill laydown area.
Descalent	Up to 10 m^3	Stored in IBCs on the main deck. Usual storage would be 3-6 m^3.
Methanol	4 m^3	Stored in 1 m^3 tote tanks on a raised platform above the self-contained and bunded methanol injection package that is connected to the open drain system. Two 1 m^3 tote tanks are stored on southern infill laydown area.
Diesel	8.4 m^3	Stored in an 8.4 m^3 tank within the crane pedestal.
Diesel	5 m^3	5 m^3 emergency generator day tank. 100 L diesel day tanks for fire pumps.
TEG	24 m^3	Throughout the TEG system and 4 m^3 of storage.
Propane gas	A rack of nine cylinders	Cylinders stored on the main deck west of the well bay. Used for flare purge when fuel gas is unavailable.
Nitrogen gas	Two racks of 15 cylinders	Cylinders stored on the main deck, west of the well bay.
Firefighting foam	One 200L foam tank for monitors Two 50L foam tanks for hose reels One 205L drum containing 200L One 205L drum containing ~90l	Various locations.

Table 3.9: Hazardous substances that may be present during well intervention operations

Substance	Typical inventory	Description
Diesel	20 m^3 for workover. 10 m^3 for project work (e.g., temporary generators/air compressors).	IBCs (intermediate bulky container) stored on main deck.
Radioactive materials	As required.	A purpose designed container will be used for storage if radioactive materials are utilised.
Explosive materials	As required.	A purpose designed container will be used for storage if explosive materials are utilised.

3.5.14 Waste Disposal

There are two liquid waste discharge points from the platform to the ocean, these being:

- PFW and deck drainage discharged via the dump caisson.
- Black and grey water from the accommodation module combines with brine from the desalination plant and surplus water from the sea water lift and fire pump header and is discharged from the sewage caisson 7 m below sea level. The sewage treatment system is connected to a 1,000 L storage tank, with a solids macerator located upstream of this tank.

All other liquid and solid wastes are transported from the Yolla-A platform to shore using the supply vessel. From the port, the waste is transported to the LLGP, where an EPA licenced waste contractor then transports waste to licensed facilities for reuse or disposal. Waste generated during project activities is collected by an EPA licence waste contractor for transport to licensed facilities, with Cleanaway transporting flammable goods.

Solid wastes generated on the platform include paper and cardboard, wooden pallets, scrap steel, metal, aluminium, cans, bottles, glass, plastics and rope. Waste is managed in accordance with MARPOL Annex V (Garbage Pollution Prevention), which requires:

- Placards on the platform identifying the waste disposal requirements.
- A Garbage Management Plan to be in place.

Waste is managed in accordance with the BassGas Waste Management Plan (CDN/ID 3974553). This plan describes the waste management hierarchy, waste characterisation and classifications, storage, labelling, collection and transport, recording and reporting and training requirements.

All solid wastes produced are segregated and stored on the platform while awaiting transport to shore and then to an EPA Victoria-approved disposal facility. Chemicals are stored in purpose-built bunded areas on the main deck, while temporary self-contained bunds (tied or weighted down to prevent loss overboard) are used to store chemicals used during shut-down or maintenance activities.

All waste generated on Yolla-A is listed in a waste manifest before it is sent ashore and combined with that from LLGP.

3.5.15 Accommodation Facilities

The Yolla MLE project converted the platform to a manned facility in 2012 with the installation of permanent accommodation modules. These modules can accommodate:

- Fully manned operation with up to 22 POB for planned maintenance activities and wireline.
- Exceptional circumstance maximum manning 44 POB (up to 38 sleeping on board plus day visitors) for major campaigns such as well workover and construction works.

The accommodation block contains the following:

- Ten bedrooms (9 x 4 berth, 1 x 2 berth);

- First aid room;
- Galley and mess area;
- Frozen, cold and dry storage for the galley;
- External laydown for the galley;
- Laundry facilities and linen store;
- TR (temporary refuge) muster area;
- TV lounge, quiet room and gymnasium;
- Toilet and wash facilities;
- Dirty change area;
- Supervisor's office and permit to work (PTW) area; and
- Electrical switch room.

3.5.16 Communications

Communications integrity is ensured, to enable control and surveillance of the platform and two-way voice communication with personnel onboard, by the provision of the following communications equipment:

- A satellite link for Operational Technology (OT) communications network. This system supports continuous control and monitoring of production, facility surveillance via CCTV system and two-way voice communication.
- A separate and independent satellite link for Information Technology (IT) services providing internet connection and supporting office network facilities. This system is also configured to provide a segregated auto-switchover backup network link to the OT communications network in the event of the OT satellite communication link failure.
- Private Automated Branch Exchange (PABX) telephone system onshore with external links channelled through the OT communication satellite network.
- Analogue handsets and two copier/scanning machines with ability to email files/copies.
- Ultra-high frequency (UHF) radio system consisting of intrinsically safe handheld radios and a base station allowing communication between personnel throughout the facility and with onshore personnel via the OT communication satellite link telephone interconnect.
- Aeronautical very high frequency (VHF) radio system allows communication with approaching helicopters or other aircraft in the vicinity of the platform.
- Portable satellite phones are available for emergency communications.

- Marine very high frequency (VHF) radio system allows communication with vessels providing services to the platform (e.g., the supply vessel and standby vessel) or other marine vessels in the vicinity of the platform. Marine VHF also allows communication to general marine traffic in the vicinity of the platform during an emergency situation.
- Public address and general alarm (PA/GA) system.
- UHF and VHF marine radio units in the crane cabin.
- Emergency Position Indicating Radio Beacons (EPIRB) for use during an emergency are located within the TEMPSC, and in each of the life rafts located at the TEMPSC embarkation area and at the alternative muster area (AMA).

Communications at the AMA include a hand-held satellite phone and hand-held radios for communications with the TR muster area, LLGP control room and aircraft and vessels in the vicinity of the platform. A telephone with PA/GA access port has been provided at the AMA as a means to access the PA/GA system.

When the LLGP central control room (CCR) has the remote console selected to monitor the platform operations channel, the attendant onshore operators are able to hear the platform local radio traffic and are able to transmit if required.

The TR muster area is equipped with a communications panel, fire and gas and ESD (emergency shut down) mimic panel, hand-held satellite phone, PA/GA access panel, and closed-circuit television (CCTV) coverage.

3.5.17 Navigational Aids

The platform has a fully automatic navigational aid system comprising:

- RACON Radar Beacon – Phalcon 2000 RACON that detects radar signals from passing ships and returns a coded response.
- Four navigational lights provide cover in all directions, with battery back-up that will supply power for 96 hours (4 days).
- A foghorn with battery back-up that will supply power for 96 hours (4 days). The foghorn can be manually activated from either the LLGP CCR or the platform.
- An automatic identification system (AIS) sounds an alarm should any vessels with an AIS unit enter the gazetted 3 km-radius cautionary zone (restricted navigation) around the platform. The prohibition of Entry into a Safety Zone (with a 500 m-radius) was gazetted under the former *Petroleum (Submerged Lands) Act 1967 (Cth) (Section 119)* by Mineral Resources Tasmania on the 31st of August 2005. To date, there have been no breaches of the Safety Zone, but entry into the cautionary zone has been noted. Anchoring, navigation or fishing in the cautionary zone is not permitted without prior approval from the platform PIC (Person in Charge).

3.5.18 Lighting

Under normal operations, personnel activities on the platform are undertaken during day shift conditions, with only essential work undertaken during hours of darkness. After the MLE upgrade to

the platform, lighting was upgraded to cater for the new operating conditions and new equipment and escape routes.

The Yolla MLE Project Basis of Design identified the required areas of illumination throughout the deck (lux levels and maintenance factors), with an 'as-built' assessment of lighting conditions conducted in August 2011 by Worley Parsons. As a result of this assessment, the navigation aid lantern was relocated to the corner of the accommodation module. Lighting on the platform is deemed suitable for a manned facility.

3.6 Offshore Raw Gas Pipeline

3.6.1 Pipeline Description

The 350 mm offshore RGP that exports dehydrated gas and condensate from the Yolla-A platform to LLGP has three sections:

1. An offshore export riser and subsea section that runs approximately 147 km along the seabed in a direct route to landfall near the township of Kilcunda on the Victorian coastline.

2. A shore crossing consisting of a horizontal directionally drilled (HDD) buried pipeline approximately 1.4 km in length that passes under the surf zone, beach and coastal dunes.

3. The buried onshore pipeline, which is 32.4 km in length and terminates at the LLGP (outside the scope of this EP).

The offshore RGP rests on the seabed (i.e., it is not trenched) and is stabilised by concrete weight coating along its entire length (Plate 3.3).

The riser, submerged RGP and shore crossing have a protective coating. The riser has a fusion-bonded epoxy (FBE) coating, the subsea pipeline has a 5 mm thick asphalt enamel under 30-60 mm concrete weight coating, and the shore crossing section has a 1 mm NAPROCK coating over 0.4 mm FBE.

Aluminium/zinc bracelet type sacrificial anodes are installed along the length of the pipeline on the seabed and on the riser to provide external corrosion protection in case of coating damage. Anode intervals vary along the pipeline, and are generally every 5 to 12 pipe joints. Approximately 1,500 anodes are installed.

The shore crossing section of pipeline is protected by an impressed current cathodic protection system. Internal pipeline corrosion is controlled by separation and dehydration of the well fluids and the continuous injection of corrosion inhibitor into the pipeline from the platform.

The pipeline has a single main line valve (MLV) station situated onshore near the shore crossing at Kilcunda. The valve station is located north of the Bass Highway and is a buried installation within a small unobtrusive compound located on private property. The 350 mm nominal bore MLV ball valve is locked open under normal operation with the valve hand-wheel stored at the gas plant.

The offshore pipeline and riser can be isolated from the platform topsides facilities by the LVO. The LVO is located above the water level on the riser just below the platform cellar deck and is controlled by the platform ESD system. The pipeline approach to the west of the platform just north of the south-western jacket leg was selected to avoid the possibility of damage from a mobile offshore drilling unit

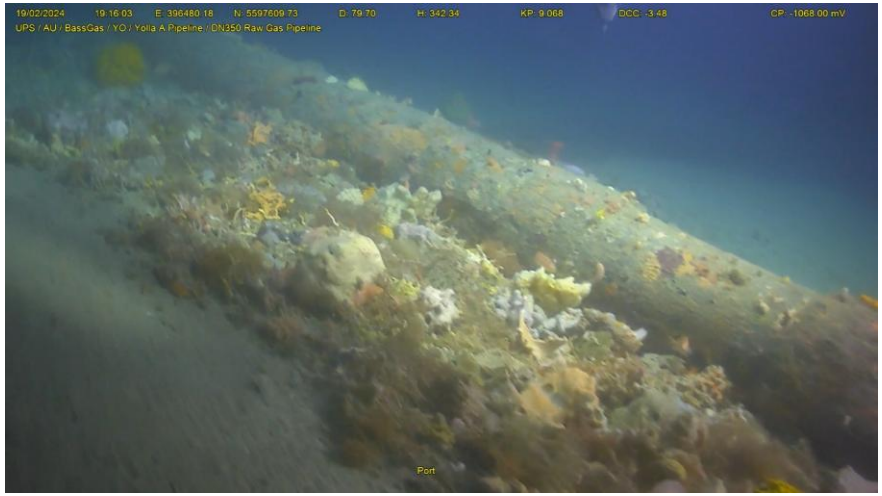
(MODU) or crane operations. The riser is located within the Yolla-A platform jacket substructure to provide protection against vessel impact.

The offshore pipeline maximum allowable operating pressure (MAOP) is 14,100 kPag @ 80°C. The operational limits of the offshore RGP during normal operation are:

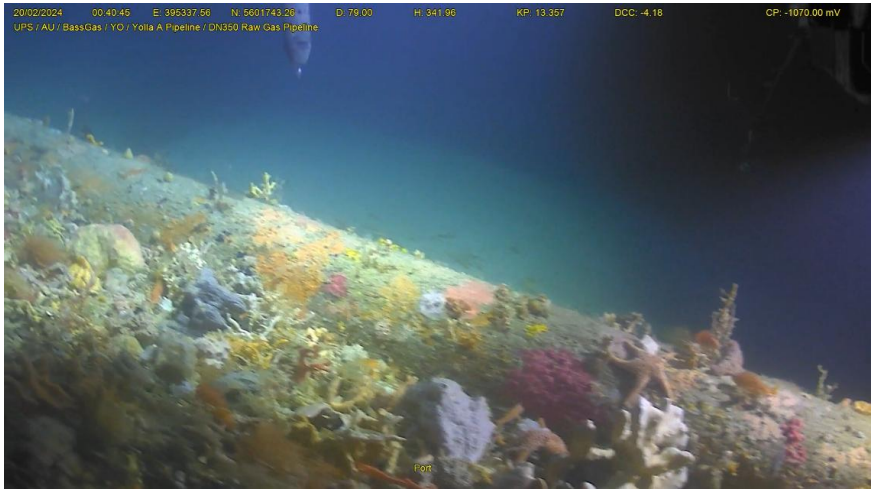
- Flow rate of raw fluids into the pipeline in the range of 20–67 TJ/day sales gas equivalent.
- Normal operating pressure at the onshore slug catcher is 6,000 – 7,000 kPag. The pipeline can be operated at pressures between 5,500 – 13,000 kPaG by design where the line pack is considered to be operating at pressures above 7,000 kPaG at the gas plant inlet. The offshore pipeline typically operates between 9,300 – 12,800 kPaG at 45°C.

In the event of a pipeline leak, a drop in pressure will be identified at either the LLGP via the inlet PZT (which will trip the plant at 4,000 kPa) or at the Yolla-A platform if two out of three independent pressure transmitters on the export line register a pressure of 4,000 kPa. These transmitters also have a low alarm at 5,000 kPa. A small (i.e., pin hole) leak would possibly not be picked up if the Control Room Operator (CRO) does not see a loss of pressure on the instrumentation, but there is a possibility that if the ground was disturbed onshore that a farmer may notice it or when maintenance inspections are completed. Intelligent pigging of the pipeline is completed every 5 years and would detect abnormalities that could result in a leak (see Section 3.6.2, following).

A series of 12 photos (Plate 3.4) show images of various sections of the offshore RGP from the 2019 and 2024 subsea inspections.



KP 9.068, Depth 79.7m (2024)



KP 13.357, Depth 79.00m (2024)



KP 18.484, Depth 78.87 m (2024)



KP 45.735, Depth 74.56 m (2024)



KP 65.210, Depth 74.44 m (2024)



KP 83.716 ,Depth 74.10 m (2024)



KP 102.741, Depth 74.19 m (2024)



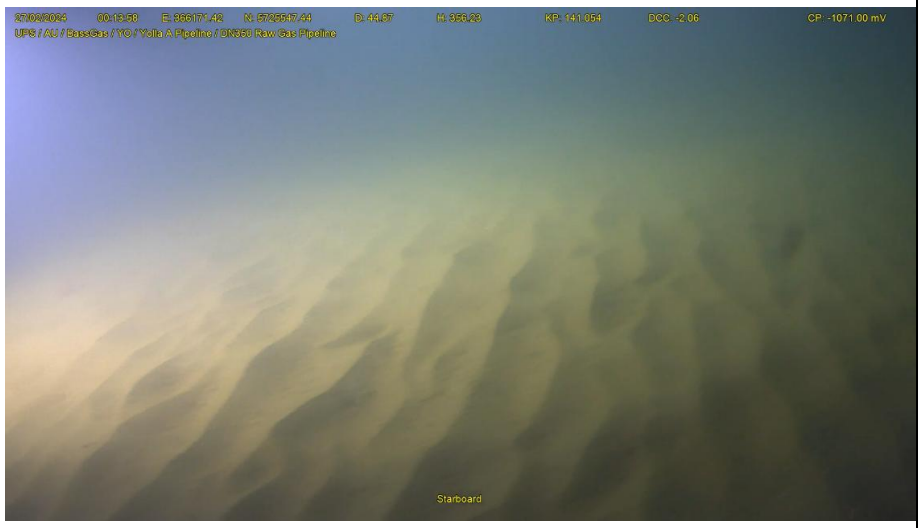
KP 110.924, Depth 73.57 m (2024)



KP 128.386, Depth 47.58 m (2024)



KP 133.183, Depth 43.98 (2024)



KP 141.054, Depth 44.87 m (2024)



KP 146.023, Depth 21.22 m (2019) Pipeline entering stabilisation mattress.

Plate 3.4: Images of various sections of the offshore RGP from the 2019 and 2024 subsea inspections.

3.6.2 Pigging Facilities

The export riser and the offshore RGP are cleaned and pigged (using an intelligent pig) from the pig launcher installed on the main deck of the platform. The pig launcher design conditions are consistent with the offshore RGP. Pigging is conducted every 5 years in line with the Pig Launcher Operation: BassGas Raw Gas Pipeline Procedure (CDN/ID 3976964). Intelligent pipeline pigging surveys were conducted in December 2010, March 2016 and April 2024, with no appreciable defects detected. The next pigging survey is due to take place in 2028.

The pigging facilities are fitted with mechanical interlocks to minimise any safety risk arising from improper operation. A quick opening closure is provided for easy loading of a pig into the major barrel with pressurisation lines and vent to atmosphere provided for pressuring/depressuring operations. The depressurisation line to atmosphere is stainless steel, which allows for the localised cold temperatures experienced during depressurisation operations. To minimise the risk of a release to atmosphere, valve safety interlocks have been installed on the main operating valves used during the pigging operations. They are fitted on the pig trap valve, blowdown valve, kicker valve, drain valve and pig trap enclosure.

A short duration of flaring is required to depressurise the pig launcher prior to opening and inserting the pig, typically lasting about 5 minutes.

3.7 Inspection, Maintenance and Repair

Inspection, maintenance and repair (IMR) of BassGas facilities and equipment is coordinated through the Computerised Maintenance Management System (CMMS) informed by the Integrity Management Plan - Pressure Vessels (CDN/ID 3675063), Integrity Management Plan (IMP) - Pressure Relief Devices (CDN/ID 3675071) and Integrity Management Plan - Piping Systems (CDN/ID 3675061) These plans aim to:

- Ensure a consistent, cost-effective and efficient system of maintenance management; and
- Provide optimum levels of inspection, maintenance and repair to ensure that equipment and the facilities remain fit for purpose over the life of the operation.

Condition monitoring of critical equipment is input into the maintenance plan and management system and an equipment specific risk-based inspection (RBI) program determines maintenance and inspection frequencies.

For example, a Level 3 inspection was completed on Yolla-A in 2020, and a Level 2 inspection utilising a diving support vessel was conducted in 2023. The visual inspection highlighted no areas of damage, corrosion, or any structural defects during the time of inspection. Yolla-A platform leg connections are welded onto a steel gravity base and reinforced by gussets which were found to be intact reflecting no signs of damage. The DVI/ GVI-1 at node welds found no areas of fatigue or loss of material. There were no signs of damage, weldment failure or crack-like indications for the jacket leg connections.

3.7.1 ROV Inspections

Subsea remotely operated vehicles (ROV) are used to inspect the Yolla-A platform, the RGP, and plugged and suspended exploration wells to detect features, damage or signs of damage and deterioration that could present structural integrity risks. These inspections are undertaken in accordance with ROV contractor procedures, supplemented by project-specific procedures, as required.

ROV surveys are routinely planned but may also occur on an ad-hoc basis based on the findings of previous inspections or based on operational or weather events. Table 3.10 summarises the results of the ROV surveys undertaken since BassGas became operational in 2006.

Table 3.10: Summary of ROV inspections to date

Year	Inspection target
2024	Yolla-A suspended well inspection and survey of RGP
2023	Yolla-A Level 1 & 2 subsea jacket inspection
2020	Yolla-A Level 3 subsea jacket Inspection
2019	Spud can depression crater and suspended well surveys, pipeline span survey
2017	Platform, pipeline, suspended well and spud can depression surveys, pipeline span rectification
2015	Spud can depression crater survey
2014	Spud can depression crater survey
2013	Pipeline span rectification
2011	Platform, riser and pipeline surveys
2007	Pipeline survey

ROV inspections typically occur infrequently (less than annually) and normally use a dynamically positioned Inspection Support Vessel (ISV), or the Platform Supply Vessel (PSV) that is routinely used for cargo operations. The ROV inspections can also be undertaken from the platform. Specialist ROV contractors are used, with the pipeline survey typically taking 5-7 days to complete. The pipeline HDD exit is inspected for cathodic protection and stability of mats.

ROV deployments are completed as part of the integrity inspection program (Pipeline Integrity Management Plan, CDN/ID 17278891) including:

- Cathodic protection (CP) surveys – involves direct contact measurement and/or continuous field gradient measurement when traversing the length of the offshore pipeline. Pipeline protection is measured in millivolts at selected locations where a probe is used to pass through the marine growth layer onto the metal surface to ensure the anodes attached are providing corrosion protection. The field gradient is measured by proximity as the ROV traverses the pipeline while completing a general visual inspection.
- General visual inspections (GVI) – undertaken in close proximity (within 1 m) of the pipeline, pipeline spools, risers and associated clamps, and platform jacket members. GVIs locate spans along the pipeline that may exceed allowable span lengths (this varies but is generally between 11 m and 29 m) as spans lengthen and shorten due to prevailing environmental factors if soft sediments are present at the extremities of the span.
- Pipeline span remediation projects – undertaken when excessive pipeline spans require placement of support mattresses. Polypropylene bags of varied size are used for placement under the pipeline and once in position are inflated with grout. Grout is prepared on the support vessel back deck in a mixing bowl and delivered to the mattress by hose. Minimal amounts of excess grout exit vents from the mattress once it is fully inflated.

3.7.2 Diving Activities

Diving activities are not expected to be undertaken on a regular basis but in response to specific tasks for IMR purposes. Diving is undertaken from a diving support vessel or from a temporary launch and recovery system (LARS) stationed on Yolla-A. Diving procedures are prepared for each campaign, specific to the contractor and vessel/equipment performing these services. A diving contractor is selected for each campaign based on a competitive tender process.

The diving related work carried out from the Yolla-A platform typically includes the following:

- Marine growth removal (to facilitate weld inspections) using mechanical grit blasting or high-pressure water jetting;
- Level 4 NDT/ACFM inspections; and
- Platform and pipeline repair works.

The most recent dive campaign was a Level 3 structural inspection of the Yolla-A jacket in 2021. A Level 2 inspection utilising a ROV was conducted in 2023 and in early 2026 a ROV was utilised to successfully undertake a Level 3 inspection. As a result, it is likely that future dive campaigns will only be required for specific NDT or repair activities in response to ROV inspection results.

3.7.3 Fabric Maintenance

Fabric maintenance involves ongoing steel surface preparation and painting across the entire platform for selected areas of structural and process equipment. Fabric maintenance requires sand/grit/wet blasting to remove surface paint and corrosion coating followed by painting.

Enviropeel/Stopaq is applied at various times during the year (depending on the outcomes from integrity inspections, but generally undertaken in summer) between flanges to prevent contact with air and avoid corrosion. These activities are undertaken within a bottom-lined structure to contain removed surface coatings.

3.7.4 Pressure Vessel Inspection

Internal/external inspection of Yolla-A pressure vessels requires purging and venting of nitrogen and may require the use of a chemical cleaning compound for hydrocarbon cleaning. Chemical cleaning waste is contained within a circulated system and brought onshore for disposal to a licensed facility. Mecure 99 is used for mercury decontamination of the pressure vessels and similarly the Mecure 99 waste stream is contained and brought onshore for disposal to a licensed facility. This activity is undertaken once every 2-3 years, usually coinciding with planned platform shutdowns.

Pressure vessel inspection also involves the removal and re-testing of PSVs, which are tested onshore.

3.7.5 Pipeline Surveys and Monitoring

Surveys along the offshore RGP are required infrequently to determine pipeline condition and assess if any integrity issues exist. Such surveys involve using a small vessel (typically a fishing vessel) and generally take up to a few days (depending on sea state conditions). One or all of the following geophysical techniques described below may be used (generally in combination), and a simple pictorial representation of these techniques is presented in Figure 3.3.

Multi-beam echo sounder

A multi-beam echo sounder (MBES) has wide coverage on the seabed and is likely to be used once during the life of this EP. The backscatter data from the MBES is used to characterise the seabed and to assist in seabed classification. The beams record seabed reflectivity (termed 'backscatter'), which can be used in making seabed facies (or substrate maps). Muds generally give a weak or 'soft' reflection, sands are medium energy or 'harder' and cemented materials (limestones, or exposed rock) give the hardest reflection.

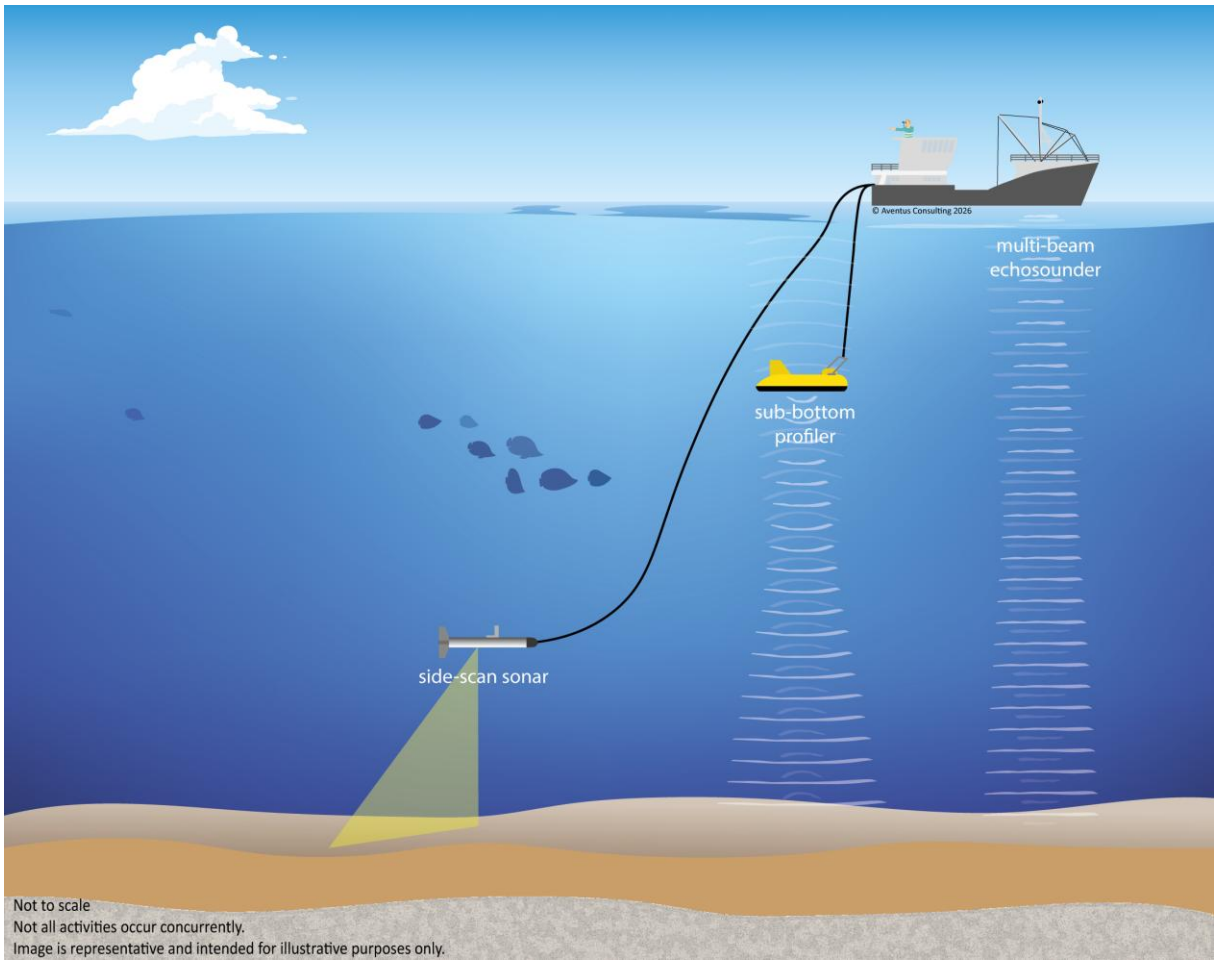


Figure 3.3: Simplified representation of pipeline geophysical survey techniques

Bathymetric data is acquired using an MBES from a transducer mounted to the base of a pole attached to the side of the vessel. An MBES acquires a wide swath (strip) of bathymetry data perpendicular to the vessel track and provides total seabed coverage with no gaps between vessel tracks. The number of beams may be up to 250 with a maximum sounding rate of 40 Hz. The MBES equipment is generally operated at tow speeds of 3-4 knots (5.5–7.4 km/hr).

Side scan sonar (SSS) is a hydro-acoustic technique used to detect hazards such as pipelines, lost shipping containers, boulders, debris, unmarked wrecks, reefs and craters. An SSS survey is undertaken by towing a sonar tow-fish over the pipeline. The tow-fish is equipped with a linear array of transducers that emit and later receive an acoustic energy pulse in a specific frequency range. Typically, a dual-channel, dual-frequency SSS is used. The acoustic energy received by the SSS (backscatter) is continuously recorded creating a 'picture' of the seabed that can be used to give an indication of the seabed texture. The resultant SSS image is created by assembling each swath of data into a georeferenced composite that represents the acoustic character of the seabed. All data is digitally recorded and allows for a geo-referenced mosaic of the data so

that a digital model of the seabed can be created. Interpretation of these data allow mapping of seabed features to take place, with particular emphasis on the pipeline (though surface geology, geomorphology, and other natural and man-made obstructions and debris can also be detected). The SSS tow-fish is typically towed at a speed of 3-4 knots (5.5–7.4 km/hr), approximately 10–15 m above the seabed (depending on water depth and the exact frequency) at a distance of about 150- 200 m behind the vessel. The SSS is towed and operated at the same time as the MBES.

Sub-bottom profiler Sub-bottom Profilers (SBPs) are devices for converting electrical energy into acoustic energy. They produce an acoustic profile which extends from the seabed down to the limit of penetration. SBPs are used to survey the shallow geology of an area, and as such have a lower output of acoustic energy compared to other geological survey techniques such as seismic surveys using airgun arrays. Acoustic emissions from SBPs are typically in the frequency range of 0.05 to 12 kHz, with peak sound pressure level (SPL) of up to 220 dB re 1µPa @ 1 m. There are three different types of SBP, which exhibit a trade-off in resolution versus depth of penetration based on the frequency of the acoustic signal:

- Very high frequency systems including pingers, parametric echo sounding and Compressed High-Intensity Radar Pulse (CHIRP) – produce a swept-frequency signal. CHIRP systems usually employ various types of transducers as the source. The transducer that emits the acoustic energy also receives the reflected signal. The beam width is usually between 15° and 55°. CHIRP system transducers are usually circular and point downwards. A CHIRP is normally hull-mounted when used for shallow water operations but may also be towed in a similar fashion to the SSS. This system uses an FM signal across a full range of frequencies, typically either 2-16 kHz or 4-24 kHz (low to high frequency). This SBP method is most likely to be used for pipeline surveys because CHIRP signals typically penetrate only about 5-10 m into the seabed and provide the best resolution.

- High-frequency boomers – consist of a circular piston moved by electro-magnetic force (comprising an insulated electrical coil adjacent to a metal plate). The high voltage energy that excites the boomer plate is stored in a capacitor bank. A shipboard power supply generates an electrical pulse that is discharged to the electrical coil causing a magnetic field to repel a metal plate. This energetic motion generates a broadband, high amplitude impulsive acoustic signal in the water column that is directed vertically downward. Boomer sources show some directionality, which increases with frequency. Although they can be considered omnidirectional for frequencies below 2 kHz, they are quite directional in the vertical. Boomers are mostly surface towed but may also be towed below the surface to avoid sea surface wave noise and movement. A boomer system is unlikely to be used for pipeline surveys as they penetrate far deeper into the seabed (up to 100 m below the seabed) than is required.

- Medium-frequency sparkers – are seismic sources that create an electric arc between electrodes with a high voltage energy pulse. The arc momentarily vaporises water in a localised volume and the vapour expands, generating a pressure wave. Sparkers can use the same capacitor bank as boomers. Sparkers provide low-resolution data to a much greater penetration depth below the seabed (~100 m). Sparkers are surface towed. A sparker system is unlikely to be used for pipeline surveys as they penetrate deeper into the seabed (>30 m below the seabed) than is required.

The receiver for the sparker or boomer system is usually a solid-state hydrophone or hydrophone array consisting of a string of individual hydrophone elements located within a neutrally buoyant synthetic hydrocarbon filled tubing. They typically contain 8 to 12 hydrophone elements evenly spaced in a tube that is 2.5 to 4.5 m in length and 25 mm in diameter.

The SBP system can be towed and operated at the same time as the MBES and SSS. Beach's Offshore Gas Victoria Geophysical and Geotechnical Seabed Survey EP, 2023 (A1044228) outlines further magnetometer survey activities.

3.8 Environmental Studies

Environmental studies have been undertaken throughout the platform's operational life to assess potential cumulative impacts associated with ongoing operations. These activities have included:

- Sediment sampling – to assess the impact of ongoing PFW discharges on the sediment surrounding the discharge point; and
- PFW plume verification – to confirm that the PFW modelling outputs are representative of the dispersion of produced formation water.

In addition to continuing with the above-listed studies, additional studies requiring the use of vessels within the Operational Area may be required to support planning for decommissioning. While the scope of these studies, if required, will be defined based on the outcome of desktop assessments yet to be completed, the studies undertaken will usually involve the mobilisation of a single vessel, using ROV equipment and potentially dynamic positioning consistent with that required for IMR activities described in Section 3.7. Marine study durations are usually 1-3 days and are not expected to exceed a week in duration.

3.9 Logistics

This section provides an overview on the logistics of providing transport for the supply of personnel, equipment and supplies to the Yolla-A platform.

3.9.1 Helicopters

The platform has a cantilevered helideck. Helicopters are the primary form of transport for crew changes and transfer of day visitors to and from Yolla-A platform as well as the preferred means of evacuation. The current service provider is IHS, using a Sikorsky AW139. There are no helicopter refuelling facilities on the platform; helicopters carry enough fuel to travel to the platform and return.

The approximate flight time (one way) between the helicopter base at Tooradin and the Yolla-A platform is 45 minutes. The change to normally manned operations with periods where the platform is unmanned has not changed the helicopter flight schedule to Yolla where there are approximately three return helicopter flights per month to the platform.

A weather station on the platform transmits weather data to LLGP control room. This allows the helicopter pilots to obtain real-time weather information before departing base. The platform has helicopter radio communication links and a non-directional beacon (NDB) for helicopter navigation purposes.

3.9.2 Bunkering Facilities

The Yolla-A bunkering station is located near the pedestal crane on the east face of the main deck. Hoses are provided for the bunkering of diesel (as outlined in Section 3.5.11, diesel is currently transferred to the platform using ISBs) and fresh water is transferred from supply vessels as detailed in the Bunkering Operations Procedure (CDN/ID 3973929).

3.9.3 Vessel-related Emissions and Discharges

Routine emissions and discharges associated with supply vessels, as well as vessels used for maintenance activities, are relevant only when the vessel is within the 500-m PSZ of Yolla-A (or working along the pipeline for maintenance activities), and include:

- Atmospheric emissions – fuel consumption.
- Liquid discharges – cooling and brine water, treated sewage and grey water, bilge water and deck drainage.
- Solid waste discharges – putrescible waste.

The environmental risks associated with any vessel used to support BassGas operations and maintenance include:

- Accidental discharge of waste to the ocean.
- Introduction of invasive marine species.
- Interference with third-party vessels.
- Vessel collision with megafauna.
- Hydrocarbon spill, such as an MDO spill.

3.9.4 Field Support Vessels

A platform supply vessel (PSV) visits the Yolla-A platform approximately once every 3 months during normal basic manning to deliver:

- Food.
- Diesel and production chemicals.
- Maintenance equipment and materials.

The PSV returns domestic and industrial waste generated on Yolla-A platform to shore, generally operating out of Port Anthony (Barry Beach) in Corner Inlet (about 159 km/86 nm travel from Yolla-A, taking 10-16 hours sailing time). The Port of Hastings (Western Port Bay), Victoria Dock (Melbourne) and Corio Quay (Geelong) are used as back up ports.

Beach uses locally available domestic or imported vessels where possible, however, where such vessels are not available, Beach may use vessels sourced internationally. PSV contractors are pre-qualified prior to engagement, and they must demonstrate they have a rigorous HSE Management System onboard in accordance with the requirements Beach's marine assurance processes including the Beach Service Provider Competency Management (CDN/ID 18985423).

Beach ensures that PSVs owners are members of the International Association of Classification Societies (IACS) and have valid OVID inspection, and current certificates and insurances. Beach inspects all contracted vessels for flag and class compliance based on industry format (OVID or eCMID) at least once annually using

qualified marine surveyors and performs desktop and in-person review (where possible) every time a vessel is engaged in accordance with the Beach Vessel Assurance Guideline (CDN/ID 18994116).

3.9.5 Other Vessels

Certain operational activities will require the presence of additional offshore vessels:

- Standby vessels – for higher risk activities, such as work over water, heavy lifts, and well intervention. 1-2 times a year for work over water.
- ROV support vessels – for routine asset integrity inspections of the platform and pipeline (as described in Section 3.7.1).
- Diving support vessels – for maintenance and repair that cannot be completed with an ROV (as described in Section 3.7.2).

The Field Support Vessel Operations Procedure describes the requirements for all vessels operating within the facility PSZ and Cautionary Zone (500 m and 3 km radii around the platform, respectively). It includes procedures for vessel approach, cargo operations, communications and emergency response. It applies to all registered vessels capable of supporting BassGas operations.

Beach requires vessels used as part of its operations to hold valid Australian Quarantine Inspection Service (AQIS) certification for vessels entering from outside Commonwealth waters. Smaller, local vessels are not required to hold this certification.

3.10 Non-routine Operations

The Offshore Yolla risk register identifies loss of containment (LoC) from vessels, wells, platform and the RGP as the key risk during operations.

3.10.1 Loss of Containment

The likelihood for a LoC of gas or gas condensate from the offshore RGP is remote, taking the following factors into account:

- A catastrophic failure event is remote and the most likely scenario would be pin hole leaks due to corrosion.
- Failure at the HDD exit point is possible, however it would need to be a result of free span type issues. Surveys for pipeline free spans are routinely conducted and rectified (the most recent rectification works taking place in 2017, see Section 3.7.1), pipeline surveys in 2019 and 2024 showed no span rectifications required.
- If in a main shipping lane, it is possible that the anchor drag would result in rupture.

The most credible release location has been determined as the pipeline intersection with the shipping lane, approximately 5 km (3 nm) from the shore (at the pipeline's shore crossing point).

3.10.1.1 Loss of Containment - Wells

An uncontrolled release of hydrocarbons from Yolla-A may occur from a loss of well control (LoWC) caused by damage to wellhead equipment, a failure of process equipment or, in an extreme case, the collapse of the

platform from a collision or a catastrophic storm event (in the unlikely event of a SCSSSV failure to isolate reservoir fluids).

Loss of containment contingencies in the event of a LoWC of the Yolla Platform wells are described in detail in the WOMP (CDN/ID 3972817) and include 1) platform-based well kill or, 2) in the event that there is no access to the platform due to fire, the presence of a gas cloud or extensive structural damage, well kill via the drilling of a relief well.

Drilling a relief well is the most suitable source control strategy for an uncontrolled hydrocarbon release (LoWC) at Yolla-A where the platform is not accessible. Beach has considered the use of a well capping stack, but it has been discounted because the platform will need to be removed from location to gain access at the seabed to cut the conductor, surface casing and expose the 95⁄8" production casing to enable installation of a subsea cap. Subsea well capping is not an option if existing platform production wells are live (i.e., shut in at the TRSSSV).

Beach develops overarching Source Control Emergency Response Plans (SCERP) in accordance with Drilling and Completion Technical Standards, Australian Energy Produces (AEP) Source Control Guidelines and source control planning and procedures. The SCERP outlines response strategies to effectively manage LOWC events. In summary, the SCERP is broadly intended to:

- Provide purpose, direction and guidance to the Beach Emergency Management Team (EMT) and any established Source Control Incident Management Team (SC IMT)
- Ensure the health and safety of all personnel involved in well control operations
- Mitigate the environmental consequences which may arise from a well control event
- Mitigate the damage to assets and production as a consequence of a well control event
- Ensure the reputation of Beach and business partners are protected.

In the SCERP for Bass Basins, the primary method of source control is a dynamic well kill by intersecting the well bore below the release location via a relief well and circulating kill weight drilling fluid into the well bore, thus controlling the flow of hydrocarbons from the reservoir.

Beach has a Relief Well Plan (RWP) (Otway and Bass) (19060495) in place for implementation if required. These plans ensure that Beach has considered its response requirements in order to reduce the time required to initiate relief well drilling operations in the event of a blowout and to allow the relief well to be completed in the shortest time practicable.

The RWP estimates that it would take about 86 days to source a suitable drill rig, mobilise it to site, drill the relief well and kill and abandon the well. Two possible relief well locations have been identified based on seabed survey details and an analysis of prevalent wind directions (from the southwest) and surface current directions (towards the east).

The relief well drilling team will be sourced and mobilised as outlined in the RWP and SCERP.

3.11 Cessation of Production

3.11.1 End of Field Life

The Yolla Field is expected to reach its End of Field Life (EOFL) at the end of 2031, based on Beach's 2P reserves forecasts for Year Ending June 2026 (YEJ26).

The base case assumption for this EP is that the existing production operations will continue for the full duration of the EP (i.e., through to end of 2031). However, while an unlikely outcome, it is possible that Yolla production will cease during the term of this EP and therefore, as a contingency, activities for the cessation of production (CoP) and subsequent preservation phase are included within the scope of this EP, with these phases and the activities comprising them summarised in Table 3.11.

The EOFL estimate is based on Beach's current modelling, assumptions and best available understanding at the time of writing. Beach's technical reserves estimates, and the resulting end of field life estimates, are updated annually and are subject to external, independent audit. These estimates are subject to change over time, as a result of the following uncertainties:

- For field and wells with long production tails, projections for late-life production are inherently sensitive to subtle changes in assumptions and inputs, leading to variability in the various forecasts and estimates. In particular, non-steady-state production factors complicate forecasting of late-life production (e.g., 'swing/cyclic' production regimes, compressor performance and reliability, variation in short-term commercial nominations, etc).

- The outcome of any future production optimisation, development, change in operating model or asset re-purposing activities.

- The prevailing economic and operating conditions may affect the various cost and revenue factors which directly influence the economic life of the asset. This also extends to include the rate of commercial offtake into the Australian East Coast gas market (customer nominations).

Beach has various obligations to maintain current and up-to-date estimates for reserves and production forecasts in line with industry practice as well as market (ASX) and regulatory expectations. These estimates are subject to external, independent audit and are required to be disclosed on an ongoing basis to both the market and relevant stakeholder regulators, such as NOPTA & AEMO.

Beach also continues to assess production optimisation, life extension and alternate economic use projects for the Yolla offshore infrastructure, which may result in the useful life of the asset (either as a whole or in part) being extended beyond the estimated timeframes for cessation of hydrocarbon production described above. These evaluations and assessments are occurring in parallel with planning for decommissioning (see Section 3.13.9.

The potential for earlier-than-forecast cessation of production has been recognised as a planning risk. Ongoing production surveillance and reserves forecasting will provide early indication of declining field performance and support timely decision-making. During the late-life operations, Beach will progress planning for both CoP & Decommissioning, which will include:

- Periodic review of CoP assumptions,

- Maintenance of CoP & decommissioning schedules, and

- Progressive maturation of engineering and environmental assessments required to support CoP & decommissioning activities.

Where warranted, these activities will be accelerated to ensure CoP activities can be implemented in a timely manner. Studies for purging, cleaning & flushing of infrastructure have been front-end loaded within existing schedules with this risk in mind (see Section 3.13.9.4).

Table 3.11: Summary of Operations, Cessation of Production, and Preservation Phase activities relevant to BassGas.

	Operations Phase	Cessation of Production Phase	Preservation Phase
 **Indicative Timing**	End CY Up to end-2031 (nominal, based on 2P est).	H1 CY2032 (i.e. up to 6 months duration)	H1 CY2032 to H2 CY2036 (i.e. up to 5 years duration)
Status			
 **Wells**	Producing (4 wells)	All wells shut-in or suspended Annulus monitoring	All wells remain shut-in or suspended Annulus monitoring
 **Platform**	Manned Powered with produced gas with backup diesel generators & UPS	Unmanned Accommodation on standby Diesel generator & UPS during manned visits; Wind/solar/battery when unmanned. Depressurised, drained, purged and displaced to nitrogen	Unmanned Accommodation on standby Diesel generator & UPS during manned visits; Wind/solar/battery when unmanned. Preserved under nitrogen blanket Remote monitoring from LLGP
 **RGP**	Flowing gas Pressure monitored from LLGP	Liquids pigged to LLGP Depressured to flare & purged with nitrogen gas Pressure monitored from LLGP	Pressure monitored from LLGP
Activities			
 **Vessel Visits**	Quarterly	Monthly (assuming 3 - 6 vessel visits over a 6-month period)	Quarterly
 **Helicopter Visits**	3 return flights per week	3 return flights per week	Monthly

3.11.2 Technical Life Extension Studies

The technical life of the key BassGas system elements are presented below in Table 3.12.

Table 3.12: Technical Design Life of BassGas Infrastructure

Infrastructure Element		Installation Year	Design Life	End of Technical Life
Wells	Yolla 3 & 4	2004	25 years	2029
	Yolla 5 & 6	2015	20 years	2035
Yolla-A Platform		2004	25 years	2029
Raw Gas Pipeline	Offshore	2004	25 years	2029

Technical life extension is required as the current technical life is insufficient to reach the 2P EOFL in 2031. Life extension studies will commence in late 2026, assessing current infrastructure condition and revisiting design analyses linked to ageing to ensure infrastructure can safely and reliably support the additional life required for either the Alternate Use project (see Section 3.13.5) or completion of decommissioning. The life extension studies will focus on the following systems:

- Yolla-A platform topsides structures and sub-structure.
- BassGas offshore RGP.

The assessments will identify risks to ageing against known current condition. Fitness for purpose and remaining life assessments will also be performed for other safety critical equipment and plant prior to reaching their technical life to ensure their suitability for service beyond 2029.

3.11.3 Cessation of Production Activities

All CoP activities are intended to place the BassGas infrastructure into a preserved state that:

- Reduces risk and preserves optionality while awaiting and planning for decommissioning;
- Ensures assets are maintained in a condition that allows safe and efficient decommissioning; and
- Upholds requirements under Section 572 of the OPGGS Act.

The following list broadly outlines the CoP process and the details of how this will be achieved for each of the elements of the BassGas infrastructure (wells, platform and topside facilities and the RGP) are described in the following sections:

- Pig runs to clear majority of liquids from the RGP using produced gas from the wells;
- Shut in and isolate wells from topsides;
- Shut down platform facilities;
- Unload TEG to bulkies;
- Unload liquids in flare drum to pipeline or bulkies;
- Blowdown Yolla topside facilities pipework and vessels to flare;

- Blowdown of RGP to flare at LLGP;
- Nitrogen purge facilities and RGP;
- Install alternate power supply to gas generators (wind/solar/battery); and
- Mothball utilities and remove any superfluous chemicals and bulkies containing products of blowdown.
- Removal of surplus & redundant equipment & materials, using the platform crane and re-supply vessels.
    - This will be limited to minor items that can be removed within the crane's capacity, such as redundant pipework, small vessels, electrical equipment, waste materials and surplus chemicals. This does not include removal of major components (e.g. topside modules) using heavy lift vessels that will form part of a future decommissioning activity.

These CoP activities are intended to reduce or remove hydrocarbon inventory and preserve the condition of the Yolla infrastructure while awaiting decommissioning or repurposing. These CoP activities are not intended to permanently decontaminate the production infrastructure in situ.

- Permanent flushing and cleaning of major infrastructure elements, including separators, compressor modules, and pipelines, to remove residual contaminants will be undertaken as part of final decommissioning activities and are therefore outside the scope of this EP.
- Limited flushing and cleaning activities may be undertaken during this EP as part of the proactive removal of minor redundant equipment & materials from the platform. This activity is similar to existing vessel cleaning activities for internal inspections described in Section 3.7.4.
    - Wherever practicable, flushing and cleaning of removed equipment will be conducted onshore rather than offshore.
    - Where flushing or cleaning activities are required on the platform, they will be limited in scope and undertaken only to facilitate the safe removal, handling & transport of the equipment.

3.11.4 Wells

Consistent with the in-force Yolla-A WOMP, at the time of CoP, Beach will make a risk-based decision (by individual well) to:

- Shut-in the wells using SSSV and Xmas tree valves, and remove spools connecting the wells to other sources until it is decommissioned;
- Suspend the wells by way of a wireline-deployed tubing plug (contingent).

Wells will continue to be monitored from the LLGP via existing pressure transmitters installed on the xmas tree and annulus outlets during the CoP & preservation phases.

Any wireline intervention for well suspension would be conducted under the scope of the existing WOMP, Safety Case and this EP (see Section 3.4.3).

3.11.5 Yolla Platform

3.11.5.1 Production Systems

Upon CoP, the production system infrastructure (i.e. hydrocarbon-bearing process piping, vessels and equipment) will be de-pressured, drained of residual liquids, purged of hydrocarbon gas and placed under a nitrogen blanket for preservation. Nitrogen is not a greenhouse gas and does not contribute to GHG emissions.

- Immediately prior to CoP, the production system will be brought down to minimum pressures by producing back to LLGP. This will reduce the volume of gas directed to flare during subsequent de-pressuring.
- The downstream production system will be positively isolated from the wells by removing a piping spool downstream of the production wing valves and blinding off the flanges (i.e. 'air-gap').
- The topside systems will be blown-down to atmospheric pressure using the platform flare, consistent with standard operational procedures deployed in the event of a planned shut-down.
    - The total hydrocarbon-bearing volume of the Yolla topsides process system is estimated to be of the order of 80-100 m^3 (including pipework). This comprises of several isolatable vessels and pipework sections.
    - Depressurisation of the Yolla topsides process facilities is expected to release of the order of 7,000-10,000 Sm^3 of hydrocarbon gas. The majority of the topsides volume will be able to be directed to the flare, with cold venting limited to minor volumes which cannot be directed to the flare. Total emissions associated with de-pressuring the topsides are expected to be 30-50 tCO_2e.[6]
    - Data from the last shut down at Yolla (January 2026) shows minimal variance from the regular operational flaring at the platform during planned shut-down procedures. Where there are variances, flaring is observed to be less than routine operational flaring. The process of shutting down and de-pressuring is not expected to exceed normal operating parameters.
- Liquid hydrocarbons will be drained from vessels and pipework, and disposed of onshore consistent with operational procedures and controls.
    - Prior to CoP, liquids in the flare drum will be pumped into the pipeline and pigged to LLGP for disposal. The residual volume remaining at CoP will be unloaded to bulkies for transport to shore via vessel. It is expected that the maximum volume from the flare drum will be 1,000 litres.
- TEG will be unloaded to onboard bulkies for removal from the platform and onshore disposal.

Once sufficiently gas-freed, the production system will be purged and displaced with nitrogen for preservation. The produced water system will also be displaced to nitrogen and the filters removed for onshore disposal.

[6] Emissions are estimated in a manner consistent with the NGER (Measurement) Determination 2008.

- Nitrogen blanket pressure is expected to range from 200 to 500 kPag, requiring 300 to 600 Sm^3 of nitrogen. The nitrogen will be supplied by either:
    - Use of the existing Yolla Nitrogen Generator skid (V-7610) (if suitable & available), or,
    - Nitrogen cylinder banks transported to the platform by supply vessel. Approximately 4 to 8 nitrogen quad-banks will be required for the initial blanketing, depending on the selected blanket pressure.

During the preservation phase, the nitrogen blanket would be maintained through periodic monitoring and replenishment as required (see Section 3.12.2.2).

3.11.5.2 Utilities

During operations, power supply for the platform is provided by two gas turbine driven generators with fuel gas taken from the primary production stream. At CoP, when the wells are isolated and the topsides are placed under a nitrogen blanket, this fuel gas source will become unavailable, and the gas turbine generators will become redundant. The platform has a back-up emergency diesel generator, and it is planned that this will become the primary power supply and operate continuously whenever the platform is manned during the preservation phase. Diesel will be delivered by bulk storage container on an as-required basis (refer resupply).

When the platform is unmanned during the CoP & preservation phases, power demand will be significantly reduced compared to manned periods. During unmanned periods, power loads will be limited to the DCS, navigation aids, communications, lighting, monitoring and surveillance systems. The diesel generator is expected to be over-sized for such minor loads and therefore it is anticipated that a small-scale, combined wind-solar-battery system (monopod) or similar will be installed for this phase.

Once hydrocarbon inventory has been removed, some fire and gas systems associated with mothballed process areas may no longer be required, and are expected to be removed from service (subject to Safety Case revision).

Chemicals and materials no longer required for CoP or preservation activities will be removed from the platform. This includes methanol, oils, degreasers, TEG, recovered hydrocarbons, and other residual products generated during blowdown, draining and purging activities.

The Scope 3 emissions associated with CoP will be significantly lower than operations, as 93% of Scope 3 emissions are attributed to Category 11 *Use of sold products*, and production will have ceased. Category 1 *Purchased goods and services* is expected to be the most significant contributor to Scope 3 emissions, as support is engaged for the CoP process as needed. Vessels and helicopters are expected to still be in use, resulting in Category 4 *Upstream transportation and distribution* emissions.

3.11.6 Yolla Raw Gas Pipeline

3.11.6.1 Pigging

In the late stages of production, a programme of pipeline pigging activities will be performed, using the existing pigging facilities at the platform and at the LLGP, consistent with normal operational procedures (utilising production gas). The objective of these pigging activities is to sweep residual hydrocarbon liquids from the RGP to the LLGP.

- Purged liquids and gas from the pipeline pigging activities will be handled by the facilities at the LLGP. GHG emissions associated with flaring at LLGP from this process would be reported under NGER for the facility.

- Based on the most recent pigging of the RGP (February and April 2024), there was no discernible increase in flaring at LLGP. Liquids were processed by LLGP and sent to inventory, and GHG emissions associated with this processing were reported under NGER requirements for LLGP.

3.11.6.2 Pipeline Blowdown and De-Pressuring

Upon CoP, the RGP will be de-pressured with hydrocarbon gas directed to LLGP for processing and export until the RGP pressure reduces below the minimum inlet pressure for LLGP operations (currently 4,500 kPag, with engineering studies in progress to lower this limit). This gas volume will be processed and exported as sales gas.

At this point, plant processing will cease with remaining residual gas in the RGP being re-directed to flare. It is expected that the RGP would be blown-down from ~4,500 kPag to close to atmospheric pressure resulting in ~700,000 Sm^3 of remaining raw gas inventory being directed to flare, with associated GHG emissions of ~3,300 tCO_2e.

Nominally, the residual gas would be directed to the LLGP flare system, but may be flared at Yolla if this is deemed preferable at later time. In either case, the emissions arising from de-pressuring the RGP will be included in the relevant facility NGER report.

3.11.6.3 Nitrogen Purging & Preservation

Once de-pressurised to atmosphere, the RGP will be purged of remaining hydrocarbon gas using nitrogen, and placed under a nitrogen blanket for preservation until the pipeline is either decommissioned or put into service for an alternate use. The purpose of the nitrogen blanket is to preserve the RGP by:

1. Keeping the line positively pressurised relative to atmosphere so as to minimise air and moisture ingress.

2. Avoid creating unnecessary stored-energy risk, with an inert gas stored at lower pressure.

3. Allow pressure decline monitoring as an integrity indicator.

Nitrogen blanket pressure will be determined during detailed planning, but is expected to be within a range of 500 to 1,500 kPag, leading to initial nitrogen requirements of 90,000 to 260,000 Sm^3 to purge and fill the pipeline. It is expected that nitrogen will be introduced into the RGP from LLGP, using either:

- Bulk liquid nitrogen tankers with an ambient vaporiser at LLGP; or

- A temporary nitrogen generation unit at LLGP.

The Yolla nitrogen generator may also be considered as a supplementary nitrogen source, but has insufficient output to be the primary nitrogen source on its own.

Following depressurisation of the RGP to atmospheric pressure, ~15,500 Sm^3 (~0.55 MMscf) of raw gas will remain in the pipeline. As nitrogen is introduced, the residual hydrocarbons will be displaced towards the Yolla platform and routed to flare until the hydrocarbon concentration is insufficient to sustain stable combustion, resulting in GHG emissions of ~73 tCO_2e.

Nitrogen purging will continue until pre-determined endpoint criteria are achieved, which may include hydrocarbon concentrations below a specified percentage of the Lower Explosive Limit (LEL) and confirmation that the pipeline atmosphere is non-flammable. Following completion of nitrogen purging, any remaining hydrocarbon inventory within the pipeline is expected to be immaterial and insufficient to present a credible fire or explosion hazard. At this point, the pipeline will have been filled with inert nitrogen and will be isolated.

3.11.6.4 Isolation & Preservation

The Yolla facility will be positively isolated from the RGP through the installation of blinds in any interconnected pipework. Similarly, the RGP will be positively isolated from the LLGP at a suitable location.

The pipeline pressure will continue to be monitored at both the Yolla & LLGP ends. At Yolla, the pressure transmitter will be relocated to the downstream side of the Last Valve Off (LVO).

During the preservation phase, the nitrogen blanket will be maintained through periodic monitoring and replenishment as required. Pressure decline may occur due to temperature variation, minor leakage across isolation barriers, or other mechanisms. Pressure and temperature trends will be monitored to verify preservation performance and identify abnormal losses. Periodic nitrogen top-up campaigns (nominally at LLGP) may be required to maintain the RGP above the minimum preservation pressure and ensure continued exclusion of oxygen and moisture.

3.12 Preservation Phase

3.12.1 Maintaining Property to Enable Decommissioning

Under subsection 572(2) of the OPGGS Act, a titleholder must maintain property within a title and 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. Yolla-A, its wells and the RGP will be maintained in a preserved state (the 'Preservation Phase') following CoP until they are decommissioned to the agreed end-state. Table 3.13 summarises how the activities comply with Section 572 of the OPGGS Act.

Table 3.13: Compliance with OPGGS Act Section 572

Requirement	Response
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.	Compliance is achieved by implementing Beach's IMR programs (see Section 3.7 of this EP). The inclusion of all infrastructure, plant and equipment within the CMMS (broken down to component-specific functional locations) ensures that maintenance is effectively scheduled, executed and recorded, consistent with integrity management plans and maintenance strategies.

	MOC(s) relating to the CoP will ensure that the maintenance plans within the CMMS are updated to appropriately reflect the maintenance requirements, tasks, frequencies and scopes that will apply during the preservation phase.
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 the title area; and (b) used in connection with the operations authorised by the permit, lease, licence or authority	The scope of this EP does not cover the removal of any structures, equipment or other property. Planning for decommissioning is covered in Section 3.13 of this EP and would be the subject of activity-specific EP(s). As equipment is removed or otherwise decommissioned, the MOC process will drive updates to the Asset Register within the CMMS. If any equipment is retained in the title areas after the decommissioning process is complete, the Asset Register will be updated to reflect this.
Section 572(7) This section has effect subject to: (a) any other provision of this Act; and (b) the regulations; and (c) a direction given by NOPSEMA or the responsible Commonwealth Minister under: (i) Chapter 3; or (ii) this Chapter; and (d) any other law.	

3.12.2 Ongoing Activities During Preservation Phase

A range of activities will be required to continue to be performed during the preservation phase, in order to monitor and maintain the safety and integrity of the infrastructure, to comply with environmental monitoring commitments, and to support planning for decommissioning.

Broadly, the scale and type of these ongoing activities will be the same as during the production phase, as described elsewhere in this EP. However, it is anticipated that some activities will be performed less frequently in the preservation phase than for the production phase. Any changes in maintenance frequency or scope will be managed under MOC prepared for cessation of production.

Activities that will be ongoing into the preservation phase are generally consistent with IMR activities as described in Section 3.7 although potentially at a reduced frequency (see also Section 3.12.3). These activities include:

- Planned preventative maintenance, testing, inspection, calibration and integrity management activities, as well as any arising corrective maintenance work (see Section 3.7).
- Environmental monitoring and studies, including sediment sampling and water quality monitoring (see Section 3.8).
- Associated logistics and resupply operations including helicopter flights, vessel & cargo operations (see Section 3.9)
- Pre-decommissioning activities, including:

- Removal of surplus and redundant equipment & materials, using the platform crane and re-supply vessels.
    - This will be limited to minor items which can be removed within the crane's capacity, such as redundant pipework, small vessels, electrical equipment, waste materials & surplus chemicals. This does not include removal of major components (e.g. topside modules) using heavy lift vessels which will form part of a future decommissioning activity.
- Engineering inspections, assessments and surveys to inform decommissioning planning
- Minor structural works (limited to within the capacity of the existing crane), including installation of lifting points, structural bracing/frames, access improvements, preparation for well P&A & sea-fastening.

3.12.2.1 Wells

Ongoing monitoring and maintenance of the wells during the Preservation Phase will be undertaken in accordance with the in-force WOMP and will include:

- Ongoing monitoring of well pressures (existing transmitters to remain in service),
- Annulus pressure management, including contingent pressure bleed-off
- Periodic inspection, testing and greasing of xmas trees and wellhead valves every 2 years.

The SSSVs & XMTs will be isolated closed such that testing requirements during the preservation phase may be reduced.

3.12.2.2 Yolla Platform

The platform will be not normally manned during the preservation phase, with personnel visits to be undertaken on an as-required basis. Remote monitoring of the platform from LLGP will be ongoing. The Distributed Control System (DCS) will remain operational to support remote monitoring and facility preservation.

Visits to the platform for scheduled IMR and monitoring activities, as well as for the execution of preservation activities or decommissioning studies, are expected to occur on a quarterly basis. Fewer than eight personnel are anticipated to be on site during any single visit. Where these activities require multiple days to complete, they are expected to be supported through day-trip operations via helicopter, without the use of overnight accommodation facilities. In the unlikely event that a more extensive IMR or monitoring campaign is required, the platform's accommodation facilities may be utilised.

Re-supply activities are anticipated to occur infrequently, potentially on a quarterly basis and coordinated with other offshore campaigns, such as IMR activities, to minimise vessel movements. Re-supply requirements are expected to be limited to consumables necessary to support ongoing preservation and integrity management of the installation, including nitrogen cylinder banks for maintenance of the topsides nitrogen blanket, diesel fuel for emergency power generation and other

essential maintenance materials or spare parts. Any re- supply activities will be undertaken using existing marine logistics arrangements and operational controls.

During the preservation phase, a positive nitrogen pressure will be maintained within the Yolla topsides process facilities to prevent the ingress of oxygen and moisture and minimise the risk of internal corrosion. Nitrogen pressure will be maintained using pressure-regulated nitrogen supply connected to the preserved process system. Nitrogen will be supplied either by the existing Yolla nitrogen generation package (V-7610), if available and suitable for ongoing preservation duty, or by nitrogen cylinder banks transported to the platform by supply vessel.

Preservation under a nitrogen blanket reduces internal corrosion mechanisms and supports maintenance of vessel integrity during the preservation period. Vessel inspection and integrity assurance requirements will continue to be managed in accordance with the facility Safety Case, integrity management system and applicable regulatory requirements.

Power demand while the platform is unmanned will be low and limited to essential systems for monitoring, surveillance, communications, lighting and navigation aids. A small-scale, combined wind-solar-battery system (monopod) or similar will be installed to service these loads. The diesel generator is expected to operate only when the platform is being manned (e.g. well intervention, maintenance campaigns, pre-decommissioning activities). Short-term redundancy will continue to be provided by the existing Uninterruptable Power Supply (UPS) systems.

Both the platform helideck and the crane will be maintained in service to support helicopter and cargo operations.

The accommodation module will be retained in a standby condition to support future activities. The HVAC system, refrigerators and freezers will be de-energised and reverse osmosis (RO) unit will be put in a preserved state. The lavatory will be either be ‘free dumping’ or have a storage system that is changed over during visits. Waste generated during visits will be managed in accordance with the facility waste management arrangements.

During the preservation phase, discharges from the platform will be restricted to rainwater run-off and operation of a free dumping toilet during occasional platform inspections (quarterly).

3.12.2.3 Yolla Raw Gas Pipeline

During the preservation phase, the RGP will be maintained under a positive nitrogen blanket to prevent oxygen and moisture ingress and minimise the potential for internal corrosion.

- Pipeline pressure and temperature will be monitored periodically from LLGP and trended to verify preservation performance and identify abnormal pressure losses.
- Where pressure declines below the nominated preservation threshold, nitrogen will be replenished from LLGP through periodic top-up campaigns using either bulk liquid nitrogen and vaporisation equipment or a temporary nitrogen generation unit.
- Top-up frequency and volume will be determined by observed pressure decline rates and will provide an ongoing indication of isolation barrier performance and pipeline integrity.

The nitrogen blanket will be maintained until the RGP is either decommissioned or brought back into service for an approved alternate use.

3.12.3 Comparison with Routine Operations

Table 3.14 summarises the comparison of routine operations with the preservation phase.

Table 3.14: Comparison between routine operations and the preservation phases

Activity	Difference	Description
Wells		
Production	No longer producing. Wells will be shut in on XMT & SSSV, and/or suspended with tubing plug	Section 3.11.4 & 3.12.2.1
Monitoring	No change – annulus pressure monitoring ongoing.	Section 3.11.4 & 3.12.2.1
Wireline Intervention	Contingent - One intervention campaign across four wells may be required to suspend the wells with a tubing plug.	Section 3.4.3
Platform		
Gas dehydration and compression	No longer required – not operational. Placed under nitrogen blanket.	Sections 3.5.1, 3.5.2, 3.5.4 & 3.5.5
PFW treatment	No longer required – not operational.	Section 3.5.6
Open drains	No change – will be retained in existing form and will function in the same manner.	Section 3.5.7
Closed drains	No change - retained in existing form. It will not be required as there will be no liquids from process areas.	Section 3.5.8
Dump caisson	Dump caisson and pump will remain in service.	Section 3.5.9
Flare system	Not required – no gas inventory on platform.	Section 3.5.10
Diesel storage	Required for crane operation and power generations during manned visits.	Section 3.5.11
Chemical injection	Not required – topsides pipework will be purged and displaced with nitrogen. Chemical tote tanks will be removed from the platform.	Section 3.5.12
Hazardous substances (propane gas, nitrogen gas, FFF)	Nitrogen cylinders remain to support nitrogen blanket, along with FFF. Propane gas will be removed from the platform.	3.5.13
Waste disposal	Reduced waste generation due to reduced activity. Existing waste management processes.	3.5.14
Accommodation	Day visits only. Placed in standby mode. HVAC, fridge, freezers, RO unit isolated and suspended. Lavatory converted to free-dumping type.	3.5.15
Communications	No change - retained and used in existing form. Powered by wind/solar/battery system.	3.5.16
Navigational aids	No change - retained and used in existing form. Powered by wind/solar/battery system.	3.5.17

Activity	Difference	Description
Lighting	No change - retained in existing form. Deck lighting only used during personnel visits.	3.5.18
Nitrogen Blanket	New activity - Monitored from LLGP via DCS or via manual gauges during visits. Contingent top-up to maintain pressure. Use existing nitrogen generator or quad packs.	Section 3.11.5
Offshore RGP		
Pigging	At CoP, the RGP will be pigged (contents pushed to LLGP) and then purged with nitrogen. No further pigging is expected during the Preservation Phase until transition to Alternate Use or Decommissioning.	Section 3.6.2
Nitrogen Blanket	New activity - Monitored from LLGP with pressure transmitters at LLGP and Yolla. Contingent top-up to maintain pressure from LLGP	Section 3.11.6.3
IMR		
ROV inspections	No change.	Section 3.7.1
Diving activities	No change – remains contingent for specific NDT & repair activities	Section 3.7.2
Fabric maintenance	No change.	Section 3.7.3
Pressure vessel inspection	Likely reduced as vessels removed from service, subject to statutory codes & IMP	Section 3.7.4
Pipeline surveys and monitoring	No change.	Section 3.7.5
Logistics		
Helicopters	Fewer visits – reduced from 3 return flights/week to monthly return flights.	Section 3.9.1
Bunkering	No change - contingent requirement.	Section 3.9.2
Field support vessels	No change – potential for reduced frequency.	Section 3.9.4
Other vessels	No change.	Section 3.9.5

3.13 Decommissioning

Decommissioning is the timely, safe, and environmentally responsible removal of, or otherwise satisfactorily dealing with, offshore petroleum infrastructure that is no longer in use. It is a mandatory and inevitable stage in the lifecycle of an offshore oil and gas project.

Decommissioning of the Yolla offshore infrastructure will not take place during the life of this EP and are therefore not included within the scope of this EP. Decommissioning activities will be addressed with a future EP (or EPs) outlined in Table 3.22. However, decommissioning activities are notionally described here to provide context for Beach's planning for future phases.

3.13.1 Beach's Approach to Decommissioning Planning

Decommissioning is accepted as a normal activity in the petroleum asset lifecycle with the goal of responsibly managing the transition of property, infrastructure and equipment at the end of its economic useful life.

This includes work activities like plugging and abandoning (P&A) of wells, removal of property and infrastructure, preparation for any alternate end states where agreed, and site remediation. Such activities are required to satisfy a range of commitments (such as regulatory obligations, technical standards, stakeholder expectations) and must be performed prior to relinquishing a title/licence/lease.

Decommissioning planning is a continuous process performed over the life of an asset, with the objective to refine the decommissioning plans and cost estimates based on updates to information sources (e.g. knowledge from industry peers, new technology). As the end of economic life of an asset gets closer, the level of planning detail and cost accuracy becomes more developed.

Beach's process for decommissioning planning is summarised by Figure 3.4 and is intended to align with NOPSEMA's decommissioning timeline reflected as Figure 3.5.

- During the development and operational phases of an asset's life, decommissioning planning will focus on high-level plans, studies and estimates to inform financial models and restoration provisions.
- As assets approach and enter late-life operations (i.e. CoP Year -5), decommissioning planning will address specific issues in greater detail.
    - Priority will be placed on addressing the most material uncertainties and more clearly defining the target end-state for each piece of infrastructure.
    - Preparations for CoP activities will also be developed into execution-ready plans.
    - Pre-decommissioning activities may be performed, such as the pre-emptive removal of infrastructure as it becomes redundant, P&A of expired wells and preparatory works in support of final decommissioning activities (e.g. install lifting points, reinforcing, jacking systems etc).
- Initiation of a decommissioning project will commence during the late-life operation phase, with the project progressing through a series of maturation stages (Identify, Assess, Select, Define) in accordance with Beach's Capital Assurance Framework.
    - Preparation and submission of regulatory approvals for decommissioning will be performed by the project team, informed and supported by work performed during the preceding phases.
    - Final Investment Decisions for decommissioning projects will be sought following acceptance of regulatory approvals but prior to CoP.

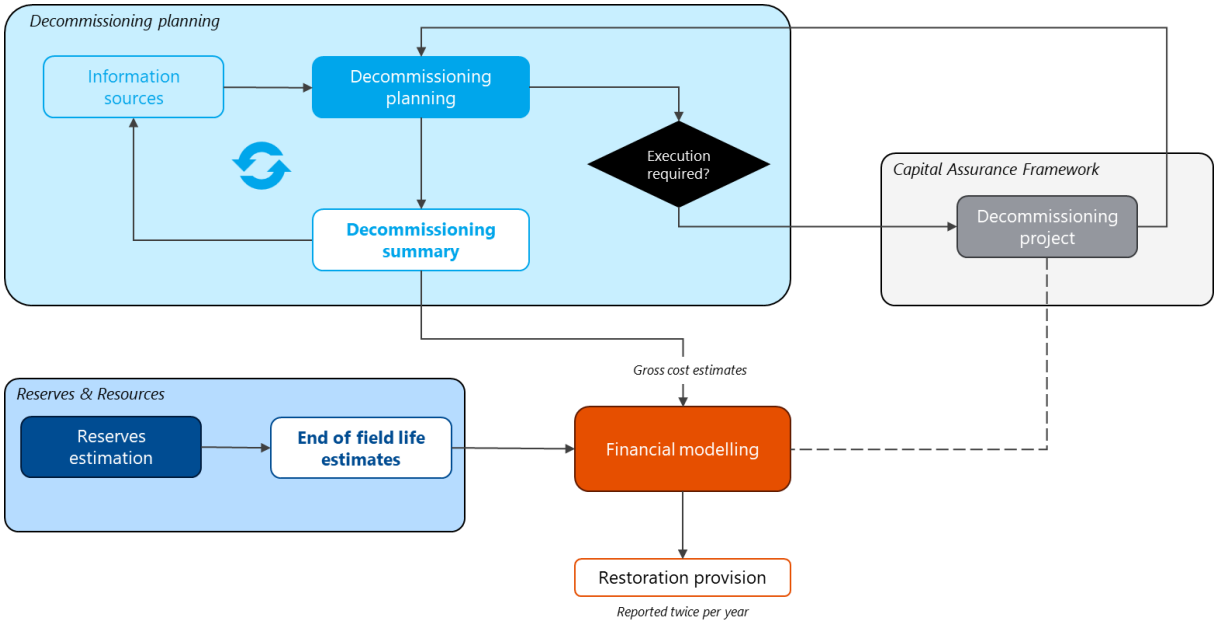


Figure 3.4: Beach Decommissioning Planning Process

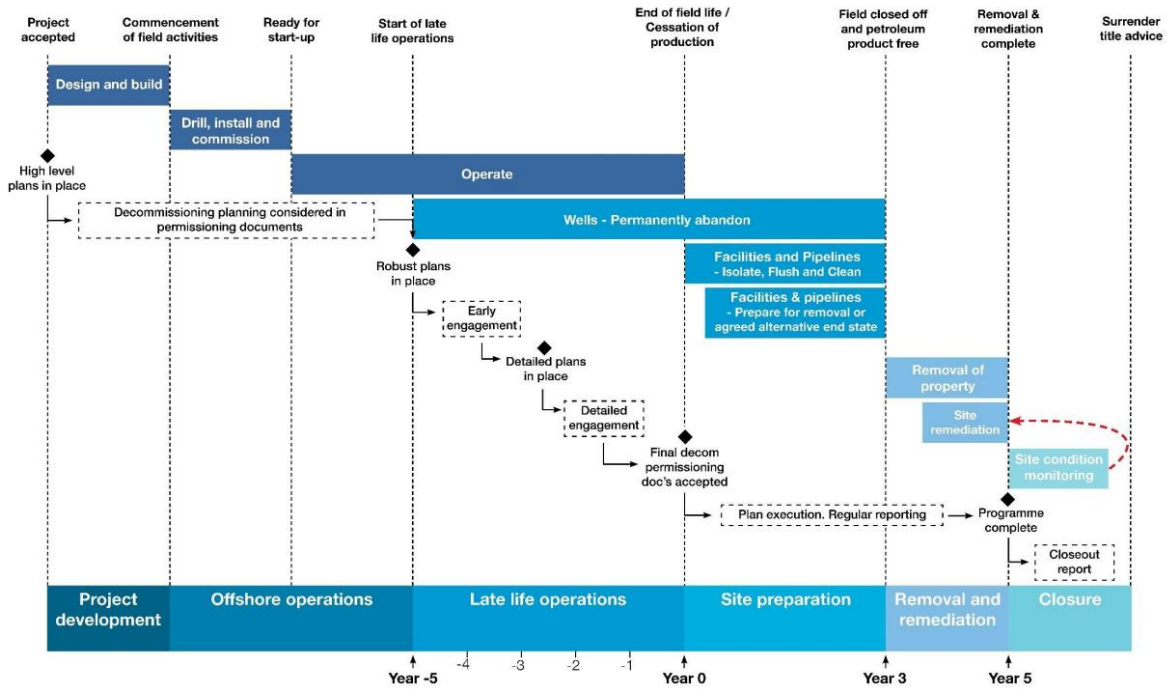


Figure 3.5: NOPSEMA Decommissioning Planning Timeline

3.13.2 Regulatory Context

In Australian Commonwealth waters, decommissioning of offshore oil and gas infrastructure is governed by a comprehensive regulatory framework (Table 3.15).

The primary legislative instrument is the OPGGS Act 2006 and its accompanying regulations, which are administered by DISR and NOPSEMA. DISR is responsible for policy and regulation development, while NOPSEMA fulfils the role of Australia's independent regulator for health, safety, integrity and environmental management of offshore oil and gas activities within Commonwealth waters.

Table 3.15: Offshore Decommissioning Regulatory Guidance

Title	Reference
Australian Government guidance for removal of oil and gas property and sea dumping of infrastructure in Commonwealth waters on May 15, 2026	May 2026
NOPSEMA Decommissioning Compliance Strategy 2024-2029	A927433, v0 November 2023
NOPSEMA Information Paper: Planning for proactive decommissioning	A816565, 31 March 2026
NOPSEMA Policy: Section 572 Maintenance and removal of property	A720369, 31 March 2026
NOPSEMA Policy: Section 270 Consent to surrender title – NOPSEMA advice	A800981, 31 March 2026

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. The scope of the activities covered by this EP does not include property removal or title surrender. Table 3.16 summarises how the activities comply with Section 270 of the OPGGS Act.

Table 3.16: Compliance with OPGGS Act Section 270

Requirement	Response
Section 270(3) The Joint Authority may consent to the surrender sought by the application only if the registered holder of the permit, lease or licence: (c) has, to the satisfaction of NOPSEMA, removed or caused to be removed from the surrender area all property brought into the surrender area by any person engaged or concerned in the operations authorised by the permit, lease or licence; or made arrangements that are satisfactory to NOPSEMA in relation to that property (d) has, to the satisfaction of NOPSEMA, plugged or closed off all wells made in the surrender area by any person engaged or concerned in the operations authorised by the permit, lease or licence (e) has provided, to the satisfaction of NOPSEMA, for the conservation and protection of the natural resources in the surrender area; and (f) has, to the satisfaction of NOPSEMA, made good any damage to the seabed or subsoil in the surrender area caused by any person engaged or concerned in the operations authorised by the permit, lease or licence.	Planning for decommissioning is covered in Section 3.13 of this EP indicting that preparation of activity specific EP(s) demonstrating compliance with Section 270(3).

The EPBC Act environmental approval decision for the BassGas Development (2001/321) states that decommissioning must not commence unless an EP for decommissioning is in place.

In addition to the OPGGS Act, if a titleholder proposes leaving property and infrastructure in the sea, approvals under the Environment Protection (Sea Dumping) Act 1981 (Cth) are also required. The Sea Dumping Act is administered by the DCCEEW. This means that approvals from both NOPSEMA and DCCEEW are required for the in-situ decommissioning of oil and gas infrastructure.

3.13.3 Planning for Proactive Decommissioning

Beach commits to the principles outlined in NOPSEMA's Decommissioning Compliance Strategy 2024-2029. When specifically considering the offshore BassGas infrastructure, the following principles are the most pertinent in practice:

- All wells are P&A within 3 years of the production system ceasing production.
- All structures, equipment and property (including pipelines, platforms and all other subsea infrastructure) that forms part of a production system are decommissioned to approved end-state as soon as reasonably practicable and no later than 5 years from that production system permanently ceasing production.
- Subsea structures, equipment and property to be decommissioned progressively as it ceases to be used, over the operating life of the project, to an approved end state as soon as practicable or otherwise as agreed by NOPSEMA.

The EPBC Act environmental approval decision for the BassGas Development (2001/321) states that decommissioning must not commence unless an EP for decommissioning is in place.

3.13.4 Infrastructure Register

All offshore BassGas infrastructure is listed in Table 3.17 and will remain operational through to CoP (see Section 3.11). Table 3.18 lists the dimensions and weights of the components that comprise Yolla-A, and Table 3.19 lists the ancillary pipeline components and support structures for the offshore RGP.

Table 3.17: BassGas Offshore Infrastructure Register

Infrastructure	Status	Installation Year	Location	Description
Yolla-A Platform	Operational	2004	See Figure 1.1	Self-installing 'Drill Ace' Steel jacket with a concrete suction/gravity base Water depth: ~80m Total mass: 8,178 t See **Error! Reference source not found.** for dimensions & weights by major component.

Infrastructure	Status	Installation Year	Location	Description
Offshore RGP	Operational	2003-2004	See Figure 1.1	Total length: 147 km long ○ ~141.8 km in Commonwealth waters ○ ~5.6 km (3 nm limit) in Victorian State waters Outside diameter: 14 inch (355.6 mm) Carbon Steel 450 Grade (sour service) Wall thickness: 12.0 mm / 12.7 mm Coating: 5 mm thick asphalt enamel under 30-60 mm thick concrete weight coating Laid on seabed (not trenched) 1.4 km HDD shore crossing at Kilcunda See **Error! Reference source not found.** for inventory of associated pipeline structures & appurtenances.
Production Wells	Operational	Yolla 3 & 4 - 2004 Yolla 5 & 6 - 2015	Yolla-A Platform	Conventional gas production wells. Refer WOMP for detailed well descriptions and construction information.
Other	No other infrastructure or property on title.			

Table 3.18: Dimensions and weights of the Yolla platform

	Component	Dimensions (L x W x H)	Weight (tonnes)
Original Installation	Gravity/Suction-cassion base	50 m x 50 m x 5.4 m	2,115
	Jacket tower	20 m x 24 m x 105 m	1,832
	Deck hull structure	50 m x 42 m x 7.6 m	1,548
	Topsides equipment and bulks	50 m x 42 m	1,386
	Well bay equipment	-	200
2015 MLE Project	New LQ module	30 m x 6 m footprint	550
	New compressor module	24 m x 5 m footprint	499
	Condensate module	8 m x 8 m footprint	48
Total			**8,178**

Table 3.19: Ancillary pipeline components and support structures for the Yolla Raw Gas Pipeline

Ancillary Item	Total Quantity	Location - KP
Groutbag(s)	34	3.895, 4.46, 4.964, 5.348, 5.421, 6.052, 6.211, 6.647, 16.667, 115.276, 115.295, 119.056, 119.077, 119.198, 119.211, 119.396, 119.403, 119.421, 119.433, 119.448, 119.46, 119.464, 119.56, 120.268, 120.303, 120.309, 120.978, 120.981, 120.988, 121.007, 124.658, 124.859, 125.52, 127.334
Multi-layered Groutbags	5	7.988, 124.712, 127.293, 127.298, 145.635
Grout Mattresses	2	5.848, 6.011

Ancillary Item	Total Quantity	Location - KP
Concrete Saddle	1	120.99
Cable Crossings	4 current (+1 planned)	Alcatel Indigo Cable Crossing - KP 55.669 Telstra Bass Strait-2 Fibre Optic Cable Crossing - KP 70.8 SubCom Hokomoana Fibre Optic Cable Crossing - KP 85.251 SubCo SMAP Fibre Optic Cable Crossing - KP 96.339 Tasman Ring Network Cable (planning in progress for installation in late 2028) – approximately KP 99.7

3.13.5 Asset Repurposing & Alternate Use

Beach is assessing options to re-purpose parts of the offshore Yolla infrastructure for other economic uses. Preliminary evaluation indicates that there is a standalone business opportunity which is supported by under-supplied market demand and which clears Beach's investment hurdle. Beach is actively progressing a project to evaluate and develop this opportunity, with a view to reaching FID in 2028.

The re-purposing opportunity utilises the Yolla platform, topsides, pipeline and LLGP, but does not require the platform wells. In all (current) cases, the wells will need to be P&A within 3 years of CoP.

For any alternate use project to proceed, a new set of regulatory approvals will be required, including a new EP specific to the Alternate Use, along with a FID. In the absence of those pre-requisites being achieved, the base case is for Yolla-A and the offshore RGP to be decommissioned within 5 years of CoP. Table 3.20 summarises the decommissioning scope with and without the Alternate Use.

Table 3.20: Decommissioning scope - with and without Alternate Use

Infrastructure	With Alternate Use		No Alternate Use
	Alternate Use	Decommission	Decommission
Wells	✗	✓	✓
Platform – MLE Modules	?	?	✓
Platform – Topsides	✓	✗	✓
Platform – Hull & Jacket	✓	✗	✓
Platform – Base	✓	✗	✓
Offshore RGP	✓	✗	✓

3.13.6 End States

The decommissioning end state is the regulator-accepted final condition of the infrastructure and its adjacent environment once decommissioning activities have been completed. At this point, all decommissioning obligations have been met and residual environmental and safety risks have been reduced to ALARP.

The retention of infrastructure for an Alternate Use does not constitute a decommissioning end state. Infrastructure supporting an Alternate Use will remain subject to future decommissioning and will ultimately be required to achieve an accepted decommissioning end state in due course.

Under section 572(3) of the OPGGS Act, titleholders are required to remove structures, equipment and other property that are no longer used, or intended to be used, in connection with authorised operations. Consistent with NOPSEMA's Section 572 Policy, complete (full) removal is therefore adopted as the decommissioning reference case against which any alternative arrangement proposed under section 572(7) is assessed.

The regulatory framework recognises that full removal may not always be technically feasible, practicable, or represent the optimal decommissioning outcome when environmental, safety, technical, social and economic factors are considered holistically. Under section 572(7) of the OPGGS Act, titleholders may propose alternative arrangements for dealing with property that differ from the default requirements in section 572(3). Alternative arrangements, including partial removal or in-situ decommissioning, may be considered where it can be demonstrated that the proposed end state delivers acceptable environmental and safety outcomes, reduces residual risks to ALARP, and is consistent with the principles of Ecologically Sustainable Development.

Any alternate end state must be accepted by the relevant regulators through the applicable approvals process. This includes acceptance by NOPSEMA through an EP and, where required, approval by the NEPA under the sea dumping framework. Additional guidance on circumstances in which infrastructure may be permitted to remain in situ is provided in the *Australian Government Guidance for Removal of Oil and Gas Property and Sea Dumping of Infrastructure in Commonwealth Waters (May 2026)*.

Until a decommissioning end state has been accepted through the relevant regulatory approval processes, all potential end states should be regarded as hypotheses requiring evidence to support them. This principle applies equally to full removal and to alternate end states. The distinction is that full removal is the regulatory reference case against which alternate arrangements are evaluated. Accordingly, planning for the full removal reference case should proceed in parallel with planning for any alternative arrangements until a final decommissioning outcome has been accepted by the relevant regulators (i.e. 'planning in parallel').

To support decommissioning planning, Beach has identified a provisional end state for each component of the Yolla offshore infrastructure, together with other potential end states that may be evaluated through future assessments. These are outlined in Table 3.21.

Table 3.21: Provisional end states for Yolla offshore infrastructure

Infrastructure	Section 572(3) Reference Case End State	Provisional End State	Other Alternate End States for Assessment
Wells	P&A	P&A	-
Platform - Topsides	Full removal	Full removal	-
Platform - Jacket	Full removal	Removal to top of base (or as close as practical)	Partial removal (to 55m below MSL) Artificial reefing
Platform - Base	Full removal	Leave in-situ	-
Offshore RGP	Full removal	Leave in-situ	Trench and bury

Provisional end states represent Beach's current planning basis and remain subject to further technical, environmental and regulatory assessment. Where a provisional end state differs from the section 572(3) reference case, the proposed alternative arrangement will be evaluated and, if pursued,

presented in a future EP for NOPSEMA's consideration. Until accepted through the relevant regulatory approval process, all end states should be regarded as provisional. Acceptance of a future EP will provide the regulatory basis for implementing the proposed decommissioning end state.

Consistent with section 572(7) of the OPGGS Act, Beach is maintaining optionality and demonstrating planning in parallel within its decommissioning strategy, by concurrently progressing and assessing the section 572(3) reference case (i.e. full removal), the provisional end state, and any potential alternative arrangements to ensure future decision-making remains evidence-based and regulator-ready. This includes:

- Assessing the section 572(3) reference case of full removal as the regulatory baseline for decommissioning planning and comparative assessment.
- Evaluating potential alternative decommissioning end states for the Yolla platform base and the offshore RGP.
- Undertaking environmental, technical, risk-based and socio-economic assessments to determine whether any alternative arrangement could achieve outcomes equivalent to, or better than, those delivered through full removal.
- Building the evidence base required to support future regulatory decision-making, including documenting the justification for any alternative arrangement within approvals submissions and, where required, sea dumping permit applications.
- Continuing to develop plans for full removal as the reference case unless and until an alternative arrangement is accepted by the relevant regulators.

Beach intends to prepare and submit a Decommissioning End-State EP to NOPSEMA approximately two years prior to CoP. The outcome of NOPSEMA's assessment of the EP will inform subsequent decommissioning planning and decision-making, including the development of activity-specific EPs for the execution of decommissioning works.

3.13.7 Yolla Decommissioning Strategy

Beach has established a preliminary decommissioning strategy for the Yolla offshore infrastructure to support and develop plans for the timely decommissioning following CoP.

The decommissioning strategy will be maintained and updated as new information becomes available through engineering studies, environmental assessments, stakeholder consultation, alternate use assessments and regulatory engagement. It will reflect an up-to-date understanding of potential decommissioning end states, while recognising that end state decisions remain subject to further assessment, evidence generation and regulatory approval.

Consistent with the approach outlined in earlier sections, the strategy will maintain optionality and readiness by progressing planning for the section 572(3) reference case, provisional end states and any potential alternative arrangements in parallel to one another. This planning basis will be maintained while assessments, stakeholder consultation and regulatory engagement continue, until such time as either a final end state is accepted by regulators via an EP and other approvals, or that Beach elects to cease pursuit of a particular alternate end state.

The current decommissioning strategy for Yolla infrastructure comprises:

- Permanent cleaning and flushing of the Yolla platform and offshore RGP.
- Permanent P&A of the four Yolla platform wells.
- Removal of the Yolla platform topsides and jacket structure (to the top of the base), with potential option for partial removal and/or artificial reefing of the jacket tower.
- Assessment of options for the platform base and suction-caisson foundation system, including potential retention in situ.
- Assessment of options for the offshore RGP and associated infrastructure, including full removal, burial and in-situ decommissioning.

3.13.7.1 Wells

The Yolla platform wells will be P&A in accordance with relevant industry standards. The wells are not being considered as part of the Alternate Use project described in Section 3.13.5.

Decommissioning of the Yolla wells is on the critical path to decommission the Yolla platform, as the platform cannot be removed until the wells have been decommissioned. It is intended that the wells will be P&A no later than 3 years after CoP, in accordance with NOPSEMA guidance.

Conceptual well decommissioning plans for the four Yolla platform wells are currently documented within the operational-phase WOMP (CDN 3972817). These plans represent the current planning basis and remain subject to further engineering, risk and execution planning. Prior to undertaking well decommissioning activities, a dedicated decommissioning WOMP and activity-specific EP will be developed and submitted to NOPSEMA for assessment.

As no permanent drilling or well intervention unit is installed on Yolla-A, well decommissioning will require the mobilisation of a suitable drilling or well intervention system to undertake permanent P&A activities. Several execution methodologies are currently being considered, including the use of a Hydraulic Workover Unit (HWU) installed on the platform, a Jack-Up Rig (JUR) positioned adjacent to the platform, and rig-less well intervention techniques. A combination of methods may be selected.

Preliminary assessments have identified the use of an HWU as the current planning basis. However, further engineering studies are required to confirm the preferred execution methodology, taking into account platform structural constraints, seabed conditions, operational risks and campaign efficiency. Depending on the selected approach, modifications to, or removal of, certain topside equipment may be required to facilitate well decommissioning activities.

Following placement of permanent well barriers, the surface and conductor casings are expected to be cut as close as practicable to the platform foundation structure to minimise any residual seabed protrusions.

The final well decommissioning methodology will be determined through future engineering, risk and execution planning and documented within the applicable decommissioning WOMP and activity-specific EP.

3.13.7.2 Yolla Platform - Topsides

The Yolla Platform is a self-installing steel "Drill-Ace" platform supported by a suction-caisson/gravity-base foundation system.

Consistent with current Australian Government decommissioning guidance and international obligations, platform topsides are required to be removed as part of decommissioning and may not be considered for retention in situ. Therefore, Beach's provisional decommissioning end state is full removal of the topsides, which aligns with the Section 572(3) reference case.

The addition of extra topside modules associated with the MLE project has increased the complexity of potential decommissioning activities. Preliminary assessments indicate that removal or relocation of selected topside equipment may be required to facilitate future well decommissioning and platform removal activities. However, the extent of any such modifications remains subject to further engineering assessment and confirmation.

Conceptual decommissioning studies have identified several potential platform removal methodologies. These include variants of the original reverse-installation concept, whereby the platform is recovered using elements of the installation methodology in reverse, as well as alternative approaches such as reverse float-over recovery, single-lift removal and staged dismantling. Preliminary assessments have identified potential challenges associated with the reverse-installation approach, including the impact of MLE modifications on deck configuration, buoyancy and stability, and the recoverability of the suction-caisson/gravity-base foundation. Single-lift and staged dismantling may present challenges as the primary topside structure was not designed to be lifted nor be dismantled in parts.

Continued engineering studies will be undertaken to evaluate the technical feasibility, safety, environmental considerations and execution risks associated with the available decommissioning methodologies. These studies will inform future decommissioning planning and support the development of future decommissioning approvals documents.

3.13.7.3 Yolla Platform - Base & Jacket

The Yolla-A foundation differs from a conventional piled jacket structure.

The platform is supported by a suction-caisson/gravity-base system that relies on a combination of gravity and soil friction to maintain stability within the soft seabed sediments present at the site. The foundation comprises a 50 m × 50 m concrete skirt that extends approximately 5 m below the seabed. Unlike a conventional jacket, where structural stability is primarily provided by piles, only the Yolla well conductor casings were pile-driven, with the platform foundation being retained through its embedded skirt, self-weight and the interaction between the foundation and surrounding soils.

This foundation configuration was specifically designed for the geotechnical conditions encountered at the Yolla field. However, it also introduces additional considerations for future decommissioning, particularly with respect to the technical feasibility of recovering foundation components that have remained embedded within the seabed for an extended period.

Preliminary assessments indicate that extraction and recovery of the suction-caisson/gravity-base foundation is likely to present significant engineering challenges, due to the extent of foundation embedment and long-term adhesion developed between the structure and surrounding seabed

sediments. Based on current understanding, extraction of the foundation is considered unlikely to be technically practicable without incurring substantial diver activity, seabed intervention and associated environmental disturbance.

The current planning basis and provisional end state for the platform foundation and jacket assumes:

- The suction-caisson/gravity-base foundation may not be practicably recoverable and is therefore being assessed for potential retention in situ.
- The jacket structure and well conductors would be removed to the top of the foundation structure, with any jacket and conductor sections located below or within the foundation remaining in situ.

While full removal of the jacket above the base forms the provisional end state, partial removal of the jacket (above 55 m below sea level) may also be considered, leaving a lower ~25 m section of the jacket in situ as an artificial reef. The cut depth of 55 m below sea level is aligned with the minimum navigation clearance for partially removed offshore installations specified in IMO *Guidelines and Standards for the Removal of Offshore Installations and Structures on the Continental Shelf and in the Exclusive Economic Zone* under IMO Resolution A.672(16). Footage gathered from in-water inspections of the platform jacket will inform whether the habitat value of the jacket justifies consideration for retaining parts of it.

These provisional end-state assumptions remain under evaluation and may be refined through future engineering studies, environmental assessments, stakeholder consultation and regulatory engagement.

3.13.7.4 Yolla Raw Gas Pipeline

The offshore RGP was not installed within a trench, although some sections may have become naturally buried over time. Supporting infrastructure associated with the offshore RGP is listed in **Error! Reference source not found.**.

Multiple decommissioning end states are currently being considered for the offshore RGP and associated infrastructure, including:

- Full removal;
- Burial or trenching; and
- In-situ decommissioning.

It is recognised that different end states may ultimately be applied along different sections of the pipeline, depending on local environmental, engineering and operational considerations.

Preliminary assessments have identified a range of opportunities and challenges associated with each end state. Full removal would require significant offshore activities and seabed disturbance associated with recovery of the pipeline and associated infrastructure. Trench and bury would similarly require substantial offshore activity and seabed disturbance, albeit with reduced safety exposure for personnel. In-situ decommissioning would minimise direct disturbance associated with pipeline recovery and avoid exposure to operational risks associated with offshore operations, but would result in the long-term retention of infrastructure within the marine environment.

Future studies will assess the environmental, safety, technical, social and economic considerations associated with the available options, with reference to Australian Government guidance. These studies will also consider potential interactions with adjacent infrastructure, including existing submarine telecommunications cables (see Section 5.9.2) and other marine users.

Information gathered through future engineering studies, environmental assessments, stakeholder consultation and ongoing inspection activities will be used to inform selection of a preferred decommissioning end state. The assessment will be undertaken in accordance with the applicable regulatory framework and guidance.

Until those assessments are completed and the relevant regulatory approvals obtained, all offshore RGP end states remain under consideration and decommissioning planning will continue in parallel with the full removal reference case.

3.13.8 BassGas Decommissioning Roadmap

A nominal roadmap schedule for planning and execution of decommissioning of the BassGas offshore infrastructure is presented as Figure 3.6.

This decommissioning schedule is indicative and reflects the current stage of decommissioning maturity within Beach's project delivery framework. At present, schedule definition is limited to high-level sequencing and indicative timing windows, with material uncertainty remaining in scope definition, execution strategy and campaign integration.

The indicative schedule is subject to change as a result of a range of factors typical of offshore decommissioning projects, including but not limited to:

- Operational and production performance, which may influence the timing of cessation of production.
- The time required to scope, define and complete technical, environmental and regulatory studies, including engineering assessments, decommissioning option evaluations, environmental surveys, impact assessments and any follow-up investigations identified through progressive project definition or regulatory engagement.
- Availability and timing of suitable offshore vessels, heavy-lift assets and specialist decommissioning resources, including competition for such resources within regional and global supply chains.
- Procurement lead times for specialist tooling and equipment, which may influence campaign sequencing, scope integration and schedule certainty.
- Seasonal constraints, including Bass Strait weather conditions, sea state limitations and daylight availability, which may restrict offshore execution to defined weather windows and necessitate multi-season campaigns.
- Availability and capacity of onshore dismantling, recycling and waste management facilities, including the time required to secure access, approvals and logistics necessary for material transfer and disposal.

- The outcome and timing of regulatory approvals, stakeholder consultation processes and consideration of any alternative arrangements or alternate use opportunities.

Accordingly, the decommissioning schedule will continue to evolve as CoP timing, project definition, regulatory considerations and external constraints develop. Schedule assumptions and milestones will be reviewed and updated periodically to reflect increasing project maturity and improved understanding of execution requirements. Further refinements will be captured through ongoing decommissioning planning activities and, where appropriate, future approvals submissions and EPs.

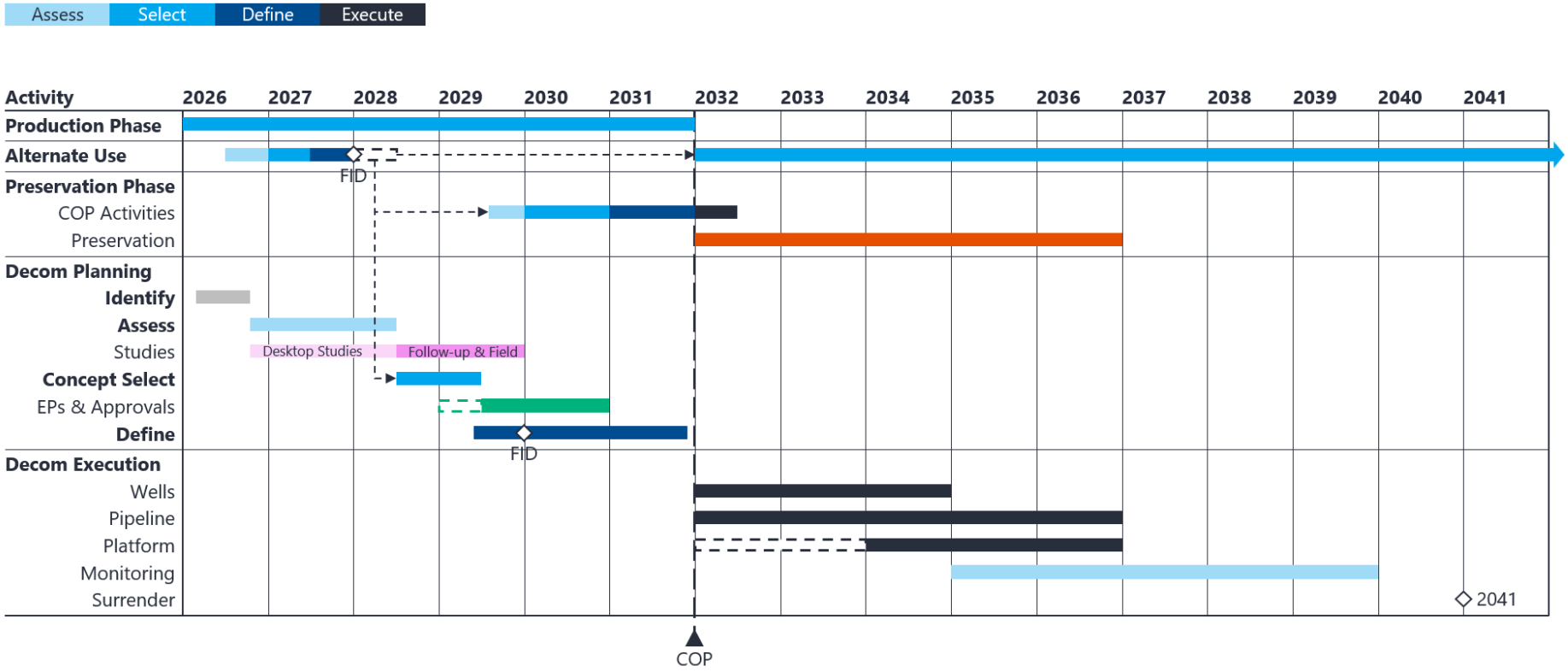


Figure 3.6: BassGas Decommissioning Roadmap

3.13.8.1 Future Approvals Relating to Decommissioning

A nominal list of expected and foreseeable regulatory approvals required for BassGas decommissioning is provided in Table 3.22. The approvals structure presented is nominal and may be adjusted to suit the project structure and regulator requirements. This list is not-exhaustive and additional approvals may be required in order to achieve title surrender in accordance with s270 of OPGGS Act.

Table 3.22: Future NOPSEMA approvals relating to decommissioning

Scope	Infrastructure	Approvals	Nominal Submission Timing	Nominal Activity Timing
Operations • Production Phase • CoP activities • Preservation Phase	Wells, Platform & RGP	EP	2026 (this document) Resubmit 2031	Production ongoing to end-2031 COP Activities in 1H 2032 Preservation Phase 2032 to 2036
		Safety Case	In force from 2025 Resubmit in 2030	
		WOMP	In force from 2024 Resubmit in 2029	
Well Decommissioning	Wells	WOMP, Safety Case & EP	2029 to 2031	2032 to 2034
Alternate Use Case – With Alternate Use (subject to FID)				
Alternate Use Operations	Platform & RGP	Safety Case & EP	2028 to 2030	2032 to TBC
Base Case – No Alternate Use				
Decommissioning - End State	Platform & RGP	EP	2029 to 2030	2032 to 2036
Decommissioning - Execution	Platform	Safety Case & EP	2030 to 2032	2032 to 2036
	RGP	Safety Case & EP	2030 to 2032	2032 to 2036
Monitoring		Safety Case & EP	To be determined at later time	

Approval of final decommissioning end states is expected to represent a critical-path activity for the BassGas Decommissioning Project. End-state EPs, particularly those proposing alternative arrangements to full removal, are anticipated to require substantial environmental and technical evidence, extensive consultation with relevant persons, and demonstration that environmental impacts and risks will be reduced to ALARP and an acceptable level. The project therefore seeks to adopt a front-end loading approach, whereby the studies required to support future end-state EP submissions will be progressed early to maximise the time available for EP preparation, regulatory assessment and potential requests for further information.

Submission timeframes for end-state EPs, supporting studies, regulatory assessments and subsequent execution activities will continue to be refined as both the BassGas Decommissioning and Alternate Use projects mature and key uncertainties are reduced. The timing of future EP submissions will be influenced by study outcomes, comparative assessment requirements, stakeholder consultation obligations, regulatory engagement and the maturity of the evidence base required to support

proposed end states. As a result, the timing and sequencing of activities may be adjusted as project understanding improves and regulatory expectations become better defined.

In addition to NOPSEMA-granted approvals, the Commonwealth and State-based regulatory approvals listed in Table 3.23 (not exhaustive) may also be required for, or relevant to, the decommissioning of the BassGas offshore infrastructure.

Table 3.23: Decommissioning-related regulatory approval requirements (Commonwealth and Victorian)

Commonwealth Approvals	State Approvals
• EPBC referral – if decommissioning activities could significantly impact MNES. • Sea dumping permit for any equipment to be permanently left in-situ.	• Safety Case & EPs for: ○ State waters section of the RGP (DEECA, Energy Safe Victoria) ○ Onshore sections of the RGP (DEECA, Energy Safe Victoria)
• Hazardous Waste (Regulation of Exports and Imports Act – Hazardous Waste Export permit may be required to export hazardous waste associated with decommissioned infrastructure.	• Waste Management & Recycling Act (EPA Victoria ○ Waste management or disposal permit ○ Waste permit A12 to transport waste interstate from Victoria
	• Dangerous Goods Licences (WorkSafe Victoria)
• Nuclear Storage & Transport Licences (ARPANSA)	• Radiation Act – Radiation Management Plan (Vic Department of Health)
• Navigation Act / Protection of the Sea Act (AMSA) may trigger requirement for a Vessel Safety Case / EP / OPEP if the platform is to be considered as a 'vessel' during the decommissioning activity	• Port Management Act – Safety Management Plan & Environmental Management Plan (EPA Victoria & Victorian Ports Corporation)
	• Marine Safety Act – permits as required by Maritime Safety Victoria and Work Safe Victoria
• Biosecurity Act – for specialist vessels entering Australian water to support decommissioning activities	

3.13.8.2 Title Surrender

Title surrender represents the final stage of the decommissioning lifecycle. Under the OPGGS Act, title surrender is not achieved automatically following completion of decommissioning activities.

Consistent with NOPSEMA's *Section 270 Consent to Surrender Title Policy*, title surrender requires sufficient evidence to demonstrate that decommissioning outcomes and any associated residual risks have been satisfactorily addressed in the context of the accepted end state, including whether or not:

- Infrastructure has been appropriately removed or otherwise dealt with;
- Wells have been permanently plugged and abandoned;
- Residual risks to the environment remain; and
- There is sufficient evidence from monitoring or otherwise to demonstrate that decommissioning outcomes are performing as intended.

This applies equally to the regulatory reference case of full removal and to any alternative end states that may be proposed.

Beach will progressively develop the evidence required to support future title surrender considerations for both the regulatory reference case of full removal and any alternative end states that may be proposed for BassGas infrastructure. While these will be fully detailed in subsequent EPs, Beach has given early consideration towards the type and forms of evidence that will likely be required to support an application for consent to surrender title, as outlined in Table 3.24.

Table 3.24: Types and forms of evidence that will likely be required to support an application for consent to surrender title

OPGGS Act Requirement	Indicative Evidence
Section 270 (3)(c) removed, or caused to be removed, all property brought into the surrender area, or made arrangements that are satisfactory to NOPSEMA in relation to that property	Comparative assessment outcomes, infrastructure end-state studies, environmental assessments, stakeholder consultation outcomes, engineering studies, end-state justification reports, asset registers and inventories, removal reports, as-left surveys, and other evidence demonstrating that the selected end state achieves acceptable environmental and safety outcomes.
Section 270 (3)(d) plugged or closed off all wells made in the surrender area.	This requirement will primarily be addressed through the WOMP and well decommissioning program for the Yolla platform wells. Evidence is expected to include approved abandonment designs, barrier verification records, abandonment execution records and Final Abandonment Reports accepted by NOPSEMA.
Section 270 (3)(e) provided for the conservation and protection of the natural resources in the surrender area	Environmental baseline studies, contaminant characterisation, infrastructure degradation assessments, long-term fate and transport studies, marine user interaction assessments, ecological assessments, comparative assessments and environmental impact and risk evaluations demonstrating that residual environmental risks are understood and managed to an acceptable level.
Section 270 (3)(f) made good any damage to the seabed or subsoil in the surrender area.	Post-decommissioning monitoring and verification data, seabed surveys, environmental monitoring results, well integrity verification, inspection data for any infrastructure approved to remain in situ, and evidence demonstrating that decommissioning outcomes are performing as intended and that residual impacts remain acceptable.

The level of detail available to address these matters will increase as the BassGas Decommissioning and Alternate Use projects mature, preferred end states are identified, and the supporting technical, environmental and stakeholder evidence base is developed. Further information relating to title surrender considerations will be provided in future decommissioning EPs and associated regulatory submissions.

3.13.9 BassGas Decommissioning & Alternate Use Projects

3.13.9.1 Capital Assurance Framework

The Beach Capital Assurance Framework (CAF) provides a structured governance and decision-making process for capital investment opportunities and projects. The CAF is designed to ensure projects and

capital investment is aligned with corporate objectives, supported by appropriate technical and commercial information, and subject to risk-based assurance and governance prior to key investment and execution decisions.

The CAF comprises a phased project development and delivery process consisting of Identify, Assess, Select and Define and Execution phases shown in Figure 3.7. The purpose of these phases is to progressively mature project definition and decision support information, enabling informed decisions at key assurance and governance points.



Figure 3.7: Beach Capital Assurance Framework (CAF) Phases

3.13.9.2 Alternate Use Project

As outlined in Section 3.13.9, Beach is progressing a parallel project for an Alternate Use opportunity, which may materially affect the scope, timing and execution of decommissioning activities at Yolla-A. However, the opportunity remains subject to further technical assessment, economic and commercial development and regulatory approval. Consistent with the principles of maintaining optionality and regulatory readiness, Beach will continue to progress decommissioning planning in parallel, in case that the Alternate Use does not progress to implementation. This approach preserves optionality and allows Beach to meet its decommissioning obligations, regardless of the outcome of the Alternate Use opportunity.

At the time of preparation of this EP, the Alternate Use project is currently within the Assess phase and is planned to enter the Select and Define phases in early 2027.

3.13.9.3 Decommissioning Project

At the time of preparation of this EP, the Yolla Decommissioning Project is completing the Identify phase and is expected to formally enter the Assess phase in late 2026.

The objectives of the Assess Phase for the BassGas Decommissioning Project are:

- To reduce uncertainty and preserve optionality for BassGas decommissioning;
- To develop a robust evidence base to support evaluation of potential decommissioning options, and future approvals for decommissioning; and
- To identify areas where further information or evidence may be required.

The Assess Phase is expected to be predominantly desktop-based, with activities focused on studies, engineering evaluations, asset characterisation, environmental baseline assessments, stakeholder engagement and planning activities. These investigations will be undertaken to identify, evaluate and progressively close key knowledge gaps associated with future decommissioning and asset end-state decisions.

The Assess Phase is not intended to include dedicated offshore survey campaigns, field trials or major data acquisition activities. Instead, the requirement for such activities will be identified, justified and

sufficiently defined to support planning and execution during later project phases. However, opportunities to acquire supplementary information through existing operational, inspection, integrity management or maintenance activities may be utilised to enhance the project evidence base.

The Assess Phase will not determine preferred end states, decommissioning concepts, comparative assessment outcomes or execution strategies for BassGas assets. While studies undertaken during the phase may identify options that are technically infeasible, environmentally unsuitable or unlikely to progress further, the purpose of the phase is to develop information rather than make final decisions. Selection of preferred end states, completion of comparative assessments, development of execution strategies and preparation of major regulatory approval submissions are intended to occur during the subsequent Select Phase.

The anticipated progression of the BassGas Decommissioning Project through the subsequent CAF phases is outlined in the BassGas Decommissioning roadmap presented in Section 3.13.8.

3.13.9.4 Decommissioning Study Programme

As part of the Assess Phase for the BassGas Decommissioning Project, Beach plans to undertake a structured programme of technical and environmental studies to inform and support decommissioning planning for the BassGas facilities. The study programme nominally comprises of 12 studies or workstreams summarised in Table 3.25, and is anticipated to commence in late 2026.

Table 3.25: BassGas decommissioning Assess Phase studies and workstreams

Study / Workstream	Objective
1. Asset Characterisation & Inventory	To establish a consolidated technical basis describing the current condition, configuration and characteristics of BassGas infrastructure relevant to decommissioning.
2. Well Abandonment Concept Studies	To develop technically feasible well abandonment concepts for the Yolla platform wells.
3. Environmental Baseline Studies	To establish the environmental evidence base required to support future decommissioning option assessments.
4. Purging, Cleaning, Flushing & Decontamination Study	To understand contamination risks and develop preliminary strategies for cleaning, decontamination and preparation of facilities prior to decommissioning.
5. Platform Structural Assessment	To determine the structural capability of the Yolla Platform to support well abandonment and decommissioning activities. (Contingent, subject to outcome and findings from the FY27 Life Extension studies by others)
6. Pipeline Degradation & Long-Term Behaviour Study	To understand the long-term fate and degradation of the RGP under potential leave-in-situ scenarios.
7. Subsea Pipeline Removal Study	To assess technically viable approaches for removal and recovery of the offshore RGP.
8. Platform Deconstruction & Removal Study	To assess technically viable approaches for deconstruction, lifting, transport and disposal of the Yolla Platform.
9. Onshore Reception, Demolition, Recycling & Disposal Study	To identify and evaluate feasible pathways for the onshore reception, dismantling, recycling and disposal of decommissioned offshore infrastructure recovered from the Yolla Platform and RGP.
10. Pipeline User Interaction & Snagging Assessment	To understand existing and future interactions between the offshore RGP and other marine users, including fisheries.

Study / Workstream	Objective
11. Preliminary Stakeholder Identification & Regulator Engagement Strategy	To identify stakeholders with an interest in BassGas decommissioning and establish an engagement strategy that supports future option development, regulatory approvals and informed decision-making.
12. Comparative Assessment Framework Development	To develop a structured and transparent framework for evaluating decommissioning options and end states for BassGas assets, ensuring future decisions are evidence-based, consistent, repeatable and aligned with regulatory expectations. Note that this is limited to the *development* of the Comparative Assessment Framework, not the Comparative Assessment itself which is expected to be undertaken during the subsequent Select Phase.

Each study represents a significant work scope in its own right and will require further definition, planning, contracting and project management prior to execution. The scope and schedule for each item will need to be developed as part of the Assess Phase, and in consultation with the relevant delivery group.

Delivery will be undertaken through a combination of internal resources, existing engineering service providers, specialist consultants and competitive procurement processes, depending on the complexity and capability requirements of each scope. This approach will allow the project to access specialised decommissioning, environmental, engineering and regulatory expertise while ensuring that project governance and decision-making remain aligned with Beach's CAF and other business processes.

As project understanding matures and additional information becomes available, the study program may be refined, expanded, consolidated, re-sequenced or reprioritised. Outcomes from early studies are expected to identify new knowledge gaps, dependencies and areas requiring further investigation. Consequently, the Assess Phase study programme is intended to remain adaptive and responsive to emerging findings, with effort focused on reducing the uncertainties most likely to influence future end-state decisions, comparative assessment outcomes, regulatory approvals and overall project value.

A nominal schedule for the study programme is presented as Table 3.25, with completion targeted in mid-2028.

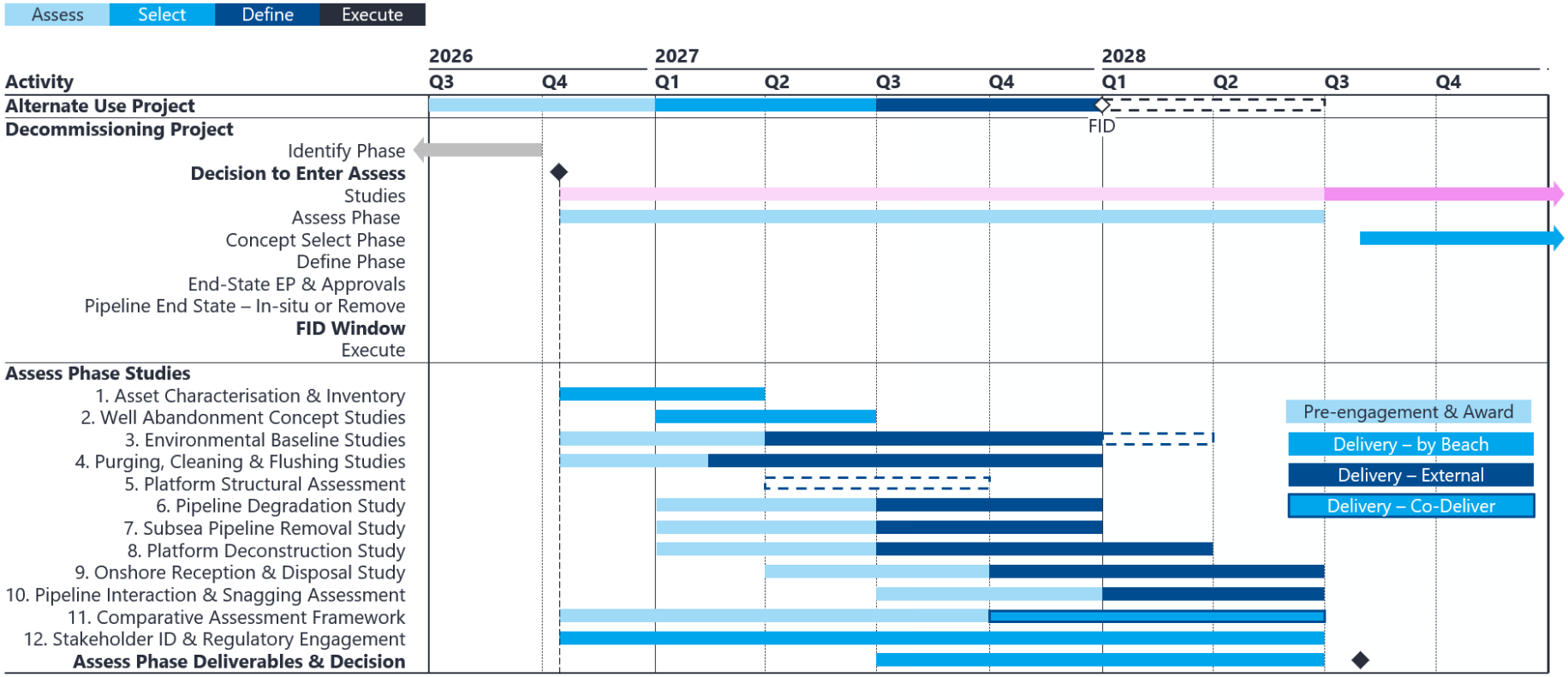


Figure 3.8: Assess Phase Study Schedule

3.14 Summary of Emissions and Discharges

This chapter provides a detailed description of the platform and offshore RGP operations and IMR activities. Table 3.26 summarises the hazards associated with planned activities (e.g., routine emissions and discharges) and unplanned activities (e.g., emergency events) resulting from operations activities and where these are addressed in the environmental impact assessment (EIA) and environmental risk assessment (ERA) in Chapter 0 of this EP. The EIA and ERA includes assessments for the CoP and preservation phases.

Table 3.26: Environmental hazards associated with the operation and maintenance of the offshore BassGas facilities

Hazard	Described in EP Section	Assessed in EP Section
Planned activities		
Platform only		
Physical presence	3.2, 3.3	7.1
PFW disposal	3.5.6	7.6
Air emissions	3.5.10, 3.5.11	7.4
Chemical injection	3.5.12	N/A – closed loop
Navigational and deck lighting	3.5.17, 3.5.18	7.3
Platform and vessels		
Deck drainage	3.5.7, 3.5.8	7.10
Sewage and grey water disposal	3.5.14	7.8
Waste disposal	3.5.14	7.11
Sound and vibration	3.5.17	7.5
Pipeline only		
Physical presence	3.6	7.1
Sound (maintenance activities)	3.7.5	7.5
Vessels only		
Cooling and brine water discharges	3.9.3	7.9
Helicopters only		
Air emissions	3.9.1	7.4
Sound and vibration	3.9.1	7.5
Unplanned activities		
Platform only		
LoC – production chemicals	3.5.12	7.14
LoC – diesel	3.5.13	7.17
LoWC	3.10	7.15
Platform and vessels		

Hazard	Described in EP Section	Assessed in EP Section
Discharge of contaminated deck drainage	3.5.9, 3.5.10, 3.7	7.10
Accidental waste overboard	3.5.14	7.11, 7.14
Pipeline only		
LoC – RGP rupture	3.10.1	7.16
Vessels only		
Sound and vibration	N/A	7.5
Vessel collision with megafauna	3.9.3	7.12
Introduction of invasive marine species	N/A	7.13
Diesel spill	3.8.2	7.17
Oil spill response activities		
Relief well drilling, ocean-based and shoreline oil spill response activities	3.9, 7.18, 7.19	7.18, 7.19

The environmental aspects associated with the BassGas operations are presented in Table 3.27 over page.

Table 3.27: Environmental aspects associated with BassGas operations

Activities	Planned Events										Unplanned Events						
	Physical presence of infrastructure	Infrastructure inspection, maintenance and repair	Routine emissions - light	Routine emissions - atmospheric	Routine emissions - noise & vibration	Routine discharges - PFW	Routine discharges - putrescible was	Routine discharges - sewage & grey water	Routine discharges - cooling & brine water	Routine discharges - Bilge water & deck drainage	Accidental discharge of waste to the ocean	Vessel collision with megafauna	Introduction and establishment of invasive marine species	LoC of bulk chemicals and hydrocarbons	Loss of well control	Loss of control from pipeline rupture	MDO release
Production wells																	
Yolla-3, -4, -5, -6	✓	✓			✓									✓	✓		
Yolla-A Platform																	
Physical presence	✓	✓	✓		✓							✓					
Process operations	✓	✓	✓	✓	✓	✓			✓	✓	✓			✓	✓		
Waste management							✓	✓			✓						
Accommodation							✓	✓			✓						
IMR		✓	✓		✓									✓	✓		
Raw gas pipeline																	
Operations	✓	✓			✓									✓		✓	
IMR		✓	✓		✓							✓				✓	
Logistics																	

Activities	Planned Events										Unplanned Events						
	Physical presence of infrastructure	Infrastructure inspection, maintenance and repair	Routine emissions - light	Routine emissions - atmospheric	Routine emissions - noise & vibration	Routine discharges - PFW	Routine discharges - putrescible was	Routine discharges - sewage & grey water	Routine discharges - cooling & brine water	Routine discharges - Bilge water & deck drainage	Accidental discharge of waste to the ocean	Vessel collision with megafauna	Introduction and establishment of invasive marine species	LoC of bulk chemicals and hydrocarbons	Loss of well control	Loss of control from pipeline rupture	MDO release
Vessel operations	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓		✓			✓
Helicopter operations		✓	✓	✓	✓												
Oil spill response strategies																	
Source control	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
Monitor and evaluate		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓		✓			✓
Assisted natural dispersion		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓		✓			✓
Oiled Wildlife Response																	

4 Stakeholder consultation

4.1 Summary

Beach operates offshore and onshore facilities in the Bass Basin and has consulted relevant persons and organisations and local communities for years. In 2019, Beach consulted on the previous Bass Gas Offshore Operations EP. While preparing this EP, Beach continued to review its methodology for identifying relevant persons and refined its engagement methods in response to case law and growing community interest.

Beach has provided relevant persons with information on the broader context of the EP by explaining how the offshore operations relate to the onshore activities, including details of the previously submitted and approved EP. This approach offered context to this EP's ongoing activities and reflected its commitment to transparent consultation, in line with NOPSEMA consultation guidelines and Beach's Community Engagement Standards.

Beach consulted relevant persons while preparing this EP (with the list available in **Appendix 1**), following all applicable regulations, case law, guidelines, and Beach's policies and standards outlined in Sections 4.2, 4.3, and 4.4.

Beach understands the purpose of consultation is to inform its understanding of the environment, including people and communities, the heritage value of places, and their social and cultural features, which may be affected by the activities described in the EP. This ensures Beach can understand and address all the environmental impacts and risks that might arise from the activities described in this EP. Consultation therefore enables Beach to refine or change measures proposed to reduce impacts and risks to an acceptable level and ALARP.

Beach's primary consultation period for the purposes of this EP commenced on 14 July 2025 and concluded on 10 October 2025. Following the primary consultation period described in Sections 4.1 to 4.16, modifications to the planning area resulted in the identification of additional fishing industry peak bodies and associations whose functions, interests or activities may potentially be affected by the activities described in this EP. Beach therefore undertook further consultation with these relevant persons from 28 August to 11 September 2026. This consultation is addressed in Section 4.17. Table 4.1 has been updated to reflect this further consultation.

Beach designed the consultation to ensure that relevant persons and organisations were identified and provided sufficient information and a reasonable period so they could make an informed assessment of the risks and impacts of the ongoing activities on them, including relevant impacts and risks. Where relevant persons raised objections or claims regarding adverse impacts and risks of the EP activities, the consultation process enabled Beach to make an assessment and consider new or changed control measures to be adopted in the EP to reduce impacts and risks to an acceptable level and ALARP.

Beach provided sufficient information in multiple formats, including emails, information sheets, public notices, online advertisements, and direct phone calls, as well as through its online consultation hub, Engage Beach – which offered information in different formats and levels of detail. Beach engaged identified relevant persons and organisations by sending information and consultation updates, publishing information on Engage Beach – including feedback forms – and holding meetings and in-person and online community information sessions with Beach technical staff.

Relevant persons and organisations were advised of the purpose of consultation and given multiple opportunities over a reasonable period to ask questions, raise concerns, and discuss control measures. Beach also advised that sensitive information would not be published and provided all relevant persons with a copy of NOPSEMA's Consultation on Offshore Environment Plans brochure.

Beach monitored and assessed response levels to communications and consultations throughout the consultation period. It reviewed non-responses on a case-by-case basis and followed up non-responders, undertaking engagement commensurate with the extent that Beach considered each relevant person's functions, interests or activities may be affected by the activities described in the EP (see Section 4.10). Beach has assessed the merits of any concerns raised and identified any additional measures adopted as a result of consultation in Section 4.14.

Consultation in the course of preparing this EP has been completed and Beach believes it has met the regulatory engagement requirements. Ongoing consultation is outlined in Section 4.16. If concerns or feedback about impacts and risks from the activities in this EP arise after the acceptance of this EP, Beach will assess them and, if needed, implement its Management of Change process as detailed in Section 8.2.3. **Appendix 2a** and **Appendix 2b** provides a full record of the correspondence between Beach and relevant persons. A 'Sensitive matters report' is provided to NOPSEMA separately to this EP.

4.2 Regulatory requirements

Table 4.1 details where information in this EP has been included to demonstrate that Beach has met the OPGGS(E)R consultation requirements for activities in commonwealth waters and the Offshore Petroleum and Greenhouse Gas Storage Regulations 2021 (Vic) (OPGGSR 2021 (Vic)) consultation requirements for activities in Victorian waters. Both sets of regulations are referred to as 'Regulations' in this chapter. Beach also takes guidance from NOPSEMA's Guideline GL2086 *Consultation in the course of preparing an environment plan*, which was prepared to support clarity and transparency on the legal requirements, including recent case law:

- Santos NA Barossa Pty Ltd v Tipakalippa [2022] FCAFC 193 (appeal decision)
- Cooper v NOPSEMA (No 2) [2023] FCA 1158; and
- Munkara v Santos NA Barossa Pty Ltd (No 3) [2024] FCA 9.

Table 4.1 indicates how consultation requirements were met for both the primary consultation period (as outlined in Sections 4.1 to Section 4.16) and further consultation period (as described in Section 4.17).

Table 4.1: OPGGS(E)R and OPGGSR 2021 (Vic) and how requirements were met

OPGGS(E)R section	OPGGSR 2021 (Vic)	How requirements were met
34 Criteria for acceptance of environment plan For section 34, the criteria for acceptance of an environment plan are that the plan demonstrates that: (g)(i) the titleholder has carried out the consultations required by section 25; and (g)(ii) the measures (if any) that the titleholder has adopted, or proposes to adopt, because of the consultations are appropriate	13D Criteria for acceptance of environment plan The criteria for acceptance of an environment plan under regulations 13C are that the plan – (f) Demonstrates that – (i) the titleholder has carried out the consultation required by 13F; and (ii) the measures (if any) that the titleholder has adopted, or proposes to adopt, because of the consultations are appropriate; and (g) complies with the Act and these Regulations.	EP Section 4.14 shows approach to assessment of objections or claims (noting no objections or claims were made during the further consultation period). EP Table 4.10 shows actual measures adopted (if any) as a result of consultation on this EP (noting no objections or claims were made during the further consultation period). EP Sections 4.3 and 4.4 shows the policy, standards and guidelines Beach applies when planning consultation. EP Section 4.4.1 show understanding and respect for consulting representative commercial fishers associations, and commercial fishers. EP Section 4.4.2 shows an informed and culturally sensitive approach to consulting First Nations groups holding formal representative roles in their communities (noting no First Nations groups were required to be consulted during the further consultation period).
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 related to activities in the offshore area of a State – the Department of the responsible State Minister; (c) if the plan related 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;	13F Consultation with relevant authorities, persons and organisations, etc. (1) In the course of preparing an environment plan, a titleholder must consult each of the following (a) any authority or entity of the State to which the activities to be carried out under the environment plan, or the variation of the environment plan, may be relevant; (b) a person or organisation whose functions, interests or activities may be affected by the activities to be carried out under the environment plan, or the variation of the environment plan; (c) any other person or organisation that the titleholder considers relevant.	EP Section 4.6 sets out a comprehensive methodology supported by research techniques, public notices, advertisements, and other methods to identify relevant persons. EP Appendix 1 (referenced in Section 4.6) shows the categories and names of relevant persons, alongside their functions, interests and activities. Table 4.11 of this document outlines additional relevant persons identified following the modification of the planning area.

OPGGS(E)R section	OPGGSR 2021 (Vic)	How requirements were met
(e) any other person or organisation that the titleholder considers relevant.		
25 Consultation with relevant authorities, persons and organisations (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.	13F Consultation with relevant authorities, persons and organisations, etc. (2) For the purpose of the consultation, the titleholder must give each of those consulted sufficient information to allow them to make an informed assessment of the possible consequences of the activity on their functions, interest or activities.	EP Section 4.7 sets out the approach to preparing different types of information based on the potential impacts on the functions, interests or activities of the relevant persons. Section 4.17.3 and Table 4.12 outlines the consultation timeline and provision of sufficient information.
25 Consultation with relevant authorities, persons and organisations, etc. (3) The titleholder must allow a relevant person a reasonable period for the consultation.	13F Consultation with relevant authorities, persons and organisations, etc. (3) The titleholder must allow a reasonable period for the consultation.	Beach recognises that what constitutes a reasonable period for consultation should be considered on a case-by-case basis, with reference to the nature, scale and complexity of the activity. EP Section 4.8 shows that a reasonable period has been provided and consultation has been completed. Section 4.17.4 outlines that a reasonable period has been provided and consultation has been completed.
25 Consultation with relevant authorities, persons and organisations, etc. (4) The titleholder must tell each relevant person the titleholder consults that: (a) a 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.		EP Section 4.15 shows that relevant persons have been informed of their rights regarding sensitive information.
24 Other information in environment plan The environment plan must contain the following: (b) the report on all consultation under section 25 of any relevant person by the titleholder, that contains: (i) a summary of each response made by a relevant person; and	19 Other information in the environment plan The environment plan must contain the following – (b) a report on all consultations between the titleholder and relevant authorities; interested persons and organisations in the course of developing the environment plan;	EP Section 4.12 shows the approach taken to consult to understand and not interfere with others' rights. Section 4.17.6 refers to the approach taken to consult to understand and not interfere with others' rights. EP Section 4.14 includes approach to assessment of the merits of objections or claims about the adverse impacts of each activity and Beach's response and reference to the report on consultation in **Appendix 2a** and **Appendix 2b**.

OPGGS(E)R section	OPGGSR 2021 (Vic)	How requirements were met
(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;		The full text of any response by a relevant person was provided to the relevant regulator on submission of the EP as sensitive information. Note, no objections or claims were made throughout the further consultation period. Accordingly, no additional management measures or modifications to the EP were required.
22 Implementation strategy for environment plan (15) The implementation strategy must provide for appropriate consultation with: (a) relevant authorities of the Commonwealth, a State or a Territory; and (b) other relevant interested persons or organisations.	16 Implementation strategy for the environment plan (8) The implementation strategy must provide for appropriate ongoing consultation with – (a) relevant authorities or entities of the State; and (b) other relevant interested persons or organisations.	EP Section 8.11 shows the consultation that will continue as part of the implementation strategy for this EP.

4.3 Guidelines considered

The guidelines detailed in Table 4.2 were also considered in planning and delivering the consultation carried out in the course of preparing this EP.

Table 4.2: Consultation guidelines considered

Organisation	Guideline (current at September 2026)
NOPSEMA	GL2086 – Consultation in the course of preparing an environment plan – 20/5/2024 (NOPSEMA Consultation Guidelines) GN1344 – Environment plan content requirements – July 2025 GN1785 – Petroleum activities and Australian Marine Parks – August 2025 GL1887 – Consultation with Commonwealth agencies with responsibilities in the marine area – November 2024 N-04750-PL1347 A662608 – Environment Plan Assessment Policy – 10 January 2024 FM2281 - Titleholder report on consultation in the preparation of an Environment Plan – August 2025 Brochure – Consultation on offshore petroleum environment plans – Information for the community – May 2023
AFMA	Petroleum industry consultation with the commercial fishing industry
IAP2	Public participation spectrum
DCCEEW	Interim Engaging with First Nations People and Communities on Assessments and Approvals under the Environment Protection and Biodiversity Act 1999

4.4 Principles of effective consultation

Beach is committed to genuine, transparent, and meaningful consultation that meets regulatory requirements and applies Beach's own policies and standards. These policies are available on Beach's corporate website:

- Community Engagement Policy
- Indigenous Participation Policy
- Human Rights Policy

Beach also undertook consultation in accordance with its internal Community Engagement Standard. This standard incorporates the International Association of Public Participation's (IAP2) Public Participation Spectrum global best practice model.

4.4.1 Consulting groups with communal interests

Beach respects the role of commercial fishing associations in representing their members and consults with them to understand their preferred consultation approach for their executive, board (where applicable) and members. When Beach is informed that an individual commercial fisher wants to receive information and consult directly, Beach accommodates these requests. See Section 4.13.

Beach respects communal interests held by First Nations groups and has approached consultation as set out in Section 4.4.2.

4.4.2 Consulting First Nations groups and peoples

Beach's Indigenous Participation Policy sets out commitments aimed at building positive, long term, trusting relationships with relevant Indigenous communities. In addition, Beach is cognisant of the NOPSEMA consultation guidelines and applicable case law, detailed in Section 4.3 and Section 4.4, and has applied these requirements in its approach to identifying and consulting with First Nations relevant persons.

As an operator in Victoria, Beach is also cognisant of the Aboriginal Heritage Act 2006 (Vic) (AHA 2006 VIC), which recognises a Registered Aboriginal Party (RAP) as the Traditional Owner Corporation appointed under the AHA 2006 VIC to manage and protect Aboriginal cultural heritage over their Country including coastal and onshore waters. The AHA 2006 VIC recognises RAPs as the primary guardians, keepers and knowledge holders of Aboriginal cultural heritage and the primary source of advice and knowledge on matters relating to Aboriginal places or objects in the appointed RAP region.

Beach has taken care to ensure its consultation with First Nations groups is respectful and culturally appropriate. For example, this included Beach:

- offering First Nations groups tailored information sessions, both in-person and online (webinars), which promoted a culturally safe space to discuss activities.
- reviewing each group's published Country or Sea Country management plans and, where discussed with First Nations groups, referenced those plans to confirm the cultural priorities and values important to those groups.
- reviewing additional research and public documents, including archaeological and anthropological reports, to further develop its understanding of First Nations groups cultural values.
- based off feedback from First Nations groups, preparing information material with a strong visual focus. This included photos of the offshore infrastructure and maps of Beach's operational area and EMBA and identified the First Nations communities adjacent to the activity and EMBA.

Beach does not directly approach First Nations individuals for consultation as this could undermine the role of the recognised representative bodies and corporations and could potentially cause issues within the community. Beach does however ask First Nations representative bodies to identify individuals and distribute Beach's activity information to those they consider relevant.

Beach's approach to respectful and effective consultation with RAPS and Registered Native Title Body Corporates (RNTBCs) identified as relevant persons also included the following steps:

- Provided information on the activities in this EP.
- Provided information on the purpose of consultation.
- Explained that the identification of cultural values and sensitivities is an important part of preparing EPs as it enables any impacts and risks to be assessed and where applicable for measures to be developed to reduce impacts and risks to an acceptable level and ALARP.
- Enquired about their consultation preferences, whether they had existing consultation guidelines and protocols, and if they wanted consultation between their members and Beach, and if so, how they would like that to occur.

- Asked if there was any cultural values and sensitivities and heritage values information they wished to provide and discussed relevant information already published, where applicable.

- Enquired if they were aware of any people, who in accordance with Indigenous tradition, may have spiritual and cultural connections to the EP's planning area that had not yet been afforded the opportunity to provide information that may have informed the management of the activity.

While not all First Nations groups responded with specific requirements for consultation with them, Beach notes the following examples as positive demonstrators of Beach's adaptive approach to consultation, taking into account First Nations responses to Beach's enquiries:

- **Gunaikurnai Land and Waters Aboriginal Corporation (GLAWAC):** Beach attended an on-country visit as GLAWAC requested to build relations, hear first-hand about their Country values and sensitivities, and for Beach to describe its project in plain English and answer any questions.

- **Bunurong Land Council Aboriginal Corporation:** Beach visited in person to discuss the activities in plain English and answer their questions, responded to their request to undertake an assessment of cultural values and sensitivities, and offered discussion sessions with their members.

4.5 Relevant persons identification methodology

4.5.1 Identification process

In following the law set out in *Santos NA Barossa Pty Ltd v Tipakalippa* [2022] FCAFC 193 (appeal decision), Beach undertook a further comprehensive review of its methodology for identifying and consulting with relevant persons resulting in multiple accepted activity EPs for Beach's Offshore Gas Victoria Project. Beach is constantly refining its methodology cognisant of NOPSEMA guidelines, recent case law, and industry best practice applicable to the nature and scale of the ongoing activities described in this EP.

The relevant person identification methodology utilised for this EP follows a process of assessing elements of the EP to identify potentially relevant persons: the existing relevant persons list consulted for the previous EP; defined activities; the spatial extent of the operational area and planning area (EMBA); environmental values and sensitivities; and identification and assessment of risks and impacts. After initial identification the consultation process was used to verify and refine the initial steps. That process is set out in Figure 4.1.

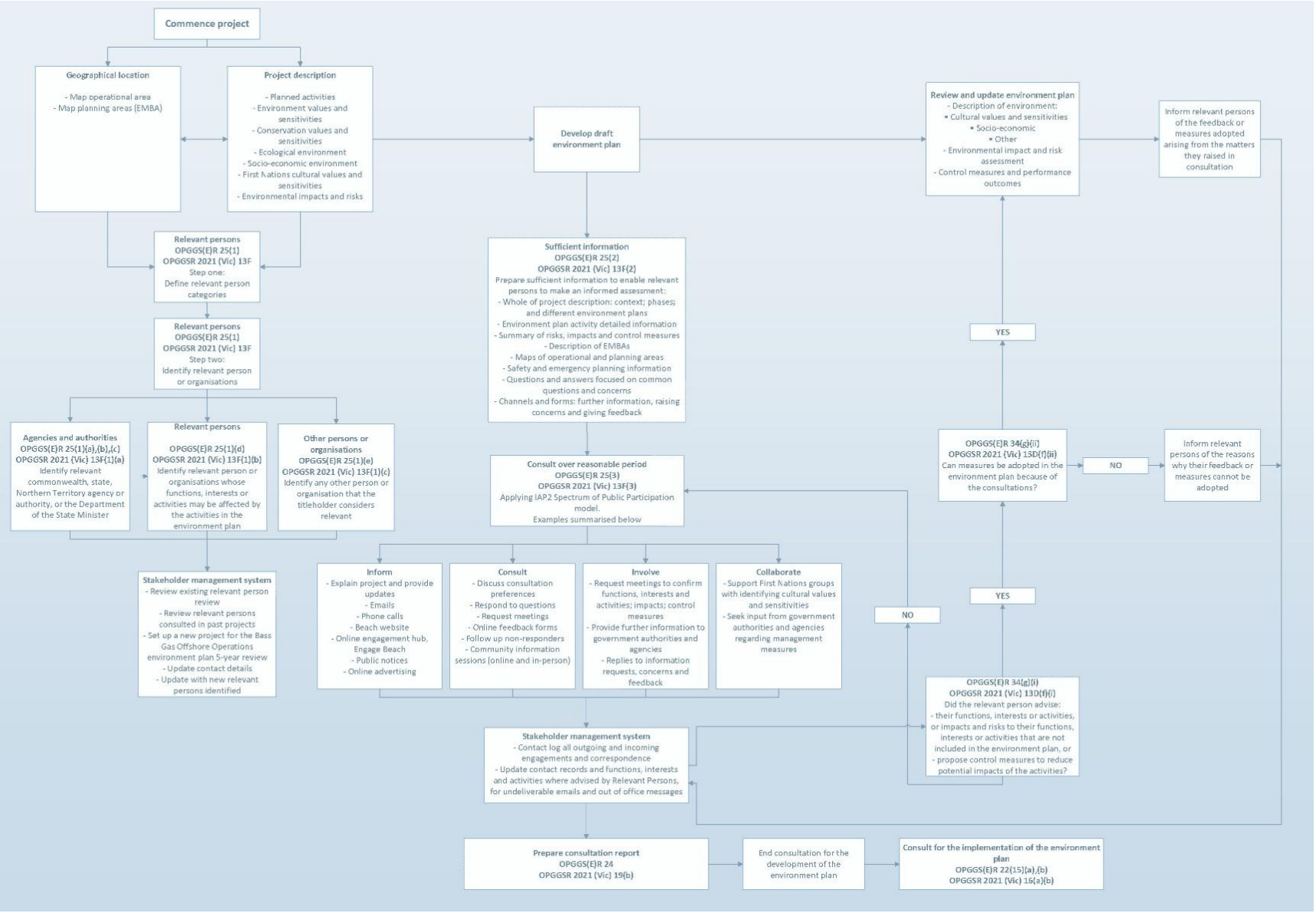


Figure 4.1: Relevant person methodology

4.5.2 Step one: Define project

The first step in the relevant person identification methodology involved defining the project including:

- Project activities
- Description of the environment where the project activities take place
- Assessment of impacts and risks to the environment from the project activities
- Geographic locations of the operational and planning areas.

4.5.2.1 Activities, environment description and assessment

The project activities were described, the environment was defined, and an assessment of impacts and risks undertaken to enable a review of relevant person categories as described further in Section 4.5.1 and set out in Table 4.3. The descriptions of environment, impact and risk assessments, along with control measures adopted, was an iterative process, informed by the consultation process undertaken to meet the requirements of OPGGS(E)R 34 and OPGGSR 2021 (Vic) 13D.

4.5.2.2 Geographic locations

Confirming the geographic areas of the activities enabled the broadest extent of potential impacts, thereby enabling a geographic area of enquiry in the relevant persons identification methodology. Geographic locations were determined including:

- Operational area: where the activities are occurring
- Planning area: the area that may be potentially exposed to hydrocarbons at the low exposure values for the four hydrocarbon phases described in NOPSEMA *Environment Bulletin Oil Spill Modelling* (NOPSEMA 2019). The planning area is conservatively based on the low exposure values that do not result in environmental or ecological impacts.

The defined geographic locations Figure 1.1 and Section 0 Environmental Impact and Risk Assessment, were examined by Beach's Community Relations and Environment project team members in the first steps in the relevant persons identification methodology. That assessment was also used to plan appropriate consultation methods given the nature and scale of the activity and the potential impacts on the relevant persons' functions, interests or activities.

There may be instances where potential environmental impacts may occur. Despite a geographical overlap, this will not necessarily equate to a consequence of the activity on a person or organisation's functions, interests or activities. In such instances, a person or organisation would not be identified as a relevant person (as defined under OPGGS(E)R Section 25 and OPGGSR 2021 (Vic) Section 13(F)).

Table 4.4 summarises the different geographical areas of enquiry, potential impacts and relevant person category focus for further research to identify relevant persons or organisations.

Table 4.3: Identification of relevant persons categories

Environmental values and sensitivities	Operational area	Planning area: Floating, dissolved, entrained	Planning area: Shoreline	Relevant person categories
Conservation values and sensitivities				
World heritage properties	N/A	N/A	N/A	N/A
Australian Marine Parks: • Beagle Marine Park	N/A	✓ ✓ ✓ ✓ ✓ ✓	N/A	Relevant government departments and agencies First Nations groups Marine based industries Marine tourism Educational and research organisations Environmental conservation groups
National heritage-listed places	N/A	N/A	N/A	N/A
Commonwealth heritage places	N/A	N/A	N/A	N/A
Maritime Archaeological Heritage See Section 5.8	✓	✓	✓	Relevant government departments and agencies
Wetlands of international importance See Section 5.5.6	N/A	✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ ✓	Relevant government departments and agencies First Nations groups Land tourism Educational and research organisations Environment Conservation groups
Nationally important wetlands See Section 5.5.10	N/A	N/A	✓ ✓ ✓ ✓ ✓	Relevant government departments and agencies First Nations groups Land tourism Educational and research organisations Environment conservation groups
Marine protected areas: See Section 5.5.2 and 5.5.3	N/A	N/A	✓ ✓	Relevant government departments and agencies First Nations groups

Environmental values and sensitivities	Operational area	Planning area: Floating, dissolved, entrained	Planning area: Shoreline	Relevant person categories
			✓	Marine tourism
			✓	Educational and research organisations
			✓	Environment conservation groups
Coastal/nearshore Protected areas: See Section 5.5.2 and 5.5.3	N/A	N/A	✓	Relevant government departments and agencies
			✓	First Nations groups
			✓	Land tourism
			✓	Educational and research organisations
			✓	Environment conservation groups
Key ecological features See Section 5.5.9	N/A	N/A	N/A	Relevant government departments and agencies
				Commercial fishing
				First Nations groups
				Educational and research organisations
				Environmental conservation groups
Ecological environment - Bass				
The ecological and physical environment described in Chapter 6 provides the basis for further assessment of values and sensitivities, along with impact and risk assessment (Chapter 0) from planned and unplanned activities. The ecological and physical environment includes: • Benthic habitats and species assemblages. • Soft sediment (habitat for various species). • Seagrass (coastline presence). • Algae (coastline presence). • Mangroves (coastline presence). • Plankton.	✓	✓	✓	Relevant government departments and agencies
	✓	✓	✓	Commercial fishing
	✓	✓	✓	First Nations groups
	✓	✓	✓	Educational and research organisations
	✓	✓	✓	Environmental conservation groups

Environmental values and sensitivities	Operational area	Planning area: Floating, dissolved, entrained	Planning area: Shoreline	Relevant person categories
• Invertebrates. • Fish. • Birds. • Marine reptiles. • Cetaceans. • Pinnipeds.				
Threatened ecological communities See Section 5.5.8	N/A	N/A	N/A	N/A
Socio-economic				
Victorian local government areas	✓	✓	✓	Relevant government departments and agencies
• Bass Coast Shire • Cardinia Shire • South Gippsland Shire	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	Community First Nations groups Land tourism
	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	Marine tourism Educational and research organisations Environment conservation groups
Offshore energy, exploration and production industry (non-Beach) companies engaged in various operations such as pipeline management, non-production activities and decommissioning projects. • Tasmanian Gas Pipeline • Woodside Energy • ExxonMobil • Carnarvon Hibiscus • Amplitude Energy	N/A	✓	✓	Marine based industries (offshore oil and gas)

Environmental values and sensitivities	Operational area	Planning area: Floating, dissolved, entrained	Planning area: Shoreline	Relevant person categories
Other infrastructure: Existing: • Victorian Desalination Plant. • Bass Strait-1 and Bass Strait 2 Telstra telecommunication cables. • Basslink Electricity Interconnector cable.	N/A	✓	✓	Marine based industries
Defence: • Restricted airspace • Unexploded ordnance areas	✓	N/A	N/A	Relevant government departments and agencies
Shipping – International and coastal trade.	✓	✓	✓	Relevant government departments and agencies
Ferry services between Victoria and Tasmanian Ports.	✓	✓	✓	Marine based industries
Tourism	N/A	✓	✓	Relevant government departments and agencies
Recreation (beach, walking, fishing, snorkelling, diving, surfing close to coastline)		✓	✓	Community
		✓	✓	First Nations groups
		✓	✓	Land tourism
		✓	✓	Marine tourism
		✓	✓	Recreational associations
Commercial fisheries: • Commonwealth • Victoria	✓	✓	N/A	Commercial fishing
Seaweed industry	✓	✓	N/A	Marine based industries First Nations groups
First Nations				
Sea Country	✓	✓	✓	First Nations groups

Environmental values and sensitivities	Operational area	Planning area: Floating, dissolved, entrained	Planning area: Shoreline	Relevant person categories
Native Title	N/A	N/A	✓	
Indigenous groups protected areas	N/A	N/A	N/A	
Indigenous groups land use agreements	N/A	N/A	N/A	
Impacts				
Routine emissions: Light glow may act as an attractant to light-sensitive species during platform, and vessels operations.	✓ ✓ ✓ ✓	N/A	N/A	Relevant government departments and agencies Commercial fishing First Nations groups Educational and research organisations Environmental conservation groups
Routine emissions: Atmospheric emissions decrease air quality and contribute to GHG emissions.	✓ ✓ ✓ ✓	N/A	N/A	Relevant government departments and agencies Environmental conservation groups
Routine emissions: Noise and vibration, during Platform, RGP and vessel activities, up to 21.9 kms for marine mammals.	✓ ✓ ✓ ✓	N/A	N/A	Relevant government departments and agencies Commercial fishing First Nations groups Educational and research organisations Environmental conservation groups
Physical presence of infrastructure and vessels, including the 500-m radius PSZ surrounding the Platform and the RGP as a potential hazard.	✓ ✓ ✓ ✓	N/A	N/A	Relevant government departments and agencies Commercial fishing Marine based industries Marine tourism
Routine marine discharges from the platform: Produced formation water.	✓ ✓	N/A	N/A	Relevant government departments and agencies Commercial fishing

Environmental values and sensitivities	Operational area	Planning area: Floating, dissolved, entrained	Planning area: Shoreline	Relevant person categories
	✓			First Nations groups
	✓			Environmental conservation groups
Routine marine discharges from the platform and vessels: putrescible waste, sewerage and grey water, cooling and brine water, bilge water and deck drainage.	✓	N/A	N/A	Relevant government departments and agencies
	✓			Commercial fishing
	✓			First Nations groups
	✓			Environmental conservation groups
Risks				
Introduction of invasive marine species	✓	✓	N/A	Relevant government departments and agencies
	✓	✓		Commercial fishing
	✓	✓		First Nations groups
	✓	✓		Environmental conservation groups
				Educational and research organisations
Vessel collision with megafauna	✓	✓	N/A	Relevant government departments and agencies
	✓	✓		First Nations groups
	✓	✓		Environmental conservation groups
	✓	✓		Educational and research organisations
Loss of bulk chemicals and hydrocarbons from the platform and vessels.	✓	✓	N/A	Commonwealth departments and agencies
	✓	✓		Commercial fishing
	✓	✓		First Nations groups
	✓	✓		Environmental conservation organisations
Loss of containment – diesel and condensate	✓	✓	✓	Relevant government departments and agencies
	✓	✓	✓	Community
	✓	✓	✓	Commercial fishing
	✓	✓	✓	First Nations groups
	✓	✓	✓	Land tourism
	✓	✓	✓	Marine tourism

Environmental values and sensitivities	Operational area	Planning area: Floating, dissolved, entrained	Planning area: Shoreline	Relevant person categories
	✓	✓	✓	Educational and research organisations
				Environment conservation groups
Spill response activities	✓	✓	✓	Relevant government departments and agencies
	✓	✓	✓	Commercial fishing
	✓	✓	✓	Land tourism
	✓	✓	✓	Marine based industries
	✓	✓	✓	Marine tourism
	✓	✓	✓	Environmental conservation groups

Table 4.4: Geographic locations and relevant person focus

Area	Summary of potential impacts	Relevant persons category focus
Operational area Area where the activities will take place.	Physical presence of infrastructure and vessels. Routine emissions – light. Routine emissions – atmospheric. Routine emissions – noise and vibration. Routine discharge – produced formation water. Routine marine discharges. Accidental discharge of materials and waste to the ocean. Vessel collision or disturbance to fauna. Introduction and establishment of Invasive Marine Species. Minor spills. Loss of Containment: • Loss of Well Control (LoWC). • Rupture of the Raw Gas Pipeline (RGP) during production. • Rupture of the Raw Gas Pipeline (RGP) while suspended.	Relevant commonwealth and state departments and authorities. Persons or organisations whose functions, interests or activities may be affected by the displacement or disturbance from the planned ongoing activities, such as: • Commercial fishing • First Nations groups • Marine-based industries • Marine tourism • Environmental conservation groups.

Area	Summary of potential impacts	Relevant persons category focus
Planning area: Shoreline hydrocarbons Worst-case hydrocarbon releases have been modelled to show the broadest extent of potential shoreline contact at low, moderate and high thresholds.	Low threshold Low threshold shoreline contact hydrocarbons may be visible as a stain or film, thereby reducing visual amenity for tourism and potentially having a socio-economic impact. The low threshold of 10 g/m^2 equates to approximately 2 teaspoons of hydrocarbon per square metre of shoreline accumulation. NOPSEMA and AMSA guidance indicates that the low threshold shoreline hydrocarbon contact would not initiate a clean-up response. Moderate and high threshold Moderate and high threshold shoreline hydrocarbon contact has the potential for environmental impact and would require activating the Beach Oil Pollution Emergency Preparedness Plan (OPEP). A shoreline concentration of 100 g/m^2 (moderate threshold), or above, is the minimum loading that hydrocarbons can be effectively cleaned up as per the NOPSEMA Oil Spill Modelling Environment Bulletin (April 2019).	Organisations who have responsibilities for emergency response activities, including commonwealth and state marine pollution agencies. Other organisations who may have a supporting or communication role, such as local government authorities or parks management authorities. Persons or organisations whose functions, interests or activities may be affected by unplanned activities such as: • Commercial fishing • First Nations groups • Marine-based industries • Land tourism • Recreational associations • Environmental conservation groups.
Planning area: Floating, entrained and dissolved hydrocarbons. Worst-case hydrocarbon releases have been modelled to determine the broadest extent of potential floating, in-water entrained and dissolved hydrocarbons at low, moderate and high.	**Low threshold** Floating Low threshold floating hydrocarbons would be visible on the sea surface (described as a rainbow sheen) thereby reducing visual amenity for tourism and potentially having a socio-economic impact. The low threshold floating hydrocarbons is considered appropriate for scientific monitoring to assess potential impacts. In-water entrained and dissolved Low threshold in-water hydrocarbons (dissolved and entrained) are not considered to have environmental, ecological or socio-economic impacts and are considered appropriate to establish planning area for scientific monitoring. **Moderate and high threshold** Floating Moderate and high threshold floating hydrocarbons may have environmental effects and at the high threshold would require activating the OPEP for a clean-up response. The moderate and	Organisations who have responsibilities for emergency response activities, including commonwealth and state marine pollution agencies. Other organisations who may have a supporting or communication role, such as local government authorities or parks management authorities. Persons or organisations whose functions, interests or activities may be affected by unplanned activities such as: • Commercial fishing • First Nations groups • Marine-based industries • Land tourism • Recreational associations • Environmental conservation groups.

Area	Summary of potential impacts	Relevant persons category focus
	high thresholds would trigger scientific monitoring to determine potential impacts to inform management measures such as closure of areas such as fishing grounds. In-water entrained and dissolved Moderate and high threshold entrained and dissolved hydrocarbons may have environmental effects. The moderate and high thresholds would trigger scientific monitoring to determine potential impacts to inform management measures such as closure of fishing grounds.	

4.5.3 Step two: Define relevant person categories

The second step in the relevant persons identification methodology involved reviewing the environment values and sensitivities, along with the impacts and risks to determine the broad categories of relevant persons or organisations whose functions, interests and activities may be affected by the activities. Relevant persons categories are shown in Table 4.3.

4.5.4 Step three: Identify relevant authorities, organisations and persons

Beach built upon and refined the previous EP relevant persons list as a basis for developing the relevant person list for consultation for this EP. The following sets out the different methods undertaken to further identify responsible agencies, authorities, and relevant persons or organisations as required by the Regulations. Methods ranged from desktop research of a variety of publicly available information, advertising, and consultation with existing relevant persons to identify other relevant persons. A complete list of relevant persons can be found in **Appendix 1**.

4.5.4.1 Identify relevant authorities – OPGGS(E)R 25(1)(a)(b) and OPGGSR 2021 (Vic) 13(F)(a)

Relevant authorities, as required in the Regulations, were identified as relevant based on their roles and responsibilities in relation to the proposed ongoing activities in this EP, the spatial extent of the planning area, potential impacts and control measures. Methods to identify relevant authorities included a review of:

- GL1887 – Consultation with commonwealth agencies with responsibilities in the marine area – January 2024.
- AFMA Petroleum industry consultation with the commercial fishing industry.
- NOPSEMA and Director of National Parks Petroleum activities and Australian Marine Parks. A guidance note to support environmental protection and effective consultation – January 2024.
- The previous Bass Gas Offshore Operations EP.
- Beach's recent consultation records in its stakeholder management database.
- Desktop research, emails and phone calls to identify any agency or department changes or contacts within the agency or department.
- Any received department or agency feedback to Beach.

The department of the responsible State Minister was identified for Victoria, as required by Regulations.

4.5.4.2 Identify relevant persons or organisations – OPGGS(E)R 25(1)(d) and OPGGSR 2021 (Vic) 13(F)(b)

Building on the relevant person category assessments in Table 4.3, the next steps involved identifying individual persons or organisations whose functions, interests or activities may be affected by the activities described in the EP. This was undertaken through a review of existing relevant person list, existing database records and additional research as described for:

- Relevant persons and organisations broadly: Table 4.5
- First Nations groups or peoples specifically: Sections 4.4.2 and 4.5
- Commercial fishing associations and commercial fishers: Sections 4.5 and 4.13.

Table 4.5: Relevant persons research methods

Activity	Detail
Database review	• Reviewed the existing relevant persons list used for the previous EP consultation. • A broader, comprehensive review of the database was undertaken in planning for consultation for the purposes of developing this EP. • Comparing the master list of organisations and individuals to relevant categories identified during evaluation of environmental values, sensitivities, impacts and risks. • Contacting each organisation or individual where engagement showed no or few responses or where data appeared to be out of date, verified contact details and if they wished to continue consulting with Beach.
Functions, interests or activities	The identification of potential new relevant persons involved preliminary research focused on their functions, interests, and activities, drawn from: • Readily available information on internet search engines, social media channels and organisation websites. • A review of prior communications with persons and organisations to update records of their functions, interests, and activities in the database. • The preparation of information sheets explaining the purpose of consultation, defining 'relevant person' according to regulations, and inviting readers to advise any other people they believe may be a relevant person to contact Beach. • The creation of consultation opportunities such as community information sessions (online and in-person) and Engage Beach, promoted via public notices in local, state and national newspapers (print and online), and social media platforms including Facebook and Instagram and other Meta platforms. • Updating the database with new information on relevant persons' functions, interests, or activities as it becomes available through the consultation process.
Broad based keyword search	• Searched online for potentially relevant persons using key words including boat; swim; dive; sail; yacht; boat charter, SCUBA diving; sea kayaking; fish; marine environment; ocean; marine mammals; cultural heritage; and maritime heritage. • Combined above terms with place-based search terms of: Flinders; Cape Shanck; San Remo; Kilcunda; Phillip Island; Wonthaggi; Cowes; Venus Bay; Inverloch; Wilsons Promontory; and Tidal River.

Activity	Detail
	• Investigated and monitored media articles and online campaigns around offshore activity concerns and using the above searches. • Investigated social media channels including LinkedIn, Facebook and Instagram using the above searches.
Bass Coast Shire Council	• Reviewed existing database contacts. • Online search conducted to identify commercial fishing and marine tourism businesses within the defined planning area. This was done following Beach's methodology, which considered factors such as time to and extent of exposure, volume of catch landed ashore, and the likelihood of accumulation above a set threshold. • Beach asked if relevant persons could share project information sheets and recommend any other potentially relevant persons. • Public notices were published in the South Gippsland Sentinel-Times, and Phillip Island and San Remo Advertiser. • Online advertisements were posted on Facebook, Instagram and Meta, using geotargeting and key interest terms to reach potentially relevant persons in the region. Online advertisements were also published on the South Gippsland Sentinel-Times website. • Information sessions were held in Wonthaggi.
South Gippsland Shire Council Cardinia Shire Council Mornington Peninsula Shire Council	• Contacted local government councils adjacent to planning areas to review the correct personnel to liaise with for Beach activity updates and environmental questions or concerns. • Public notices were published in the South Gippsland Sentinel-Times and Phillip Island and San Remo Advertiser. • Online advertisements were posted on Facebook, Instagram and Meta, using geotargeting and key interest terms to reach potentially relevant persons in the region. Online advertisements were also published on the South Gippsland Sentinel-Times website.
Marine parks	• Contacted Department of Natural Resources and Environment Tasmania (Parks and Wildlife Services). Engaged with the Director of National Parks as per the NOPSEMA and Director of National Parks guidance note. • Reviewed database of parties licensed to carry out activities within marine parks.
Conservation groups	• Beach engaged conservation groups previously identified on the existing previous EP relevant persons list. • Undertook desktop research to identify further local groups. • Through multiple mediums, Beach encouraged self-identification for those whose functions, interest or activities may be affected by the ongoing activities in this EP.
Tourism groups	• Beach engaged tourism groups previously identified on the existing previous EP relevant persons list. • Researched marine tourism operators active in South Gippsland and undertook desktop research to identify further local groups. • Through multiple mediums, Beach encouraged self-identification for those whose functions, interest or activities may be affected by the ongoing activities in this EP.

Activity	Detail
	• For locations where potential shoreline oil is limited to the low threshold, the following is considered for relevant persons identification associated with tourism: time to exposure, extent of exposure, volumes ashore and probability of accumulation above threshold.
Other public notices and online advertising	• Public notices were published in the National Indigenous Times, Koori Mail and Herald Sun for greater reach of potentially relevant persons. • Online advertisements were published on news sites where available and social media platforms (see Section 4.7).

4.5.4.3 Identifying First Nations group or persons

Beach has assets in Victoria that have been in operation for many years. Since becoming the operator of those assets, Beach has been investing time to build honest and transparent relationships with the First Nations groups on whose Traditional Lands and Waters Beach operates. Beach has consulted with these groups for various purposes including relationship building, agreement making, cultural heritage management plans and community development initiatives. These engagements have been led by Beach's First Nations Engagement Manager, a First Nations person who has completed post graduate studies in Land and Sea Country management and Cultural Heritage.

Beach understands that Sea Country is an important part of First Nations people's traditional estate, and they hold a cultural responsibility to ensure its protection and management. First Nations people's relationship to their Sea Country brings with it a complexity of cultural rights and responsibilities, including the right to access, use and distribute resources, and the responsibility to manage those resources from generation to generation. Beach acknowledges that First Nations groups make various claims to land; that they are owners of their country, they below to their country, they identify with their country, and they are stewards of their country, including their Sea Country (Smyth 1994).

First Nations groups who reside along the coasts or on islands believe that Sea Country contains the evidence of creation stories; stories about animals, plants and people, as well as the creation of landscape features such as islands and reefs. Coastal and Islander communities hold cultural responsibilities to ensure Sea Country is cared for and managed carefully. Contemporary First Nations groups, including RAPs and RNTBCs are playing an increasingly important role in the management of this Sea Country, through formalised roles and programs that work alongside various state and commonwealth government departments or agencies.

Values and sensitivities regarding Sea Country may include different features such as:

- Historic and contemporary cultural harvesting of marine flora and fauna.
- Cultural landscape features that hold dreamtime and creation stories, such as offshore islands, estuaries, beaches, bays and marine areas.
- Different marine and avian species that hold deep connections to cultural lore and represent spiritual emblems.

Given these Sea Country values and sensitivities, there is the potential for some First Nations groups and peoples to be considered 'relevant persons' in relation to the activities set out in this EP. Beach understands the interconnectedness of Sea Country, along with the importance of respectful and effective consultation with RAPs and RNTBCs. Given this, Beach's method of identifying potential First Nations peoples that may be relevant persons included:

- Assessing the total values and sensitivities of the physical environment that may be affected by the planned and unplanned activities in the EP, including the spatial extent of the activities.
- Carrying out desktop research to identify any published Sea Country, Healthy Country research or management plans that may identify any culturally significant landscapes, totem species, marine and avian, that may be considered a cultural value or sensitivity relevant to the activities.
- Recognising the importance of Sea Country and researching opportunities to uplift Beach's knowledge of Sea Country and submerged cultural heritage and to connect further and develop relationships with First Nations groups and leading regulatory bodies. In addition to desktop research, Beach's First Nations Engagement Manager attended the following events to build knowledge and relationships:
    - National Sea Country Summit, November 2023 in Darwin.
    - Underwater Cultural Heritage Conference, September 2023 in Canberra.
- Understanding and respecting that First Nations Peoples are protective of their cultural sensitivities, and therefore such information may not be published, further research was undertaken to identify First Nations Peoples organisations and persons including:
    - Using the National Native Title database to identify any Native Title claims or determinations in the area adjacent to Beach's activities.
    - Using the Victorian Aboriginal Heritage Council online map to identify any RAPs in Victoria.
    - Researching the Prescribed Bodies Corporate, RAPs, Native Titleholders and claimants. This research focussed on Victoria and Northern Tasmania given the nature and scale of the planned and unplanned activities, including the spatial extent of the planning area in the EP.
    - Visited the local government authority websites (the shire or municipal council), which often includes an acknowledgement of the local Traditional Owners.
- Reviewing commonwealth and state marine park management plans, or Indigenous Protected Areas (IPAs) that overlap the planning area, which may identify Traditional Custodians or representative bodies to contact regarding Sea Country and any cultural values.
- Asking each First Nations group or person consulted if they could identify any other potentially relevant persons (organisations or people) who may wish to be consulted, alternatively if they did not want to identify them to Beach, Beach requested they share the project information with them.

- Advertising in the National Indigenous Times and Koori Mail newspapers and their online platforms to invite consultation with any persons who may have a function, interest or activity that may be affected by the activities set out in the EP (see advertising schedule in Section 4.7.2). This additional step was undertaken to provide an opportunity for any relevant persons unknowable to Beach, notwithstanding the relevant person identification steps undertaken.

- Completing a broad-based online keyword search using: Deakin University Library; Google; Google Scholar; LinkedIn; Facebook; TikTok; and Instagram to identify potential additional relevant persons or organisations and cultural values and sensitivities using the following search terms.

    - Sea Country; Saltwater Country; cultural Sea Country; cultural sea values; cultural values; totems; Sea Country totems; submerged cultural heritage and landscapes; paleo landscapes; songlines; whales; whale songlines; dream time; deep time; and dreaming.

- Undertaking combined searches including:

    - Combined above terms with Indigenous terms: First Nations; Aboriginal; Indigenous; Aboriginal newsletters; and Aboriginal news.

    - Combined above terms with industry relater terms: gas; offshore gas; fossil fuels; and offshore energy.

    - Combined above terms with the place-based search terms of: Flinders; Cape Shanck; San Remo; Kilcunda; Phillip Island; Wonthaggi; Cowes; Venus Bay; Inverloch; Wilsons Promontory; and Tidal River.

- Investigating and monitoring media articles identified in the above searches for further relevant persons.

- Investigating social media platforms including LinkedIn, Facebook and TikTok, to search for individuals who may be associated with relevant First Nations groups.

The representative entity for the land and Sea Country adjacent to the Bass Gas operational and planning area, is the Bunurong Land Council Aboriginal Corporation (Bunurong Land Council). Bunurong Land Council are the RAP, which under the AHA 2006 VIC are recognised as the primary guardians, keepers and knowledge holders of Aboriginal Cultural Heritage and are the primary source of advice and knowledge on matters relating to Aboriginal places or objects within their registered region. Beach have also identified other First Nations groups who may have an interest in the activities based on a worst-case scenario of an incident in the planning areas. They include:

- Gunaikurnai Land and Waters Aboriginal Corporation

- Aboriginal Land Council Tasmania

- Tasmanian Aboriginal Centre

- Circular Head Aboriginal Corporation

Flinders Island Aboriginal Association Inc were consulted as they were included in the previous EP planning area and therefore on the existing relevant persons list. For the purpose of developing this EP they were not included in the reduced planning area however Beach recognises the interconnectedness of Sea Country and as such they were included in consultation. They did not raise any concerns for this EP.

For First Nations organisations that Beach had not consulted for this project prior to commencing consultation on this EP, Beach's First Nations Engagement Manager made a personal phone call to identify the most appropriate contact, where such information was not obvious on their website. Beach's methodology for identifying First Nations groups has been endorsed by First Peoples State Relations Victoria and Aboriginal Heritage Council Victoria.

4.5.4.4 Identifying commercial fishers

Methodology for identifying relevant commercial fishers

Beach has a long-standing history of consultation and successful coexistence with relevant peak bodies and fishery associations representing commercial fishers in the Bass Basin. These fishers actively operate in areas that have, over many years, been primarily adjacent to Beach's offshore operations.

The commercial fishing sector is a key category of relevant persons given the potential overlap of fishing and petroleum activities. Beach consulted with commercial fishers and their associations for the development of the previous EP and other Beach project activity EPs in the area and provided ongoing communication regarding these activities.

In 2021, Beach worked with the Commonwealth Fishing Association, Bass Strait Scallop Industry Association, and South East Trawl Fishing Association (SETFIA) to codesign its Fair Ocean Access procedure (**Appendix 4**). It sets out Beach's commitment to consultation, minimising impacts of its activities, the circumstances where a fisher may claim compensation, the evidence required and the claim process. Beach also sought input from the Victorian Fisheries Authority (VFA) and Seafood Industry Victoria (SIV).

Consultation for the development of this EP built upon existing relationships by engaging fishing peak bodies and associations on behalf of their members about the potential ongoing activities and potential impacts, along with mitigation measures.

Designated commonwealth fisheries are vast, often spanning three or more states. State fisheries are also vast, spanning entire coastal perimeters out to three nautical miles off the shore. Persons or organisations with fishing entitlements may be a vessel permit holder, a fishing licence holder, a quota holder, or hold a combination of more than one of those rights, and across multiple fisheries.

Beach understands from discussions with the fishing industry that fishery entitlement holders are being consulted by petroleum titleholders, proponents holding windfarm feasibility licences, government marine management authorities, and their own fishing management authorities, leading to concerns about stakeholder fatigue. Many fishery entitlement holders who may hold more than one permit, licence or quota, have been receiving multiple approaches via various industry proponents who have acquired

entitlement holder mailing lists and issued correspondence regardless of where the entitlement holder may fish.

Beach's methodology is focussed on identifying fishing activity that may be impacted by Beach's activities, and therefore 'on-the-water' commercial fishers either via their peak bodies or associations or, where applicable, directly whose functions, interest and activities may be affected.

For the purposes of this EP, the methodology applied for identifying relevant commercial fishing persons or organisations included:

- Reviewing the existing relevant person list.
- Identifying fishing peak bodies and associations that represent fisheries present in the operational and planning areas defined in the EP.
- Consulting with peak bodies and associations, assessing their membership coverage, representation role, consultation approach and any engagement agreements required.
- Reviewing existing Beach stakeholder management database of commercial fishing peak bodies and associations for previous history, including advice received in the last 12 months through ongoing consultation.
- Multi-channel advertising for self-identification.
- Desktop research of publicly available materials and published guidance.

Identification of fishing peak bodies and associations

As part of its ongoing consultation with peak bodies and fishing associations, Beach understands the membership representation of each.

For this EP Beach applied the above methodology (Section 4.5), including undertaking desktop research and reviewing its existing relevant person list, stakeholder management system and publicly available information from the Australian Fisheries Management Authority (AFMA), sections of the previous Beach commissioned SETFIA report, and the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) Fishery Status Report 2024 to confirm designated fisheries that have the right to operate in the operational and planning areas of the activities described in this EP.

SETFIA and SIV were identified as the primary peak bodies representing commercial fishing interests within the operational and planning area. Beach undertakes ongoing consultation for the previous EP and other activity EPs in the Bass Basin and in 2024 Beach met with the relevant peak bodies and fishery associations to confirm their membership lists and licence holders. Beach referred to the membership lists and cross referenced it with the previous list of active fishers.

The AFMA website identifies relevant fishing associations, all of which offer voluntary membership to commercial fishers. Beach consulted with AFMA at the beginning of the consultation period and received

recommendations of an additional commercial fishery association to consult for the development of the EP and used this recommendation to build on its relevant person list.

SIV membership coverage includes all Victorian commercial fishery licence holders, except Abalone fishers who are represented by one or more associations. Victorian Abalone fishing associations include Abalone Council Victoria and Abalone Victoria Central Zone.

Although the activities are not taking place in Tasmanian state waters Beach recognises Seafood Industry Tasmania (SIT) and its membership coverage includes all Tasmanian commercial fishery licence holders. In addition to the broad membership coverage of SIT, Tasmania also has fishery associations representing all relevant fishery licence holders as follows Tasmanian Rock Lobster Fisherman's Association and Scallop Fisherman's Association of Tasmania.

Beach has identified and undertaken consultation with all relevant commonwealth and state commercial fishing associations as described in Section 4.6.

Ongoing identification of active fishers

In addition to the commercial fisher identification methods described, Beach has undertaken local media and online advertising to create general awareness and in an effort for new fishers to self-identify as a relevant person. In-person and online information sessions were advertised using multi-channel advertising (see Section 4.7) and promoted to members by SETFIA, Southern Shark Industry Alliance and SIV. Local media advertising has not resulted in newly identified commercial fishers.

From time to time, Beach receives direct contact from individual fishers who received Beach's contact details from other commercial fishers and Beach updates its database to include these fishers accordingly.

Notifications throughout the activity as required by the Regulations also provide an opportunity for fishers to contact Beach if they have not been in contact already.

4.5.5 Identify persons of organisations the titleholder considers relevant – OPGGS(E)R 25(1)(e) and OPGGSR 13F(1)(c)

In the development of this EP, Beach also consulted with other persons or organisations it considers relevant, in accordance with the Regulations.

The methodology applied by Beach in identifying other persons or organisations is based on ensuring continuity of Beach's long standing proactive consultation undertaken with community members, local businesses, and some government agencies around Beach's operating assets. As a local operator, Beach considers it good engagement practice to consult with people and organisations that will not be relevant persons under the OPGGS(E)R 25(1)(a), (b) and (d) and OPGGSR 2021 (Vic) 13F(1)(a) and (b) but may still have an interest in Beach's activities.

Beach regularly reviews its stakeholder management database, which contains historical engagement information used to identify persons or organisations that may have an interest in future Beach projects. Unless organisations or individuals advise Beach that they no longer wish to receive communications, Beach has continued to consult with such stakeholders.

4.6 Relevant persons identified

Relevant persons and other persons identified and consulted in relation to developing this EP are set out in **Appendix 1** as follows:

- Relevant authorities, OPGGS(E)R 25(1)(a), (b), (c) and OPGGSR 2021 (Vic) 13F(1)(a).
- Relevant persons, OPGGS(E)R 25(1)(d) and OPGGSR 2021 (Vic) 13F(1)(b).
- Other persons, OPGGS(E)R 25(1)(e) and OPGGSR 2021 (Vic) 13F(1)(c).

4.7 Sufficient information

4.7.1 Types of information

Beach has prepared and delivered sufficient information cognisant of regulatory requirements, guidelines and standards. Information must be sufficient for each relevant person to assess how the possible consequences of the activity might affect their functions, interests or activities. The detail, format (e.g. short copy, long copy, questions and answers, and maps), and delivery are tailored to the different relevant person's needs and the degree to which they may be affected.

Key types, purpose, key content and the relevant person focus for the provision of sufficient information are set out in Table 4.6 in chronological order. Copies of information are provided in **Appendix 3.**

Table 4.6: Provision of sufficient information

Information type	Purpose	Key content	Relevant person focus	Date
Email	Introduce/reintroduce the Bass Gas Offshore Operations Project, its context and an overview of a range of its activities, including the 5-year review of EP. Commence review of relevant persons. Invite consultation.	Link to previously approved EP. EP information sheet. Outline of the purpose of consultation as defined by the regulations, including link to regulations. Definition of a relevant person as per regulations. Overview of sufficient information and reasonable period as regulation requirements. Sensitive information statement. Advise information on EP available on Engage Beach, including information sheets, summary of impacts and	All in stakeholder management database assigned by Beach to Bass Gas Offshore Operations project as potentially relevant persons.	14 July 2025

Information type	Purpose	Key content	Relevant person focus	Date
		risk assessment and activity area maps. Link to NOPSEMA's consultation and public comment webpage, which includes NOPSEMA's *Consultation on offshore petroleum environment plans brochure*. Link to Engage Beach. Invite consultation. Information sessions and webinar details.		
Email	Reintroduce the Bass Gas Offshore Operations Project, its context and an overview of a range of its activities, including the 5-year review of EP. Commence review of relevant persons. Invite consultation. Provide an opt in or out of consultation for those no longer in the EMBA.	Link to previously approved EP. Recipient included in previous EP EMBA (reduced EMBA does not include recipient). Option to opt in or out of consultation. EP information sheet. Outline of the purpose of consultation as defined by the regulations, including link to regulations. Definition of a relevant person as per regulations. Overview of sufficient information and reasonable period as regulation requirements. Sensitive information statement. Advise information on EP available on Engage Beach, including information sheets, summary of impacts and risk assessment and activity area maps. Link to NOPSEMA's consultation and public comment webpage, which includes	All in stakeholder management database assigned by Beach to Bass Gas Offshore Operations project as potentially relevant persons for the previous EP but that are no longer within the EMBA of this EP.	14 July 2025

Information type	Purpose	Key content	Relevant person focus	Date
		NOPSEMA's *Consultation on offshore petroleum environment plans brochure*. Link to Engage Beach. Invite consultation. Information sessions and webinar details.		
Information sheet	Provide a clear overview of the project activity's key details. Provide information about regulatory and consultation requirements.	The project overview, timing and location (including map); facilities; activities; environment description; impacts, performance outcomes and controls; cultural values and sensitivities; exclusion zones; emergency planning; and consultation overview, including sensitive information. Link to Engage Beach NOPSEMA's *Consultation on offshore petroleum environment plans* brochure. Contact details	Key focus is for relevant persons whose functions, interests or activities may be affected by the activity in the EP.	14 July 2025
Engage Beach	A Bass Gas Offshore Operations EP 5-year review project information page including: EP scope, timings, and locations. A separate EP open consultation page. A prominent link to Engage Beach was included on the home page of Beach's corporate website.	Long and short form content. Q&A on common concerns. Maps. Downloadable summary table of risks, impacts and controls. Downloadable information sheet. Purpose of consultation. Information sessions and webinar details. Questions and feedback form. Invitation to identify functions, interests or activities and join mailing list.	Key focus is for relevant persons whose functions, interests or activities may be affected by the activity in the EP, providing detailed information in different formats. Secondary focus is new potentially relevant persons who can request further information and consult and/or register for ongoing consultation.	14 July 2025

Information type	Purpose	Key content	Relevant person focus	Date
		Button link to NOPSEMA's *Consultation on offshore petroleum environment plans* brochure.		
Summary table of impacts and risks	Provide an overview of impacts and mitigations.	Planned and unplanned activities and potential impacts to do with relevant activities. Control measures.	Relevant persons whose functions, interests or activities may be affected by the activity in the EP.	14 July 2025
Fair Ocean Access information sheet	Simple explanation of Beach's commercial fishing compensation protocol.	Summary of protocol. How to find out more information.	Potentially impacted commercial fishers.	Was available to commercial fishers upon request.
Public notices (information sessions and webinars)	Provide overview of Beach. Provide overview of the project. Advise consultation and invite consultation, to unknown potentially relevant persons. Advise community information sessions and webinar series.	Overview of the EP. Advise consultation dates. EMBA information. Project maps. Information sessions and webinar details. QR code for more information.	Unknown potentially relevant persons in regional locations adjacent operational area. First Nations persons. Unknown relevant persons more broadly.	21 July to 3 August 2025 *(see advertising schedule below)*
Online banner advertisements (National Indigenous Times and Koori Mail)	Invite consultation. Encourage unknown relevant persons who may be impacted to consult with Beach.	Consultation is underway. Call to action to click the banner advertisements to visit Engage Beach to view project information and consultation pages.	First Nations unknown potentially relevant persons.	28 July to 10 August 13 to 28 September 2025 *(see advertising schedule below)*
E-newsletter banner advertisement (twice weekly – National Indigenous Times)	Invite consultation. Encourage unknown relevant persons who may be impacted to consult with Beach.	Consultation is underway. Call to action to visit Engage Beach to consult.	First Nations unknown potentially relevant persons.	28 July to 10 August 13 to 28 September 2025 *(see advertising*

Information type	Purpose	Key content	Relevant person focus	Date
				schedule below)
Facebook, Instagram and Meta advertising	Invite consultation. Encourage unknown relevant persons who may be impacted to consult with Beach.	Invite consultation. Consultation dates. Purpose of consultation. Call to action to visit Engage Beach to consult.	Unknown potentially relevant persons in regional locations adjacent to operational and/or planning area.	28 July to 10 August 2025 1 to 14 September 2025 29 September to 3 October 2025 *(see advertising schedule below)*
Email	Reminder of consultation opportunities – in-person and online information sessions.	Invite consultation. Information sessions and webinar details. Link to Engage Beach.	All in stakeholder management database assigned by Beach to the project as potentially relevant persons.	4 to 10 August 2025
Community information session (in-person)	Provide additional opportunity to consult with Beach technical staff and ask questions or raise concerns.	Open community and dedicated First Nations information sessions were held. Attended by Beach technical staff from Environment, Project, First Nations and Community teams. Information sheets provided. Posters of operation and planning area maps, and Yolla-A photos displayed. First Nations country map on display. Printed NOPSEMA *Consultation on offshore petroleum environment plans* brochures available.	Relevant persons whose functions, interests or activities may be affected by the activity described in the EP. Relevant persons in stakeholder management database were advised of the sessions via email and sessions were advertised publicly.	19 and 20 August 2025
Email	Reminder of consultation opportunities – online information sessions (webinars).	Invite consultation. Webinar details. Link to Engage Beach.	All in stakeholder management database assigned by Beach to the	25 August 2025

Information type	Purpose	Key content	Relevant person focus	Date
			project as potentially relevant persons.	
Online advertising	Invite consultation. Encourage unknown relevant persons who may be impacted to consult with Beach.	Call to action to visit Engage Beach to consult.	Unknown potentially relevant persons in regional locations adjacent to Operational and or Planning areas.	25 August to 7 September 2025 *(see advertising schedule below)*
Public notice	Provide overview of Beach. Invite consultation. Advise webinar series.	Overview of the EP. EMBA information. Advise consultation dates. Webinar details. QR code for more information.	Unknown potentially relevant persons in regional locations adjacent Operational Area.	27 August 2025
Community information sessions (online)	Provide additional opportunity to consult with Beach technical staff and ask questions or raise concerns.	Webinar 1: Open community information webinar. Webinar 2: Dedicated culturally sensitive First Nations webinar. Webinar 3: Dedicated culturally sensitive First Nations webinar. Webinar 4: Open community information webinar. Attended by Beach technical staff from environment, project, First Nations and community teams.	Relevant persons whose functions, interests or activities may be affected by the activity described in the EP. Relevant persons in stakeholder management database were advised of the sessions via email and sessions were advertised publicly.	9 and 10 September 2025
Email	Reminder of consultation closing.	Invite consultation. Consultation dates. Link to Engage Beach.	All in stakeholder management database assigned by Beach to the project as potentially relevant persons.	30 September 2025
Email	Advised consultation has closed. Next steps.	Consultation has closed. Advise EP will be sent to regulator for assessment. Link to Engage Beach and contact details.	All in stakeholder management database assigned by Beach to the project as potentially relevant persons.	14 October 2025

4.7.2 Advertising

Prior to consultation, research was conducted to determine where the public typically accesses news. Findings indicated that a large proportion of Australians now source news online, with a growing preference for social media platforms. A February 2024 report from the Australian Communications and Media Authority confirmed an increase in people using social media as their primary news source. In response, a hybrid media strategy was adopted throughout the consultation period, combining print public notices with targeted online advertising across news websites, Facebook, Instagram, and other Meta platforms. This approach provided broader reach and accessibility, with online campaigns delivering targeted messaging to people in specific demographics and geographic locations and offering real-time analytics to optimise performance and engagement.

The digital advertising used geotargeting locations within the planning and operational areas and key demographic interests from Facebook's list of terms, such as commercial fishing; marine; recreational fishing (fishing); cultural heritage; and environmentalism to inform the reach. The call to action was to click through to Engage Beach where there were opportunities to learn more and consult via a feedback form. Beach email and phone contact details were also available on the site.

When the first Facebook, Instagram, and Meta campaign launched on 28 July 2025, there was a significant increase in click-throughs to Engage Beach. During this period, the first round of advertisements reached 33,802 individuals and generated 63,634 views across these platforms. As a result, Engage Beach received 133 unique visitors and 177 total views of the activity's information and consultation pages. During the entire consultation period, the Engage Beach activity pages had a total of 399 unique visitors, 640 page views and 547 visits.

Beach continuously optimised the campaign by reviewing key terms and geotargeting locations within the planning area for advertisements. Throughout the campaign, Beach monitored click-through rates to the consultation hub in real time to maximise reach and engagement.

The purpose, content and relevant person focus for advertising is explained in Table 4.6. The locations, publisher and dates are shown in Table 4.7. Copies of advertisements are provided in **Appendix 3**.

Table 4.7: Advertising schedule

Locations	Date	Media
Melbourne, statewide	21 July 2025	Herald Sun
South Gippsland Shire, VIC	22 July 2025	South Gippsland Sentinel-Times
Bass Coast Shire Council, VIC	23 July 2025	Phillip Island and San Remo Advertiser
National reach to First Nations audiences	29 July 2025	National Indigenous Times
National reach to First Nations audiences	30 July 2025	Koori Mail
National reach to First Nations audiences	28 July to 10 August 2025	National Indigenous Times website
National reach to First Nations audiences	28 July to 10 August 2025	National Indigenous Times e-newsletter
National reach to First Nations audiences	28 July to 10 August 2025	Koori Mail website

Locations	Date	Media
Geotargeting locations within the EMBA	28 July to 10 August 2025	Facebook, Instagram, Meta
Geotargeting locations within the EMBA	25 August to 7 September 2025	South Gippsland Sentinel-Times website
Geotargeting locations within the EMBA	25 August to 7 September 2025	NewsCorp websites
Bass Coast Shire Council, VIC	27 August 2025	Phillip Island and San Remo Advertiser
Geotargeting locations within the EMBA	1 to 14 September 2025	Facebook, Instagram, Meta
National reach to First Nations audiences	13 to 28 September 2025	National Indigenous Times website
National reach to First Nations audiences	13 to 28 September 2025	National Indigenous Times e-newsletter
National reach to First Nations audiences	13 to 28 September 2025	Koori Mail website
Geotargeting locations within the EMBA	29 September to 3 October 2025	Facebook, Instagram, Meta

4.7.3 Information sessions and webinars

Beach held four in-person regional community information sessions during the consultation period. The sessions were scheduled flexibly to accommodate different work and personal commitments. Their purpose was to provide a chance to consult directly with Beach technical staff about the activities described in the EP. Face-to-face consultation allowed participants to express concerns, engage in two-way dialogue, and collaborate on control measures when applicable. This method also supported those who preferred in-person communication over emails or phone calls. Attendees represented various stakeholder demographics, including a community group, First Nations, environmental activists, telecommunications and local government. Wonthaggi was chosen as the location as it is the largest and nearest regional centre to Lang Lang Gas Plant and Kilcunda. All concerns raised by participants are summarised in Table 4.8.

Beach also advertised for and held four online information sessions (webinars) during consultation. Two sessions received registrations, and one received attendance. Following the attended webinar, a 'what we heard' summary report was distributed via email to attendees.

After each information session and webinar, Beach reviewed the number and types of attendees, the questions and concerns raised, and the overall engagement approach. The Community team also held weekly meetings to track consultation progress with different relevant person categories and individual organisations. During these meetings, they reviewed the questions asked and identified the information needed from Beach subject matter experts to prepare considered responses. In addition, the project consultation team met twice weekly to review engagement progress. These assessment processes allowed Beach to regularly check that sufficient information was being provided and the consultation channels used were effective.

Table 4.8 details the schedule of information sessions (both in-person and online) locations, dates, attendees and consultation summary.

Table 4.8: Summary of information sessions (in-person and online)

Location	**Date**	**Attendees**	**Concerns, objections** and/or feedback
Community information session (in person) Wonthaggi *(Dedicated culturally sensitive First Nations session)*	Tuesday 19 August 2025 11am to 3pm (AEST)	Nil attendees	N/A
Community information session (in person) Wonthaggi	Tuesday 19 August 2025 6pm to 8pm (AEST)	5 attendees	• Objection to fossil fuel. • Queries about and objection to Beach's carbon emissions. • Questioned the need for new gas and Australia's gas exportation. • Queries about careers in the industry (questioning how people could work within the industry, another person seeking work). • Questions about location and timing of activities. • Questions about whether Beach is an Australian company. • Beach explained the industry regulations and the impacts and risks assessment. • Beach provided an overview of activities described in the EP, including that this is existing operations and infrastructure.
Community information session (in person) Wonthaggi	Wednesday 20 August 2025 11am to 3pm (AEST)	3 attendees	• Concerns about subsea cable interference. • Queries regarding other Beach projects. • Queries regarding location and timing of activities. • Queries regarding existing infrastructure, including the Lang Lang Gas Plant and pipeline. • Queries regarding other energy industries e.g. wind turbines. • Queries regarding whether activist groups had provided objections. • Queries regarding who Beach is consulting with. • Comments regarding other proponents' consultations. • Supportive comments of gas as a backup energy source.

Location	Date	Attendees	**Concerns, objections** and/or feedback
			• Beach provided an overview of activities described in the EP, including that this is existing operations and infrastructure. • Beach explained oil spill modelling. • Beach explained PSZ and mitigation measures. • Beach explained regulatory requirements.
Community information session (in person) Wonthaggi *(Dedicated culturally sensitive First Nations session)*	Wednesday 20 August 2025 6pm to 8pm (AEST)	Nil attendees	N/A
Community information session (online)	Tuesday 9 September 2025 2.15pm to 3pm (AEST)	6 registered 3 attendees	• Beach provided an overview of activities described in the EP. • No concerns raised.
Community information session (online) *(Dedicated culturally sensitive First Nations session)*	Tuesday 9 September 2025 7pm to 7.45pm (AEST)	Nil attendees	N/A
Community information session (online) *(Dedicated culturally sensitive First Nations session)*	Wednesday 10 September 2025 2.15pm to 3pm (AEST)	Nil attendees	N/A
Community information session (online)	Wednesday 10 September 2025 7pm to 7.45pm (AEST)	2 registered 0 attendees	N/A

4.8 Reasonable period

Consultation for the revised EP commenced on 14 July 2025 with two versions of the same email sent to all identified relevant persons. The first version was distributed to stakeholders currently on the relevant person list, while the second version was sent to those previously identified as relevant persons but no longer included due to the reduced planning area for this environment plan. Both emails provided similar

information; however, the second version also explained that recipients were no longer within the planning area and invited them to opt in or out of consultation for the purposes of developing the revised EP. The purpose of and key content of the email can be found in Table 4.6.

The consultation period was open for three months from 14 July to 10 October 2025. Throughout consultation, further emails and information was distributed to relevant persons, and different consultation opportunities were provided up to the conclusion of the formal consultation period. Before the consultation period closed, Beach again emailed all relevant persons to alert them of the consultation closing dates and remind them of all available avenues to consult.

During consultation for this EP, relevant persons were advised the purpose of consultation was to ensure potential impacts and risks were identified and appropriate measures adopted because of the consultations. Relevant persons were encouraged to contact Beach if they required further information or wished to discuss how the activities described in the EP may affect their functions interests and activities.

Beach understands that what constitutes a reasonable period for consultation should be considered on a case-by-case basis, with reference to the nature, scale and complexity of the activity.

Beach considers that it has provided reasonable time for consultation and that consultation in the course of preparing this EP has been completed.

4.9 Reasonable period: First Nations relevant persons

4.9.1 Comparison with benchmark periods for consultation with First Nations peoples and communities under other legislative instruments

In determining whether a reasonable period for consultation has been achieved with First Nations peoples and communities, Beach considered the requirements for consultation with First Nations groups and communities under other legislative instruments and policies.

Beach has observed and understands that there is a general reluctance from authorities to prescribe specific periods of time for consultation. Beach accords with the notion that what constitutes a reasonable period of consultation will vary on a case-by-case basis with the nature of the consultation required having regard to the scale and complexity of the proposed activity, the regulatory purpose of consultation, and the circumstances of the persons required to be consulted with. Beach notes the court in Tipakalippa reasoned that the consultation process must be capable of being discharged within a reasonable time, where, at paragraph 136, the court said that "… it must be taken to be the regulatory intention that the consultation requirement cannot be one that is incapable of being complied with within a reasonable time".7

[7] Santos NA Barossa Pty Ltd v Tipakalippa [2022] FCAFC 193 at [136]

The court went on to say the obligation to consult must be capable of practicable and reasonable discharge by the titleholder.[8] This has been repeated in NOPSEMA's consultation guidelines for regulation 25. [9]

Beach has considered the benchmark materials and its general determination of whether a 'reasonable period' for consultation has been afforded to relevant persons through this lens. Taking into consideration these comparative materials, and its experience and understanding of First Nations groups and communities, Beach has taken the approach to determining whether a reasonable period of time for consultation has been afforded to relevant persons pursuant to regulation 25(3). In particular:

- As described in Section 4.8 above, Beach commenced consultation in respect of this EP in July 2025. This has involved an iterative release of project information and materials to relevant persons.

Beach has provided a period for consultation with relevant persons across a period of three months. Relevant persons have had sufficient information to assess the possible consequences of the activity on their functions, interests or activities. This consultation period has allowed Beach opportunity to engage in meaningful, two-way discussions with relevant persons without compromising the ability of those relevant persons to meaningfully consider Beach's project information and engagements, and to make an informed assessment of the possible consequences of Beach's activities on their functions, interest or activities. With regard to the benchmark consultation periods discussed below, Beach considers the period of consultation it undertook demonstrates that Beach has provided a reasonable period for relevant persons to consult in accordance with OPGGS(E)R 25(3) and OPGGS(R)13F(3). However, Beach notes that there is no directly comparable consultation framework to OPGGS(E)R 25 and OPGGS(R)13F and what is a reasonable period for consultation under the Regulations needs to be determined on a case-by-case basis.

- The *Native Title Act 1993 (Cth)* contains various requirements for proponents and government authorities to undertake consultation with native title parties for periods ranging from two to eight months [10].

- Past versions of the *Mineral Resources Act 1989* (Qld) provided for a two-month consultation period for entry into a native title area for low impact prospecting. [11]

- Minimum public comment periods required under other legislation include:

    - *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth),* regulation 30(1) provides for a 30-day public comment period on seismic or exploratory drilling environment plans that have been submitted and published on NOPSEMA's website.

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[8] Santos NA Barossa Pty Ltd v Tipakalippa [2022] FCAFC 193 at [89].
[9] See, for example, page 5 of the NOPSEMA guideline 'Consultation in the course of preparing an environment plan' (2024).
[10] See for example, section 24JAA which provides for a two or four month consultation period in relation to certain proposed future acts to be carried out by government authorities, and section 24MD which provides for an eight month consultation period in relation to an objection to a right to mine for the sole purpose of the construction of an infrastructure facility associated with mining.
[11] For example, see the Mineral Resources Act 1989 (Qld), section 435 (Reprint No. 5A) and also the version current as at 1 July 2016

- *Heritage Act 2004* (ACT), section 37(1) provides for a four-week public comment period in relation to the registration of a place or object. This period may be extended by the Australian Capital Territory Heritage Council under section 37(2).

- *Environment Protection and Biodiversity Conservation Act 1999* (Cth), provides for a range of public comment periods including at least 28 days in relation to the publication of draft terms of reference and draft impact assessment reports for strategic assessments (sections 146(1B)(b) and (2)(b), and a period of not less than 20 business days in relation to draft public environment reports (section 98(3)).

- *Aboriginal Heritage Act 1988 (SA),* sections 24(1), 24(4) and 24(6) provide for not less than eight weeks' notice to make representations to the Minister regarding a proposed direction prohibiting or restricting activities, or access to a site surrounding an Aboriginal site, object or remains. The Minister may however give a direction without this notice if satisfied that urgent action is necessary.

- Consultation guidelines published from the (now repealed) *Aboriginal Cultural Heritage Act 2021* (WA), prescribe approximately 12 weeks consultation (unless otherwise agreed) depending on the degree of engagement from relevant First Nations groups.

These benchmarks indicate a range of consultation periods under current and former legislation. Noting the difference in legislative purpose for these consultation periods, the consultation period afforded by Beach to relevant persons in relation to this EP represents a conservative and reasonable period properly suited to the legislative intent of the OPGGS Act and the OPGGS(E)R.

4.9.2 Review of consultation policies for consultation with First Nations peoples and communities

Beach also ensured it has had regard to relevant policy statements in relation to its method of consultation with First Nations peoples and communities and how Beach can best respect those First Nations peoples and communities with regard to time.

In order to assist with ensuring its consultation is appropriate and adapted to First Nations relevant persons, Beach incorporated the following policy guidance into its consultation methodology:

- "Proponents should be aware that cultural obligations, such as protocols governing death and grieving, may require First Nations peoples and communities to engage in ceremony for days, weeks or in some cases months, during which First Nation peoples or communities may not be available for other business. First Nations peoples and communities may also be unavailable on calendar dates that are significant, such as, during NAIDOC Week and National Sorry Day. Proponents should respect these protocols, and build flexibility into engagement strategies, as far and as early as possible in the engagement process. 12

[12] Page 8, Interim Engaging with First Nations People and Communities on Assessments and Approvals under the Environment Protection and Biodiversity Conservation Act 1999 (Cth).

- "Good practice consultation with Aboriginal people, including through their representatives and organisations where applicable, includes … (5) Respecting Aboriginal traditions, cultural protocols and obligations, including taking reasonable steps to make contact and allowing sufficient time for genuine consultation to occur. This may include using multiple contact methods (e.g. phone and email) and providing a reasonable time for responses". 13

- "Engagement takes many different forms, and it is important that the level of your engagement appropriately matches what you are doing. Give it time – leave space for people to get to know you and to build trust; leave time for unexpected occurrences (e.g. sorry business); be sensitive to the different timelines of the communities you are working with".14

- "Additional time may be needed to deal with external cultural influences, such as ceremony or conflicts between family groups. Attempting to force the pace may result in expedited outcomes that do not stand the test of time".15

4.10 Non-responsive relevant persons

Beach undertook the following approach for non-responsive relevant persons during the consultation period.

Beach attempted consultation with all identified relevant persons, as well as additional relevant persons identified by Beach under the OPGGS(E)R 25(1)(e) and OPGGSR 2021 (Vic) 13F(1)(c), at different stages as outlined in Section 4.7. Throughout the process, Beach provided sufficient information and multiple opportunities for consultation to support the understanding of the activities, potential risks and impacts, and to enable questions, concerns and feedback.

Communication options were promoted during the consultation period, including email and phone contact with Beach, the option to request meetings, attendance at in-person and online information sessions, and access to Engage Beach. Through Engage Beach, relevant persons were encouraged to submit questions and feedback via a simple enquiry form and were provided with contact details.

In instances where relevant persons did not respond or a returned email was received Beach undertook follow-up actions to verify contact details or update key contact, confirm receipt of correspondence, and ascertain whether they wished to continue to be consulted. Beach did not set a specific number of contact attempts as a measure for meeting regulatory requirements, including non-responsive relevant persons. Instead, a qualitative, case-by-case approach was adopted, with the frequency and method of follow-up commensurate with the extent that Beach considered each relevant person's functions, interests, or activities may be affected by the activity.

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[13] Section 5, 'Consultation policy for section 18 applications', Published in November 2023 by the Department of Planning, Lands and Heritage (WA) pursuant to the Aboriginal Heritage Act 1972 (WA). 15 Page 2, Poli

[14] Page 2, Policy Paper 'Principles for engagement in projects concerning Aboriginal and Torres Strait Islander peoples' Published on 23 December 2020 by the Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS).

[15] Page 19, Section 4.2, 'Working with Indigenous Communities: Leading Practice Sustainable Development Program for the Mining Industry'. Published by the Commonwealth of Australia (2016).

Additionally, Beach sought to meet the regulatory consultation requirements while being mindful of feedback from some relevant persons about 'stakeholder fatigue'. The qualitative case-by-case approach was aligned with the IAP2 Spectrum of Public Participation model, as detailed in Section 4.11.

As described in the processes outlined in Section 4.11 and above, Beach has established a methodology to provide sufficient information over a reasonable period, using different consultation methods. Where there were relevant persons whose functions, interests and activities may be impacted by the activities set out in the EP, such as First Nations groups, Beach ensured it used best endeavours to make personal contact. For First Nations groups, Beach called the newly identified group following the first email correspondence to facilitate an introduction to the project and the purpose of the consultation. Beach then sent a follow up email in line with the methodology above. For commercial fishers who actively fish in the operational area, Beach consulted with relevant associations.

4.11 Consultation methods

Beach understands the regulatory requirements for consultation and that genuine consultation involves a two-way dialogue. While participation in consultation remains voluntary for relevant persons, some have indicated experiences of stakeholder fatigue due to multiple consultation requests from petroleum titleholders, other organisations, and government agencies on offshore matters. Beach adopted an approach that prioritises building and maintaining long-term relationships with key relevant person groups. This includes demonstrating an understanding of their needs, respecting their timelines, providing information in a form that supports informed consideration, and offering consultation pathways aligned with their preferences.

Beach recognises that consultation methods should be adapted based on the nature and scale of the activity, and the potential impacts on the relevant person's functions, interests or activities. Beach also acknowledges that any specific requirements communicated by relevant persons should be considered and accommodated where practicable in the consultation process. Therefore, consultation methods should be appropriate for different types of relevant persons, that not all persons or organisations will require the same type of consultation, and that some relevant persons may not be willing to participate in consultation, see Section 4.10.

Table 4.9 shows how Beach has adapted and applied the different levels of the IAP2 Spectrum of Public Participation model to its methodology based on the nature and scale of the activity, the potential impacts on the relevant person's functions, interests or activities, and where relevant persons elect to participate in two-way dialogue with Beach.

To inform relevant persons about the EP review and provide the opportunity to consult, Beach used a variety of communication methods, beginning with two versions of an email distributed on 14 July 2025 to relevant persons detailing information about the EP's activities and an invitation to community information sessions (in-person and online) as set out in Table 4.6.

Beach also followed up key non-responders by email and phone. Beach sent subsequent emails to relevant persons throughout the consultation period reminding them of important dates such as information sessions and consultation period dates.

Beach used an optimised mixed media advertising effort to inform the public about the EP review under development, invite enquiries from and consultation with potentially relevant persons, and ensure as greater reach as possible. This included public notices in regional, state and national newspapers, and digital advertising on news sites, social media and the National Indigenous Times e-newsletters, as set out in Table 4.7.

Engage Beach provided information in a variety of formats with long and short descriptions of activities, project and consultation timelines, maps, detailed information on key topics, and contact details and forms to ask questions and provide feedback. Online and in-person information sessions were also promoted on the site. Beach saw increased activity on the Engage Beach project and consultation pages at key points throughout the consultation period, including the first day of the first Facebook, Instagram and broader Meta campaign, throughout its news site advertising campaigns and around bulk email distribution dates.

Beach held in-person and online meetings with individuals and organisation representatives, including a Community Reference Group meeting held at the Lang Lang Gas Plant. Participants included representatives from local government, emergency services and community members.

Beach conducted in-person and online community information sessions as outlined in Section 4.7.3. These sessions provided relevant persons with opportunities to ask questions, share feedback, and gain a deeper understanding of the activities described in the EP. Following the webinar series, Beach compiled and distributed a 'what we heard' summary report outlining what was raised during the webinar and Beach's response.

Beach has consulted with some First Nations groups employing the 'involve' and 'collaborate' practices in the IAP2 model, with success, and as demonstrated in the Consultation Report at **Appendix 2a** and **Appendix 2b**, and corresponding records in the Sensitive Information Report.

Table 4.9: IAP2 Spectrum of public participation – Informed methodology for consultation on this EP

	Inform	Consult	Involve	Collaborate
Relevant person focus	Relevant persons identified from Beach methodology and desktop research. Self-identified relevant persons from public notices and online advertisements.	Those seeking further information or who raise concerns. Fishing associations. First Nations groups. Relevant government departments and authorities.	Relevant government departments and authorities.	Support if requested for First Nations groups to identify cultural values and sensitivities.
Consultation methods	Engage Beach Information sheet Phone calls Emails Public notices Advertising.	Responses to questions and concerns e.g. emails, phone calls, meetings. Email and phone calls to discuss	Follow up non-responses to verify contact details, receipt of Beach emails, if they wish to be consulted. Request meetings with First Nations	Support First Nations groups if requested, to identify cultural values and sensitivities.

Inform	Consult	Involve	Collaborate
	consultation preferences. Follow up phone call to relevant persons who haven't responded. Email follow ups to other non-responders. Engage Beach encouraged consultation. Online and in-person information sessions.	groups to identify consultation preferences, cultural values and sensitivities, and any other relevant persons. Provide further information to requests from marine park authorities and other government agencies regarding activities, locations, risks and impacts.	

4.12 Consultation to minimise impacts on relevant person's rights

Beach understands petroleum activities must not interfere with navigation, fishing conservation of resources of the sea and seabed, other offshore electricity infrastructure and petroleum activities, and the enjoyment of Native Title rights and interests (within the meaning of the Native Title Act 1993) to a greater extent than is necessary for the reasonable exercise of the titleholder's rights and obligations.

Beach has consulted with other petroleum industry operators in the vicinity of the ongoing activities, and no concern were raised.

Regarding Native Title rights, Beach has undertaken an extensive assessment of First Nations relevant persons as detailed in Section 4.5.4.3 and implemented an approach to consultation with First Nations groups as outlined in Section 4.4.2. This process aimed to ascertain whether the activities would impact their functions, interests, activities, and where applicable, their Native Title rights. Throughout this consultation, no concerns were raised regarding the ongoing activities.

4.13 Commercial fishing industry consultation

Beach has established long-term, respectful relationships with commercial fishing stakeholders operating in the Bass Basin, as detailed in Section 4.5.4.4. Recognising that industry representatives have expressed consultation fatigue due to increasing requests from petroleum titleholders seeking to meet Regulations requirements, and more recently the offshore wind sector, Beach adopts an adaptive approach to consultation. This approach is tailored to reflect the potential impacts and risks to commercial fishers.

4.13.1 Commercial fishing peak body and association consultation

Beach has consulted with key commercial fishing peak bodies and associations for many years, recognising their role in representing their member's interests. This ongoing consultation aims to reduce the potential impact from Beach's activities, prevent stakeholder fatigue, and provide consultation opportunities to all potentially relevant persons and organisations.

Beach has advised the peak bodies and associations it will consult with them and seek their support to engage their members to inform them of its proposed and ongoing activities, and request feedback. Where appropriate, Beach has also advised it will activate engagement agreements in line with agreed terms to facilitate this consultation as it has done with certain associations for many years.

Additionally, Beach has informed these associations it maintains a comprehensive stakeholder management database that includes a significant number of individual fishers who have been consulted directly by Beach over many years where appropriate. Unless otherwise advised, direct consultation with individual fishers will continue.

The key peak bodies and associations consulted by Beach for many years and again for this EP review have previously reported that their membership includes majority of active fishers in their respective sectors, and these members wish for the peak bodies and associations to represent them in consultations with the petroleum industry.

Beach holds active engagement agreements with SIV and SETFIA to support consultation. When a consultation period begins, Beach activates these agreements to engage with members. In 2024, Beach met with SIV and SETFIA to confirm their membership lists and licence holders.

Beach understands SIV is the peak body for the Victorian seafood industry and represents all Victorian licenced commercial fishers except for the abalone sector (see Section 4.5.4.4). For this EP, Beach arranged for SIV to distribute activity information and solicit feedback from its members, including sending emails with invitations to information sessions as outlined in Section 4.7.

Beach consulted with abalone fishery associations representing Victorian abalone fishers, including bodies such as Abalone Council Victoria and Abalone Victoria Central Zone.

Beach understands SETFIA represents Commonwealth Trawl Sector licence holders in Southern and Eastern Scalefish. SETFIA assists in member engagement, communication, and information sharing before, during, and after project activities. For this EP SETFIA distributed activity and consultation information and sought feedback from its members. This included sending emails and SMSs with information sessions as described in Section 4.7. No concerns were raised throughout consultation.

This approach ensures ongoing, formalised engagement with key fisheries stakeholders aligned with regulatory and project requirements.

4.13.2 Summary of commercial fishing industry consultation

The following key steps set out Beach's approach to consultation with the commercial fishing sector, including peak bodies and associations, during the development of this EP review.

- Provide information sheet and link to Engage Beach to all identified relevant persons and organisations.
- Activate engagement agreement with peak bodies and associations for consultation with their members and licence holders.

- Provide additional information as requested, where applicable.
- Send follow up emails to peak bodies and associations throughout the consultation period.

4.14 Assessment of merit of objections or claims

The merit of objections or claims raised during consultation were assessed via evidence such as applicable publicly available credible information, scientific data or peer reviewed scientific literature, published fishery reports from state or commonwealth authorities. Where the objection or claim was relevant to the scope of the activities described in the EP and substantiated, where applicable, it was assessed as per the Beach impact and risk assessment process and controls applied where appropriate to manage impacts and risks to an acceptable level and ALARP. The measures that were adopted as a result of consultation are listed in Table 4.10.

Relevant persons were provided with feedback as to the assessment of merits of the objection or claim made, where applicable, how it was assessed and if any controls were put in place to manage the impact or risk to an acceptable level and ALARP. A full copy of the consultation report can be found in **Appendix 2a** and **Appendix 2b**.

If an objection or claim is raised after acceptance of this revised EP and the matter necessitates a revision of the EP, this will be managed in accordance with Beach Management of Change processes (Section 8.2.3), and the relevant person will be advised of the process.

Table 4.10: Measures adopted as a result of consultation

Relevant objection or claim raised	Beach's assessment of merit for activities	Measures adopted
Circular Head Aboriginal Corporation		
Circular Head Aboriginal Corporation not identified as a relevant First Nations group in activity information sheet.	Beach has a list of previous relevant persons for the previous EP that was used as the basis for this EP's relevant person list. Additional relevant persons, including Circular Head Aboriginal Corporation have been identified with a review of functions, interests and activities within the area.	Circular Head Aboriginal Corporation included on the relevant persons list for this EP. No additional controls or measures required Beach provided the following documents: - NOPSEMA's ALARP guidance note - Information sheet - Summary of impact and risks
Cultural heritage and underwater archaeology High probability of submerged Aboriginal cultural heritage in or near the operational area. Concerned that: - No marine archaeological surveys appear to have been undertaken;	As the activities within the EP are for existing infrastructure and activities, and there is no additional infrastructure required on the seabed.	N/A Should this change Beach will ensure any relevant assessments are completed, where required. Beach provided the following documents: - NOPSEMA's ALARP guidance note - Information sheet

Relevant objection or claim raised	Beach's assessment of merit for activities	Measures adopted
- Aboriginal communities are not included in planning for discovery, assessment, or repatriation of any finds; - The protections available under the Underwater Cultural Heritage Act 2018 have not been activated meaningfully.		- Summary of impact and risks
Ecological and commercial concerns – Kelp and Sea Country There is no mention of: - Kelp forests or marine vegetation assessments: - Potential disturbance from subsea pipeline operations or emergency spill scenarios.	Beach acknowledges Giant Kelp Marine Forests of South East Australia may occur within the planning area. Beach recognises the importance of Sea Country and the particular significance of Giant Kelp, to a number of First Nations groups.	The environmental impact assessment within the EP will assess the potential impacts of the activities on the environment, including the Giant Kelp Marine Forests to ensure all possible impacts are ALARP. Beach provided the following documents: - NOPSEMA's ALARP guidance note - Information sheet - Summary of impact and risks
Emergency planning and cultural inclusion - Cultural sensitivities along the Tasmanian coastline; - Aboriginal knowledge systems in spill planning or recovery; - Formal roles for Aboriginal organisations in the emergency response process.	Beach acknowledges concerns regarding the lack of cultural sensitivity to Tasmanian coastlines in spill response plans for the Bass Gas offshore operations. The identified broadest extent of the planning area for this activity does not reach either Tasmanian coastal waters or the coastline.	As per the Regulations, Beach must have an accepted Oil Pollution Emergency Plan (OPEP) in place for each activity that will be implemented in the event of a loss of containment (LOC) or loss of well containment (LOWC). Beach provided the following documents: - NOPSEMA's ALARP guidance note - Information sheet - Summary of impact and risks

4.15 Sensitive information

The following information has been included on the information sheet, introductory bulk email, and online content:

"Relevant persons may request that the information they provide not be published, and it will be identified as sensitive information and not published in the Environment Plan."

The sensitive information report is provided to the regulator with this EP.

4.16 Report on consultations

The consultation report (**Appendix 2a and Appendix 2b**) details the information provided to relevant persons, summarises the responses received – including any concerns regarding the potential impacts and risks to their functions, interests, and activities as described in the EP – and outlines the assessment of these concerns and the corresponding responses.

When a relevant person raised an objection or claim, they were provided feedback outlining whether the objection or claim was substantiated, how it was assessed and if any additional controls were required to manage the impact or risk to an acceptable level and ALARP. Where an objection or claim was substantiated via evidence – such as publicly available credible information and/or scientific or fishing data – this was assessed as per the impact and risk assessment process detailed in Section 2 and, where appropriate, controls applied to ensure impacts and risks are managed to an acceptable level and ALARP.

Copies of the full text of any response by a relevant person have been provided to NOPSEMA as sensitive information under Section 26(8) of the OPGGS(E)R.

4.17 Further consultation with additional relevant persons

Following the completion of the consultation described in Sections 4.1 to 4.16 of this chapter, modifications to the planning area resulted in the identification of additional fishing industry peak bodies and associations whose functions, interests or activities may potentially be affected by the activities described in this EP.

Beach therefore undertook further consultation with these relevant persons from 28 August to 11 September 2026. This section documents that further consultation and its outcomes. The associated consultation report is provided in **Appendix 2b**. Table 4.1 has been updated to reflect the further consultation period.

4.17.1 Demonstration of consultation requirements

Table 4.1 summarises how both the primary and additional consultation addressed the consultation requirements applicable to the preparation of the EP.

Section 4.3 outlines the guidelines considered in planning and delivering the further consultation carried out in the course of preparing the EP. Section 4.4 outlines Beach's principles for effective consultation.

4.17.2 Relevant persons consulted

Beach applied the methodology outlined in Section 4.5 to identify additional commercial fishers and fishing industry organisations within the modified planning area. Further consultation was undertaken with identified fishing industry peak bodies and associations whose functions, interests or activities may potentially be affected by activities described in the EP and who were therefore considered relevant persons for consultation purposes.

The newly identified relevant persons and organisations consulted in relation to developing this EP are set out in Table 4.11.

Table 4.11: OPGGS(E)R 25(1)(d) and OPGGSR 2021 (Vic) 13f(1)(b) identified relevant persons

Type	Name	Roles and responsibilities
Commercial fishing – Commercial fisheries	Seafood Industry Australia	The national peak body representing the entire Australian seafood industry, including wild catch, aquaculture, and post-harvest sectors.
Commercial fishing – Commonwealth fisheries	Small Pelagic Fishery Industry Association Inc.	Industry association for Australia's Small Pelagic Fishery.
Commercial fishing – Victorian fisheries	Abalone Council Victoria	Peak body representing interests of abalone divers, quota holders and processors in the Victorian wild harvest abalone fishery.
Commercial fishing – Tasmanian fisheries	Bass Strait Central Zone Scallop Fishery	Commonwealth-managed commercial fishery operating in Bass Strait, with interests in maintaining access to scallop harvesting grounds, sustainable fishery management and protection of commercial fishing activities.
Commercial fishing – Tasmanian fisheries	Tasmanian Rock Lobster Council Ltd	Represents commercial fishers, advocates industry interests, and supports sustainable fishery management.

4.17.3 Sufficient information

As outlined in Section 4.7, Beach's consultation approach included providing information tailored to support an informed assessment of the possible consequences of the activities. Applying the same approach, Beach provided the newly identified relevant persons with information regarding the EP, the modified planning area and the potential impacts and risks relevant to their functions, interests or activities.

The date, activity, purpose / key content, relevant person focus, and method for the provision of sufficient information are set out in Table 4.12 in chronological order.

Table 4.12: Consultation timeline and provision of sufficient information

Date	Information / consultation activity	Purpose / key information	Relevant person focus	Distribution methods
28 August 2026	Introductory email	Introduced EP. Advised further consultation commencement and invited consultation. Attached information sheet. Included link to Engage Beach.	Newly identified relevant persons	Direct email

Date	Information / consultation activity	Purpose / key information	Relevant person focus	Distribution methods
		Explained consultation process and requirements. Included link to NOPSEMA consultation guidance.		
28 August 2026	Information sheet	Provided sufficient information to enable an informed assessment of the EP. Included project overview, timing, location, facilities, activities, environmental impacts and risks, performance outcomes and controls, cultural values and sensitivities, exclusion zones, emergency planning, consultation process, and sensitive information provisions. Included link to Engage Beach. Included link to NOPSEMA's consultation brochure and contact details.	Newly identified relevant persons	Direct email
28 August 2026	Summary of impacts and risks table	Provided a concise summary of potential impacts, risks and measures associated with the activities described in the EP.	Newly identified relevant persons	Engage Beach
28 August 2026	Engage Beach	Provided a central location for project information, consultation materials, key dates, maps, frequently asked questions, contact details and feedback opportunities throughout the consultation period.	Newly identified relevant persons	Link emailed. Engage Beach and Beach corporate website.
7 September 2026	Consultation period closing soon	Reminded that consultation period for the development of this EP was closing soon. Invited consultation.	Newly identified relevant persons	Direct email
14 September 2026	Consultation has closed	Advised stakeholders that consultation had concluded and outlined next steps.	Newly identified relevant persons	Direct email

4.17.4 Reasonable period

Following the identification of additional relevant persons resulting from modifications to the planning area, Beach undertook a targeted consultation period between 28 August 2026 and 11 September 2026. This consultation was in addition to the consultation described in Sections 4.1 to 4.16, which was undertaken between 14 July 2025 and 10 October 2025. Section 4.8 outlines the reasonable period approach for the initial consultation. The purpose of the further consultation was to provide the newly identified relevant persons with an opportunity to review the activity information and provide feedback, objections or claims regarding the possible consequences of the activities on their functions, interests or activities.

In determining an appropriate consultation period, Beach considered the nature and scale of the additional consultation. The consultation was directed to a targeted group of newly identified fishing industry peak bodies and associations rather than the broader range of relevant persons consulted during the preparation of the EP. These organisations routinely participate in consultation relating to offshore activities and represent members with interests in the planning area.

Beach provided stakeholders with information regarding the activities described in the EP, the planning area modifications, potential impacts and risks, and the consultation process. Stakeholders were provided direct contact details for Beach, access to supporting consultation materials and online information, and were

invited to provide feedback throughout the consultation period. Reminder correspondence was also issued prior to the close of consultation.

Beach considers that the consultation period from 28 August 2026 to 11 September 2026 provided a reasonable opportunity for stakeholders to make submissions regarding the EP. This assessment reflects the targeted nature of the additional consultation, the information and consultation methods provided, and that the consultation was limited to a small number of additional relevant persons identified following completion of the broader consultation program described in this chapter.

4.17.5 Consultation methods and outcomes

As outlined in Section 4.11, Beach applies consultation methods that are proportionate to the nature, scale and potential impacts of the activity and tailored to the functions, interests and activities of relevant persons. Consistent with the approach described in this Sections 4.1 to 4.16, consultation with the newly identified relevant persons was undertaken through direct written correspondence supported by consultation materials, information and tools made available on Engage Beach. Stakeholders were also provided with contact details and were able to provide feedback directly to Beach throughout the consultation period.

These methods were selected to facilitate timely distribution of information, provide access to supporting materials and enable stakeholders to engage directly with Beach. Consistent with the consultation process described in Sections 4.1 to 4.16, stakeholders were invited to provide feedback, raise concerns and submit objections regarding the activities on their functions, interests or activities. Reminder correspondence was issued during the consultation period. Table 4.9 outlines how the IAP2 Spectrum of Public Participation informed consultation methodology.

No feedback, objections, claims or requests for additional information were received from the newly identified relevant persons during the consultation period. As a result, no additional environmental impacts, risks, management measures or modifications to the EP were identified through the consultation process.

Detailed records of the consultation activities undertaken, stakeholders consulted and consultation outcomes are provided in **Appendix 2b**.

As outlined in Section 4.14, if an objection or claim is raised after acceptance of the revised EP and the matter necessitates a revision of the EP, this will be managed in accordance with Beach's Management of Change processes (Section 8.2.3), and the relevant person will be advised of the process.

4.17.6 Consultation to minimise impacts on relevant person's rights

Beach's approach to identifying and consulting relevant persons whose rights, functions, interests or activities may be affected by the activities is described in Section 4.12. The further consultation documented in Section 4.17 was undertaken in accordance with that approach and was limited to the additional fishing industry peak bodies and associations identified following modifications to the planning area.

No concerns regarding impacts on rights, interests or activities were raised during the further consultation period.

4.17.7 Conclusion of further consultation period

Following modifications to the planning area, Beach identified additional fishing industry peak bodies and associations that may be affected by activities undertaken under the EP. Beach undertook further consultation with those stakeholders between 28 August 2026 and 11 September 2026 and provided information sufficient to allow an informed assessment of the possible consequences of the activities on their

functions, interests or activities. Stakeholders were provided with a reasonable opportunity to make submissions regarding the EP.

No feedback, concerns or objections were received during the consultation period. Accordingly, no additional measures were adopted, and no amendments to the EP were required as a result of the consultation. The consultation report (**Appendix 2b**) details the information provided to relevant persons and the outcomes of the consultation.

5 Existing Environment

In accordance with OPGGS(E) Regulation 21(2), this chapter describes the physical, biological and socio-economic receptors relevant to the activities described in this EP. Regulation 5 of the OPGGS(E) defines the environment 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; and

e) The social, economic and cultural features of these matters.

As per Section 21(3) of the OPGGS(E) Regulations, relevant values and sensitivities may include:

a) The world heritage values of a declared World Heritage property;

b) The national heritage values of a National Heritage place;

c) The ecological character of a declared Ramsar wetland;

d) The presence of a listed threatened species or listed Threatened Ecological Community (TEC);

e) The presence of a listed migratory species; and

f) Any values and sensitivities that exist in, or in relation to, part or all of:

   i) Commonwealth marine area within the meaning of that Act; or

   ii) Commonwealth land within the meaning of that Act.

The key sources of information used in developing this chapter include the:

- EPBC Act Protected Matters Search Tool (PMST) database (DCCEEW, 2025a), conducted on 4th July 2025 and repeated on 13th July 2026 (**Appendix 5**);
- Flora and Fauna Guarantee (FFG) Act Threatened List (DEECA July 2026);
- Atlas of Living Australia (ALA);
- Species Profile and Threats (SPRAT) Database (DCCEEW, 2026);
- Victorian Biodiversity Atlas (VBA) (DEECA, 2026), conducted on 23rd July 2026. (**Appendix 6**); and
- National Conservation Values Atlas (NCVA).

The operational area (a 500-m radius around the platform and either side of the RGP) is described where this information exists.

5.1 The Environment That May Be Affected

The environment that may be affected (EMBA) is defined as an area where a change to ambient environmental conditions has the potential to occur as a result of activities described within this EP. The spatial boundary used for the EMBA and for describing the existing environment for this EP is defined in Table 5.1. Figure 5.1 illustrates the EMBA. When the EMBA is being referred to in its entirety, it is simply called the EMBA. When a specific EMBA is being referred to, it will be appropriately referenced (i.e. light EMBA, underwater sound EMBA or hydrocarbon spill EMBA).

Where appropriate, descriptions of the Bass Strait environment (beyond the EMBA) are provided for context.

Table 5.1. The spatial boundaries used to define the EMBAs.

Areas	Description
Light EMBA	A 20 km light EMBA (Figure 5.1) has been defined to include the routine platform and vessel light emissions, based on the National Light Pollution Guidelines for Wildlife (DCCEEW, 2023). A 33 km flare EMBA (Figure 5.1) has been based on a peak flare rate of 14.1 MMscfd at the Yolla-A platform flare tip approximately 50 m above the mean sea level (MSL). This distance is the maximum theoretical line-of-sight distance at which the flare flame may remain visible above the horizon, assuming an observer elevation of 0 m relative to MSL and unobstructed viewing conditions (Xodus, 2026).
Underwater sound EMBA	The 21.9 km underwater sound EMBA (Figure 5.1) is based on the distance to behavioural effect for low-frequency cetaceans (such as blue and southern right whales) based on thresholds specified by the National Marine Fisheries Service (NMFS) impulsive noise criteria threshold of 160 dB re 1 µPa (sound pressure level (SPL)) and a non-impulsive noise criteria threshold of 120 dB re 1 µPa (SPL). This is the largest distance to effect for all marine fauna species (further detail on noise modelling is provided in Section 7.5, with the underwater sound modelling report provided in **Appendix 7**).
Hydrocarbon spill EMBA	The hydrocarbon spill EMBA is based on the combination of the worst-case extent of predicted hydrocarbon spill (Figure 5.1) from a: • Loss of well containment (LoWC) resulting in the subsea release of 70,489 bbl of gas condensate at the Yolla-A location over 86 days; • Marine diesel oil (MDO) release of 300 m^3 over 6 hours from a vessel anywhere along the pipeline or within the platform PSZ; and • A loss of 14,500 bbl of gas condensate over 36 minutes from a pipeline rupture at any point along the pipeline. The extent of the EMBA along the length of the pipeline was determined using the MDO and gas condensate loss modelling scenarios (at the 3 nm junction of Victorian and Commonwealth waters). The maximum east-west distance of the EMBA (71 km), which was limited to a nearshore area, was then applied as the pipeline rupture EMBA along the entire length of the RGP (i.e., a radius of 35.5 km around the RGP). The 100 individual spill simulations for each scenario are combined to identify the largest envelope in which a single spill is predicted to extend. Each spill simulation is subject to different wind and ocean currents at different times of the year. The EMBA is not representative of a single spill; an individual spill would affect a significantly smaller area. The EMBA is based on: • the moderate threshold for entrained hydrocarbon exposure; • the low threshold for floating hydrocarbon exposure; • the low threshold for shoreline hydrocarbon exposure; and • the low threshold for dissolved hydrocarbon exposure.

	Hydrocarbon exposure is evaluated further in sections 7.15, 7.16 and 7.17.
EMBA	The EMBA has been defined based on the combined outcomes of the light EMBA, noise & vibration EMBA and the hydrocarbon spill EMBA (Figure 5.1).

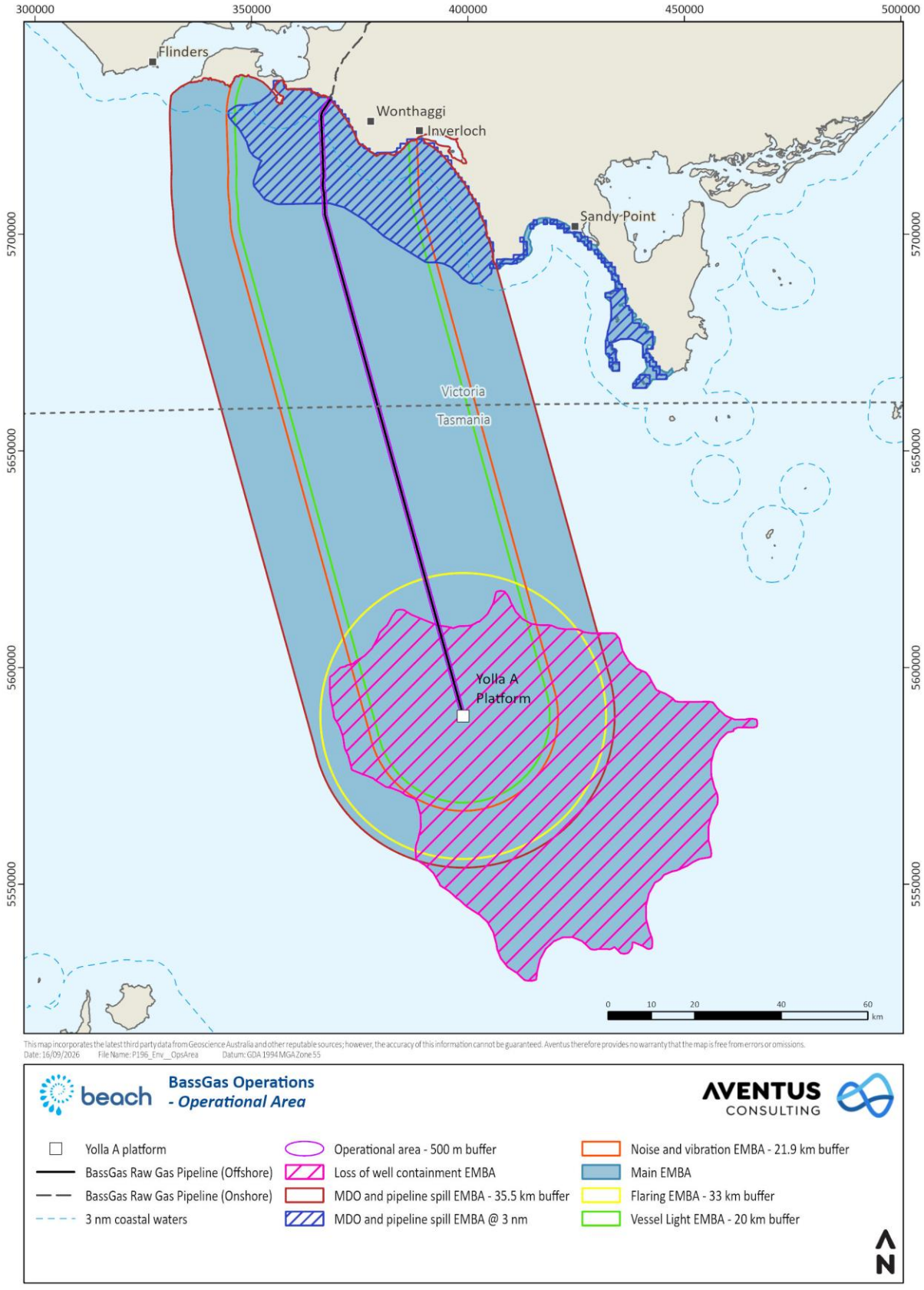


Figure 5.1: The BassGas EMBA and Operational area within Bass Strait

Table 5.2 summarises the presence or absence of receptors and sensitivities within the operational area and EMBA.

Table 5.2: Presence of receptors and sensitivities within Commonwealth and State waters of the operational area* and the EMBA

Receptor	EMBA		Operational area* (commonwealth waters)
	Victoria (state waters)	Commonwealth	
Habitats			
Mud			
Sand			
Rocky reef			
Sponge gardens			
Seagrass communities			
Protected areas			
Australian Marine Parks (AMPs)			
World Heritage-listed properties			
National Heritage-listed properties			
Threatened Ecological Communities (TECs)			
Key Ecological Features (KEFs)			
Nationally important wetlands			
Victorian marine protected areas			
Onshore protected areas			
Biological receptors			
Plankton			
Abalone			
Scallops			
Rock lobsters			
White shark			
Cetaceans, blue whale, southern right whale, humpback whale			
Pinnipeds			
Reptiles (turtles)			
Seabirds			
Shorebirds			
Marine pests			
Cultural heritage values			
Shipwrecks			

Receptor	EMBA		Operational area* (commonwealth waters)
	Victoria (state waters)	Commonwealth	
Indigenous heritage			
Socio-economic environment			
Native title			
Tourism			
Recreational fishing			
Commercial fishing			

* Operational area constitutes a 500-m radius around the development.

Green cells = presence of receptor, red cells = absence of receptor

5.2 Regional Environmental Setting

Bass Strait separates Tasmania from the southern Australian mainland by approximately 230 km at its narrowest point and contains several islands, with the largest being Flinders Island, followed by King Island (see Figure 5.1).

The Yolla gas field is located within the Bass Strait Provincial Bioregion using the Interim Marine and Coastal Regionalisation for Australia (IMCRA) classification (Figure 5.2) (DEH, 2006). At the mesoscale level, the development is located in the Central Bass Strait (CBS) bioregion, which is approximately 60,000 km^2 in size with water depths between 50 m at the margins and 80 m at the centre and is on the continental shelf (DEH, 2006). The central area of the CBS is predominantly mud substrate (DEH, 2006).

The following IMCRA mesoscale zones are intersected by the EMBA (Figure 5.3):

- Central Bass Strait.
- Flinders.
- Central Victoria.

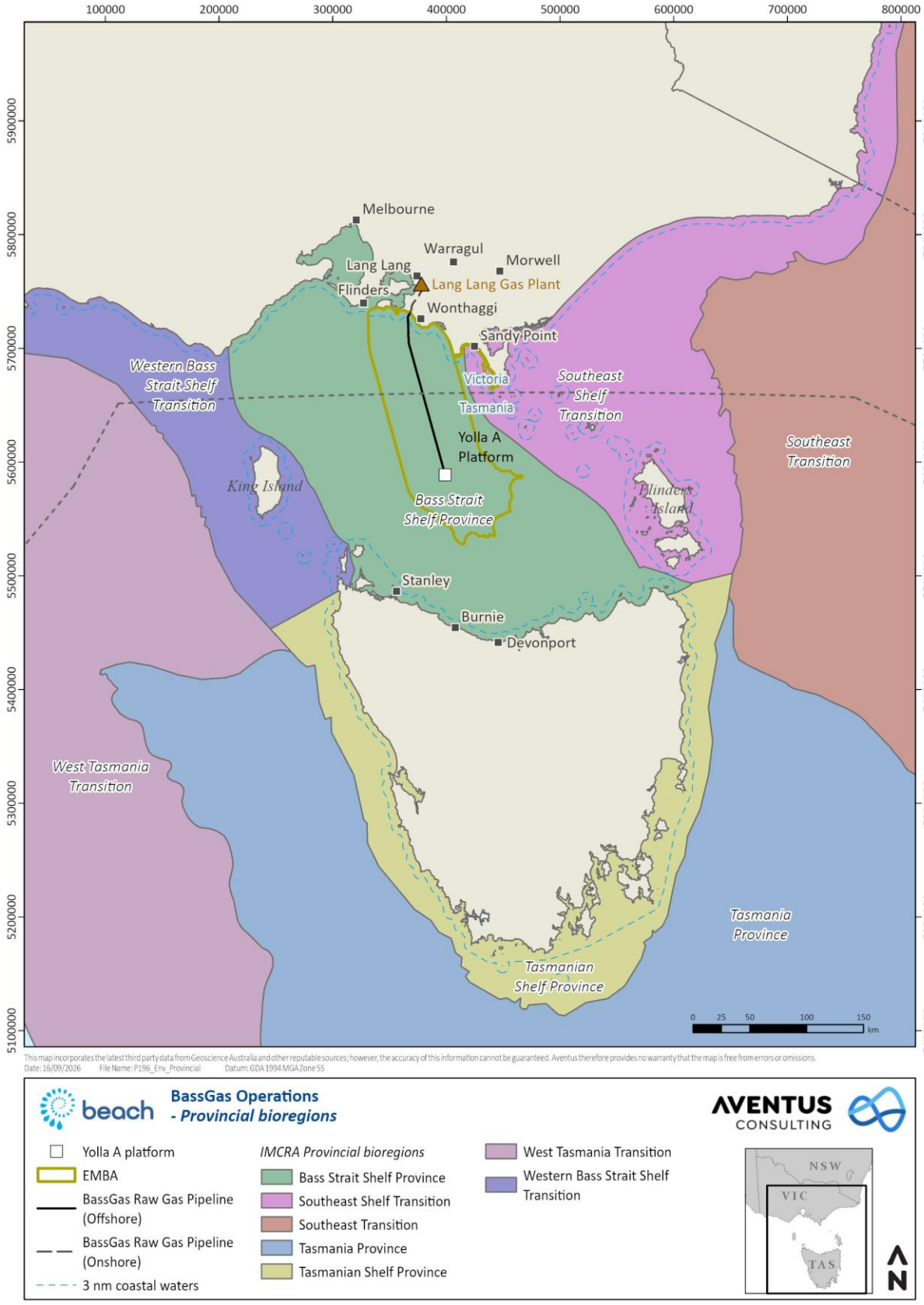


Figure 5.2. IMCRA provincial bioregions intersected by the EMBA

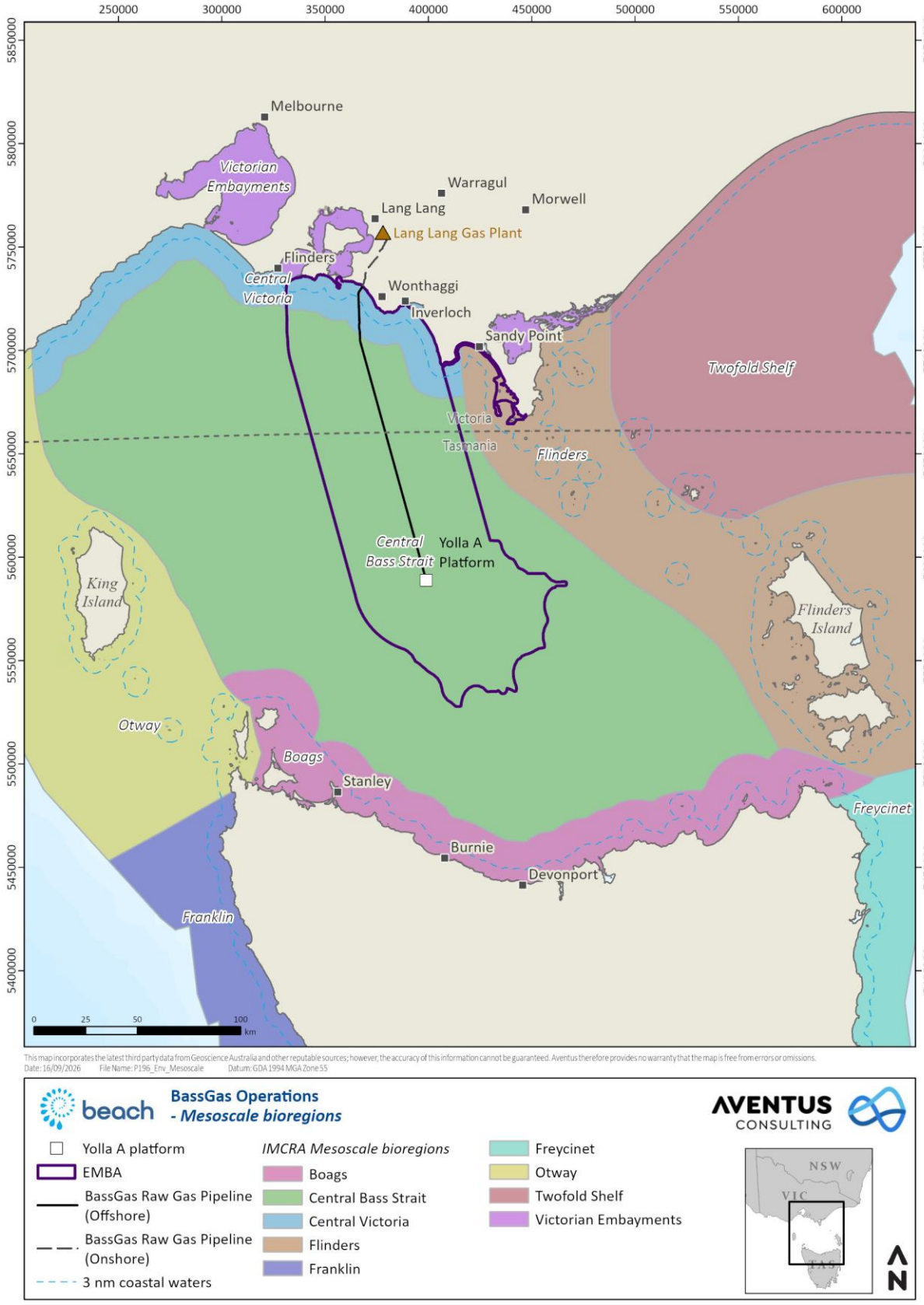


Figure 5.3. IMCRA mesoscale bioregions intersected by the EMBA

5.3 Physical Environment

5.3.1 Climate Meteorology

Bass Strait is located on the northern-most zone of an area known as the 'Roaring Forties' with its climate determined by the presence of sub-tropical high-pressure ridges and migratory low-pressure systems (extra-tropical cyclones). Migrating low-pressure systems typically bring a westerly wind regime to Bass Strait and are likely to affect the area every three to five days on average during the winter months.

5.3.2 Temperature and Rainfall

Average air temperatures recorded at King Island airport (165 km west of the Yolla platform, but the closest point for a Bureau of Meteorology [BoM] weather station) for 1995-2025 range from a minimum of 10.0°C to a maximum of 17.1°C (BoM, 2025).

Mean annual rainfall for the period 1974-2025 is 843.3 mm, with the highest rainfall totals falling in June, July and August (with an average minimum of 30.9 mm in February and an average maximum of 116.5 mm in July) (BoM, 2025).

5.3.3 Winds

RPS (2020) acquired high-resolution wind data from 2008 to 2012 (inclusive) across their modelling domain from the National Centre for Environmental Prediction (NCEP) Climate Forecast System Reanalysis (CFSR). Table 5.3 lists the monthly average and maximum winds derived from the CFSR station located nearest to the Yolla platform.

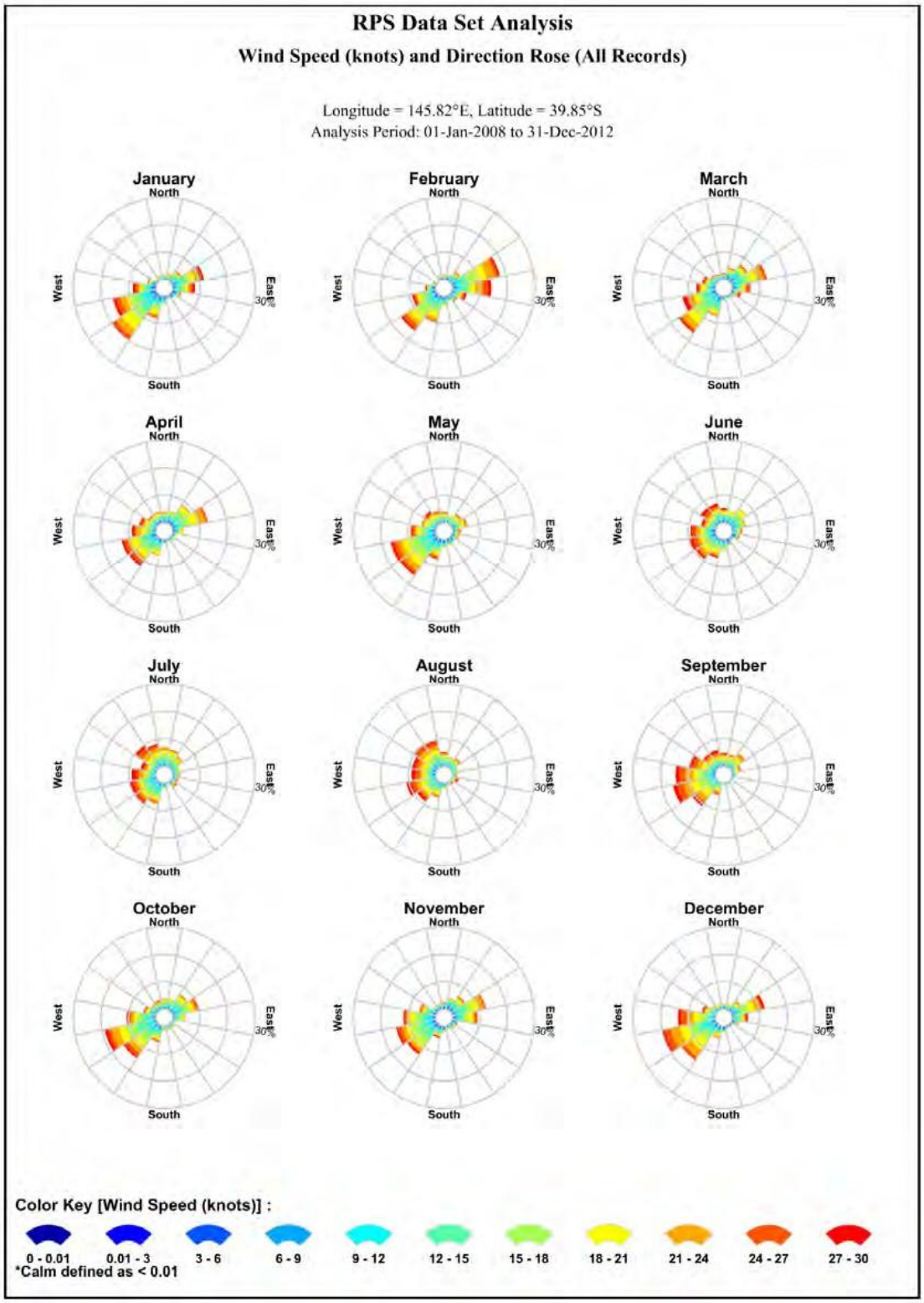
Figure 5.4 illustrates the monthly wind rose distributions from 2008 to 2012 (inclusive), with Figure 5.5 illustrating the modelled total wind distributions from 2008-2012 (inclusive), which clearly indicates that winds from the southwest dominate this region.

Table 5.3: Predicted average and maximum wind speeds for the representative wind station near Yolla-A

Month	Average wind speed (knots)	Maximum wind speed (knots)	General direction (from)
January	15.7	37.2	Southwest
February	16.4	42.3	East-northeast
March	16.4	44.6	Southwest
April	16.3	46.2	Southwest
May	16.3	40.7	Southwest
June	17.5	45.5	Variable
July	18.0	48.8	Variable
August	19.3	45.8	Variable
September	19.2	46.0	West-southwest
October	15.7	36.9	West-southwest
November	15.0	42.2	West-southwest
December	16.7	40.3	West-southwest

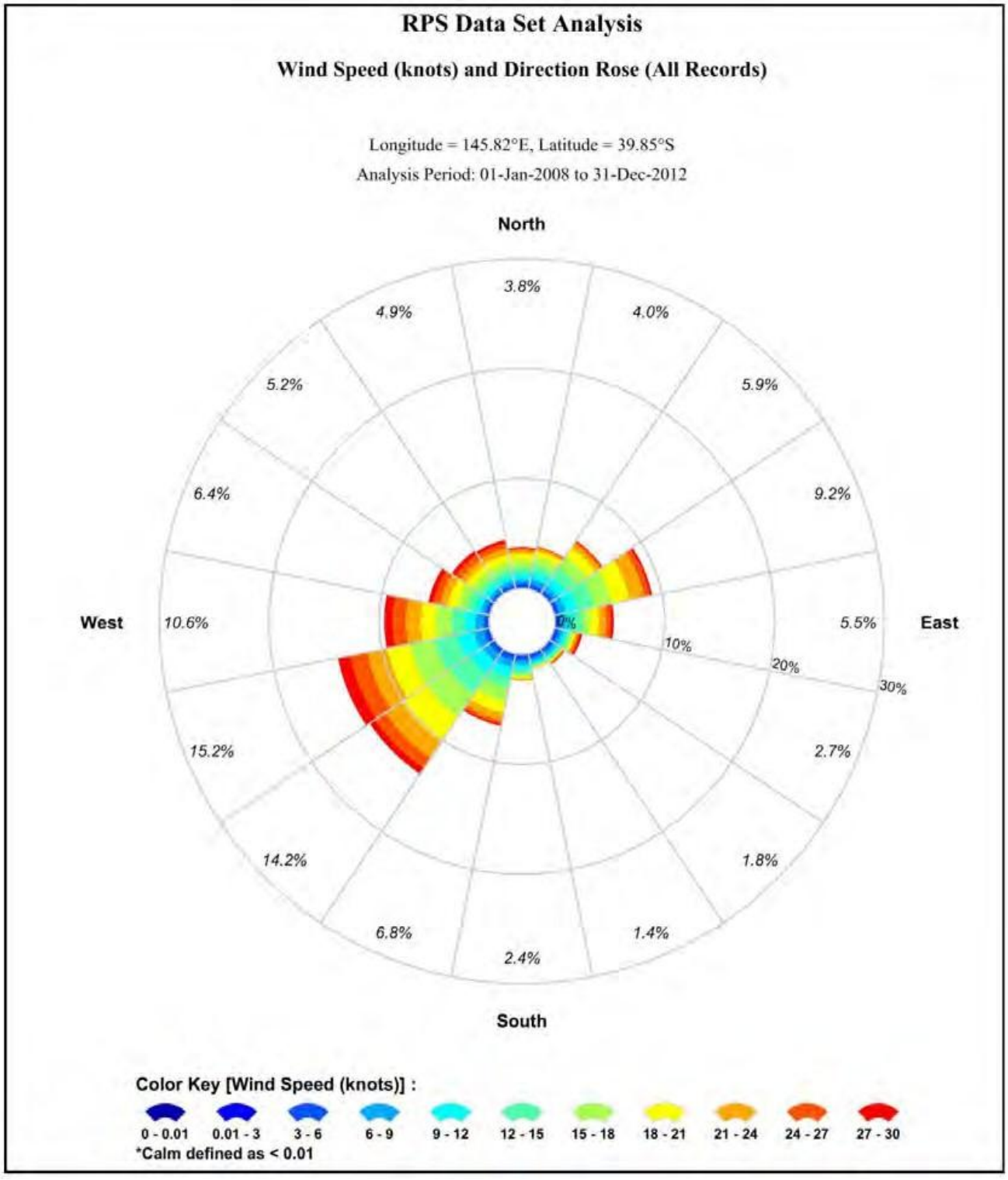
Month	Average wind speed (knots)	Maximum wind speed (knots)	General direction (from)
Minimum	**15.0**	**36.9**	-
Maximum	**19.3**	**48.8**	-

Source: RPS (2020).



Source: RPS (2020). The convention for defining wind direction is the direction the wind blows from

Figure 5.4: Modelled monthly wind rose distributions from 2008-2012 (inclusive) for the representative wind station closest to the Yolla platform



Source: RPS (2020). The convention for defining wind direction is the direction the wind blows from

Figure 5.5: Modelled annual wind rose distributions from 2008-2012 (inclusive) for the representative wind station closest to Yolla-A

5.3.4 Ambient Noise

JASCO (2025) defines ambient noise as 'Sound that would be present in the absence of a specified activity, usually a composite of sound from many sources near and far, e.g., shipping vessels, seismic activity, precipitation, sea ice movement, wave action, and biological activity.' Wind noise modelling within Australia's Exclusive Economic Zone (EEZ) displays relatively high sound exposure levels in exposed shelf regions, including Bass Strait, reflecting high wave energy and surface generated noise within the water column. While wind is a significant contributor to background noise in the Bass Strait, shipping noise modelling indicates comparatively higher sound exposure levels in the near shore areas of Bass Strait, particularly closer to the Victorian coastline including portions of the Beagle Marine Park (Peel et al. 2021).

5.3.5 Ambient Light

Ambient light in the marine seascape is defined as naturally occurring light (solar and lunar) and background anthropogenic light associated with shipping lanes, offshore and inshore infrastructure. Bass Strait is subject to considerable vessel movements both commercial and recreational and has many offshore oil and gas platforms that require minimum lighting for safety and aviation marking.

5.4 Oceanography

5.4.1 Tides and Currents

Bass Strait is a relatively shallow area on the continental shelf, connecting the southeast Indian Ocean with the Tasman Sea. The strait has strong tidal currents, which are primarily driven by tides, winds and density-driven flows. The tides of central Bass Strait are semi-diurnal with the dominant large-scale water movements due to the astronomical tide (Jones, 1980).

The tidal waves enter Bass Strait from the east and west almost simultaneously and as a result in the centre of the strait there is an area with small tidal currents where the two waves meet. The magnitude of the tidal currents then increases as the distance from the central strait increases with relatively strong tidal currents at either end. The times and magnitudes of the tide within Bass Strait are relatively uniform and predictable. However, the effects of meteorological phenomena may be significant, causing variations in level and changing the phasing or timing of the tide (Sandery and Kampf, 2005). In winter and spring, waters within the strait are well mixed with no obvious stratification while during summer the central regions of the strait become stratified (Baines and Fandry, 1983; Middleton and Black, 1994).

The region is oceanographically complex, with sub-tropical influences from the north and sub-polar influences from the south (DCCEEW, 2015a). There is a slow easterly flow of waters in Bass Strait and a large anti-clockwise circulation (DCCEEW, 2015a). Three key water currents influence Bass Strait:

1. The Leeuwin Current transports warm, sub-tropical water southward along the Western Australian (WA) coast and then eastward into the Great Australian Bight (GAB), where it mixes with the cool waters from the Zeehan Current running along Tasmania's west coast (DCCEEW, 2015a). The Leeuwin and Zeehan currents are stronger in winter than in summer, with the latter flowing into Bass Strait during winter.

2. The East Australian Current (EAC) is up to 500 m deep and 100 km wide, flows southwards adjacent to the coast of NSW and eastern Victoria, and carries with it warm equatorial waters

(DCCEEW, 2015a). The EAC is strongest in summer when it can flow at a speed of up to 5 knots but flows more slowly (2-3 knots) in winter where it remains at higher latitudes.

3. The Bass Strait Cascade occurs during winter along the shelf break, which brings nutrient-rich waters to the surface as a result of the eastward flushing of the shallow waters of the strait over the continental shelf mixing with cooler, deeper nutrient-rich water (DCCEEW, 2015a).

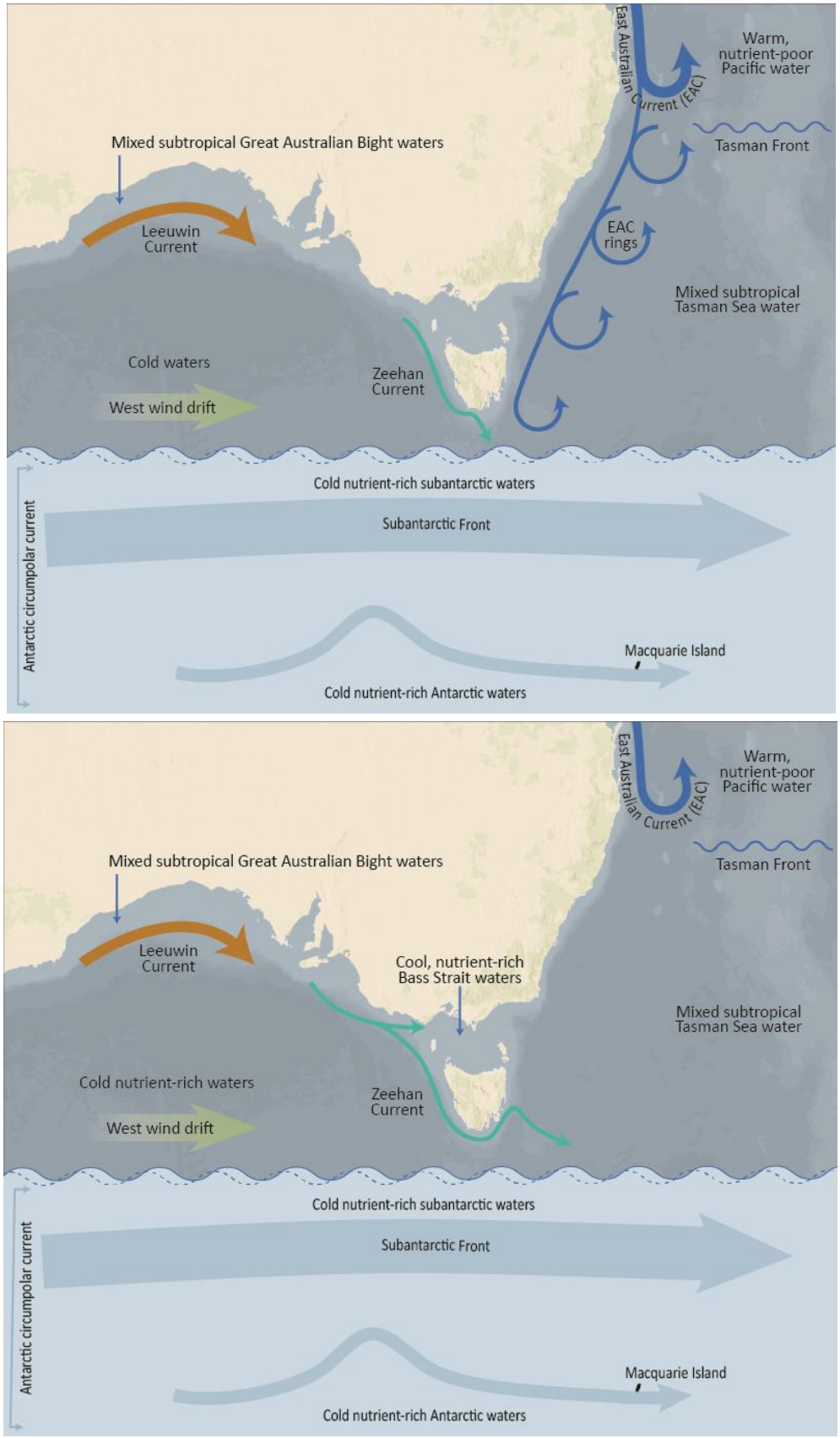
Table 5.4 provides the average and maximum net current speeds from combined Hybrid Coordinate Ocean Model (HYCOM) and tidal currents near the Yolla platform. Figure 5.6 illustrates the major ocean currents in south-eastern Australian waters during summer and winter. Figure 5.7 illustrates the monthly surface current rose distributions from the combination of HYCOM ocean current data and HYDROMAP tidal data near the Yolla platform for the five years from 2008 to 2012 (inclusive) and Figure 5.8 shows the total surface current rose distributions for the same time period. This data indicates that surface currents flow predominantly eastwards.

Semi-diurnal astronomical tides provide the major water level variations in the region with four current reversals each day and a relatively small tidal range of about 1.3 m. The tidal range at the Yolla platform location is estimated to be about 2.3 m at spring tides and 1.7 m at neap tides and the combined sea and tidal currents vary in intensity with the time of year, typically reaching speeds of up to 1.0 m/s. The lowest and highest astronomical tides at the platform are 1.47 m and +1.33 m, respectively. Tidal currents at the platform move in an ellipse and tend to flood and ebb to the southeast and northwest respectively.

Table 5.4: Predicted monthly average and maximum surface current speeds near Yolla-A

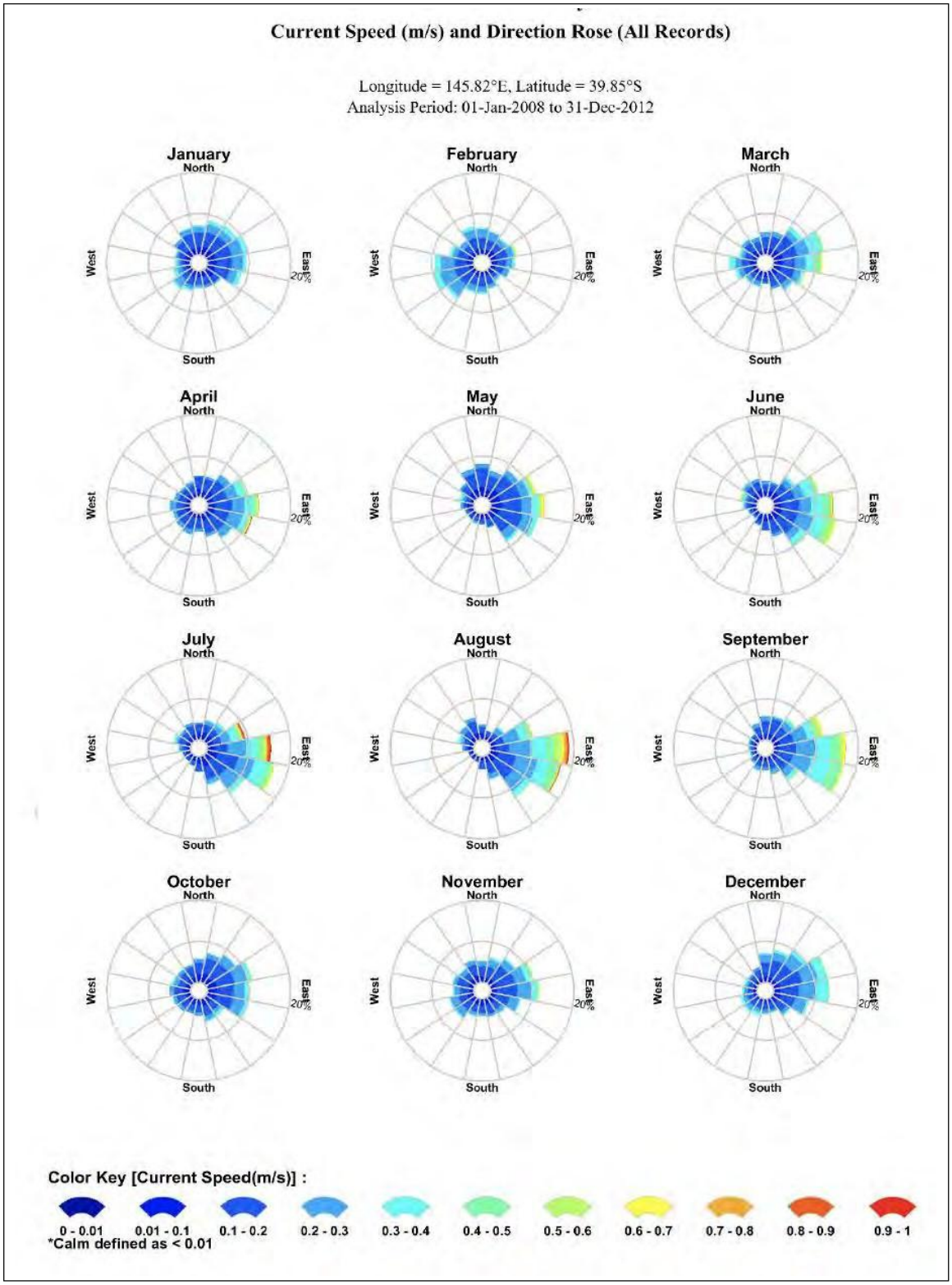
Month	Average current speed (m/s)	Maximum current speed (m/s)	General direction (from)
January	0.16	0.48	Variable
February	0.18	0.66	Variable
March	0.18	0.68	East-northeast
April	0.17	0.98	East
May	0.16	0.73	East
June	0.19	0.85	East-southeast
July	0.20	1.02	East-southeast
August	0.22	0.99	East-southeast
September	0.21	0.73	East-southeast
October	0.16	0.54	East-southeast
November	0.17	0.61	East
December	0.18	0.48	East
Minimum	0.16	0.48	
Maximum	0.22	1.02	

Source: RPS (2020).



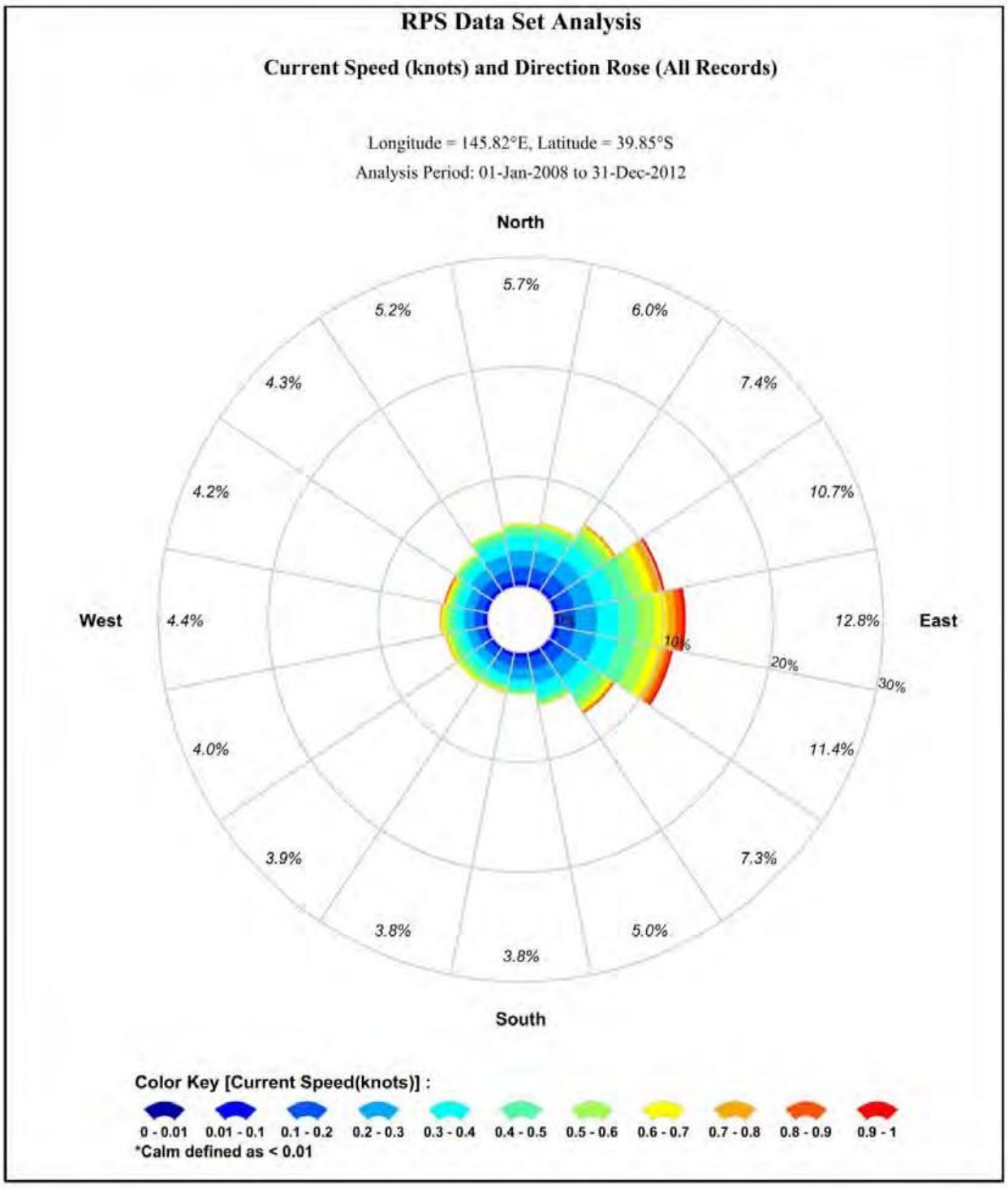
Source: DoE (2015a).

Figure 5.6: Major ocean currents in south-eastern Australian waters during summer (top) and winter (bottom)



Source: RPS (2020). The convention for defining water current direction is the direction the current flows towards.

Figure 5.7: Monthly surface water current rose plots from 2008-2012 (inclusive) near Yolla-A



Source: RPS (2020). The convention for defining current direction is the direction the current flows towards.

Figure 5.8: Annual surface water current plots from 2008-2012 (inclusive) near Yolla-A

5.4.2 Waves

In Bass Strait, the interaction between sea and swell and the resultant wave motion is complicated by the islands and Australian mainland coastline embayments, peninsulas and headlands. This restricts the access of swell from the Southern Ocean into Bass Strait. Some swell is blocked completely and some refracted by the seabed and modified as it passes into shallower waters of Bass Strait. There are

also waves generated by wind within Bass Strait and the conditions at any location will be the result of these two wave-energy bands (Falconer and Lindforth, 1972).

The local wave climate is derived principally from locally generated wind waves mostly from the west and southwest. Wave heights range from 1.5 m to 2 m with periods of 8 s to 13 s, although heights of 5 m to 7 m can occur during storm events. The 100-year Average Recurrence Interval (ARI) for waves near the Yolla platform has a maximum significant wave height of 8.3 m and a period of 12 s from the west to west-northwest. Maximum significant wave heights for 1-year and 10-year ARIs are 6.7 m and 7.4 m respectively. Smaller 100-year ARI maximum significant wave heights are 4.4 m to 7.4 m and periods of 7.6 s to 10.2s have been estimated for non-critical directions. The maximum is likely to be about twice the significant wave height.

5.4.3 Water Temperature

The shallow depth of Bass Strait causes its waters to warm more rapidly in summer and cool more rapidly in winter than waters of surrounding regions (DCCEEW, 2015a). The sea surface temperatures in the area reflect the influence of warmer waters brought into Bass Strait by the EAC (IMCRA, 1998; Barton et al., 2012).

The waters of eastern Bass Strait are generally well-mixed, but surface warming sometimes causes weak stratification in calm summer conditions. During these times, mixing and interaction between varying water masses leads to variations in horizontal water temperature and a thermocline (temperature profile) develops. The thermocline acts as a low-friction layer separating the wind-driven motions of the upper well-mixed layer of Bass Strait from the bottom well-mixed layer. RPS (2020) reports that sea surface temperature in the region (based on the World Ocean Atlas) varies from an average minimum of 12.7°C in winter to a maximum of 18.1°C in late summer. In the shallower waters of the EMBA such as the Bunurong Marine National Park (MNP) and Bunurong Marine Park, the surface water temperatures range from 13°C in the cooler months 17.5°C in the warmer months (Parks Victoria, 2006a).

5.4.4 Water Quality

The nutrient concentrations in Central Bass Strait are low compared to that of what is seen at its extremities (Gibbs et al.,1986; Gibbs, 1992). It is hypothesised that this could be due to the biological demands of the Bass Strait waters consuming much of the nutrients before moving into Central Bass Strait (Gibbs, 1992). In the nearshore areas of the EMBA, water quality may be negatively affected through the discharge of polluted waters from rivers, which drain catchments dominated by stock grazing and small coastal settlements (Parks Victoria, 2006a).

5.4.5 Salinity

RPS (2020) reports that the average monthly salinity consistently remains in the range of 34.9 to 35.5 practical salinity units (based on the World Ocean Atlas database).

5.4.6 Seabed

5.4.6.1 Bass Strait

The bathymetry of Bass Strait shown in Figure 5.9 illustrates that the seafloor is gently sloping with water depths increasing gradually from the shore to reach a maximum of approximately 80 m at the Yolla-A platform with fine to medium sand within the operational area.

The Bass Strait islands belong to the same continental landmass as mainland Australia. The continental shelf is narrow along the east coast of Tasmania but broadens in the northwest, underlying Bass Strait and the Otway and Gippsland basins. The central part of Bass Strait contains a depression that exchanges water with the ocean to the north of King Island. The Basinal Plain is the main seafloor feature of Bass Strait; a ridge along the western edge of this plain extends from King Island to northwest Tasmania.

Sedimentation in Bass Strait is generally low due to the low supply from rivers and the relatively low productivity of carbonate.

The following information provides a description of key seabed types that may be present within Bass Strait.

Subtidal rocky reef

Rocky reefs provide hard substrate that allows colonisation by a range of algae and animals, including kelps and other seaweeds, and encrusting invertebrates such as sea squirts, sponges and bryozoans. The attached biota provides habitat and food for mobile animals including molluscs such as abalone and octopus, crustaceans such as lobster and crabs, and a wide range of fish species, including wrasse and leatherjackets.

There have been a wide range of studies of nearshore reef biota in Victoria including work for the Environment Conservation Council's marine coastal and estuarine investigation (Ferns and Hough, 2000). The nearshore reefs along Victoria's open coastline are characterised by an abundance of brown kelps, with a diverse understorey of red, green and brown seaweeds, sea squirts, sponges, bryozoans, crustaceans and molluscs. There is a degree of variation in the composition of biota on the reefs along the coast but in general most species are represented widely along the Victorian coast. Parks Victoria (2006a) notes that the Bunurong Marine National Park has the highest diversity of intertidal and shallow subtidal invertebrate fauna recorded in Victoria on sandstone.

Sandy substrate

The shifting sands of unsheltered nearshore seabed are often too mobile for the development of marine floral communities and lack the necessary hard substrate required for anchoring. For example, in southern Bass Strait, large sand waves have been observed on the seafloor and documented migrating rapidly driven by strong asymmetrical tides, moving more than 100 m in a nine-month period (Auguste et al., 2021). The images shown in Plate 3.4 indicate that the seabed along the offshore RGP is dominated by sandy sediments. Nevertheless, a rich abundance of faunal communities may be present among the sands including species of molluscs, bivalves, annelids, crustaceans, and echinoderms.

Seagrass communities

Seagrasses provide nursery habitat and shelter for small invertebrates (e.g. crustaceans such as crabs and shrimp), small fish and juveniles of larger fish species. Seagrasses provide important ecosystem services such as nutrient cycling, carbon sequestration, food provision and sediment stabilisation. As habitat forming species, seagrasses support many trophic levels, from epifauna that remove epiphytic algae on seagrass leaves, omnivorous fish that remove both epifauna and seagrass leaves to megafauna (e.g. sharks, rays and seals) that utilise seagrass ecosystems for hunting (Sievers et al., 2019).

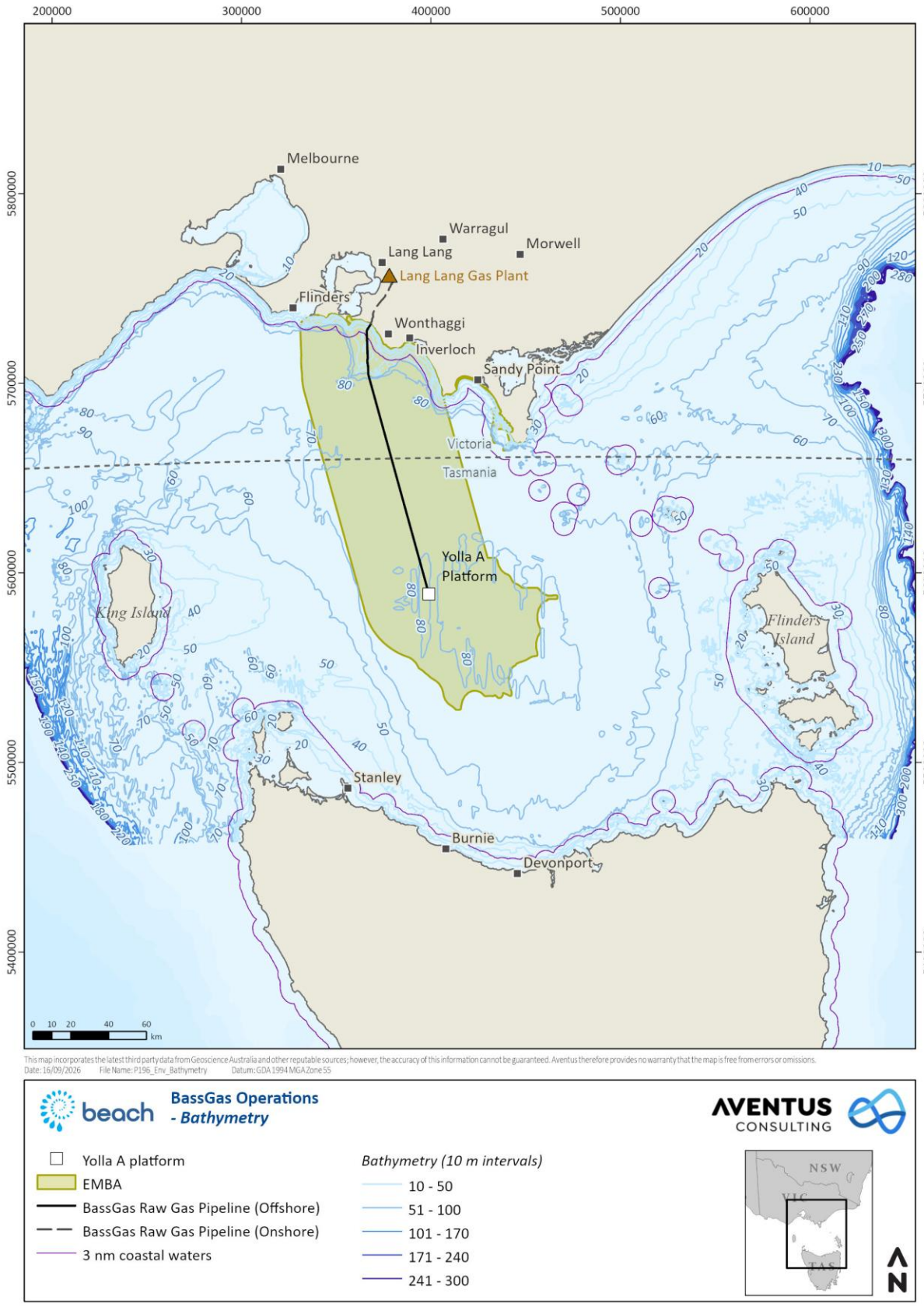


Figure 5.9: Bathymetry of Bass Strait and the EMBA

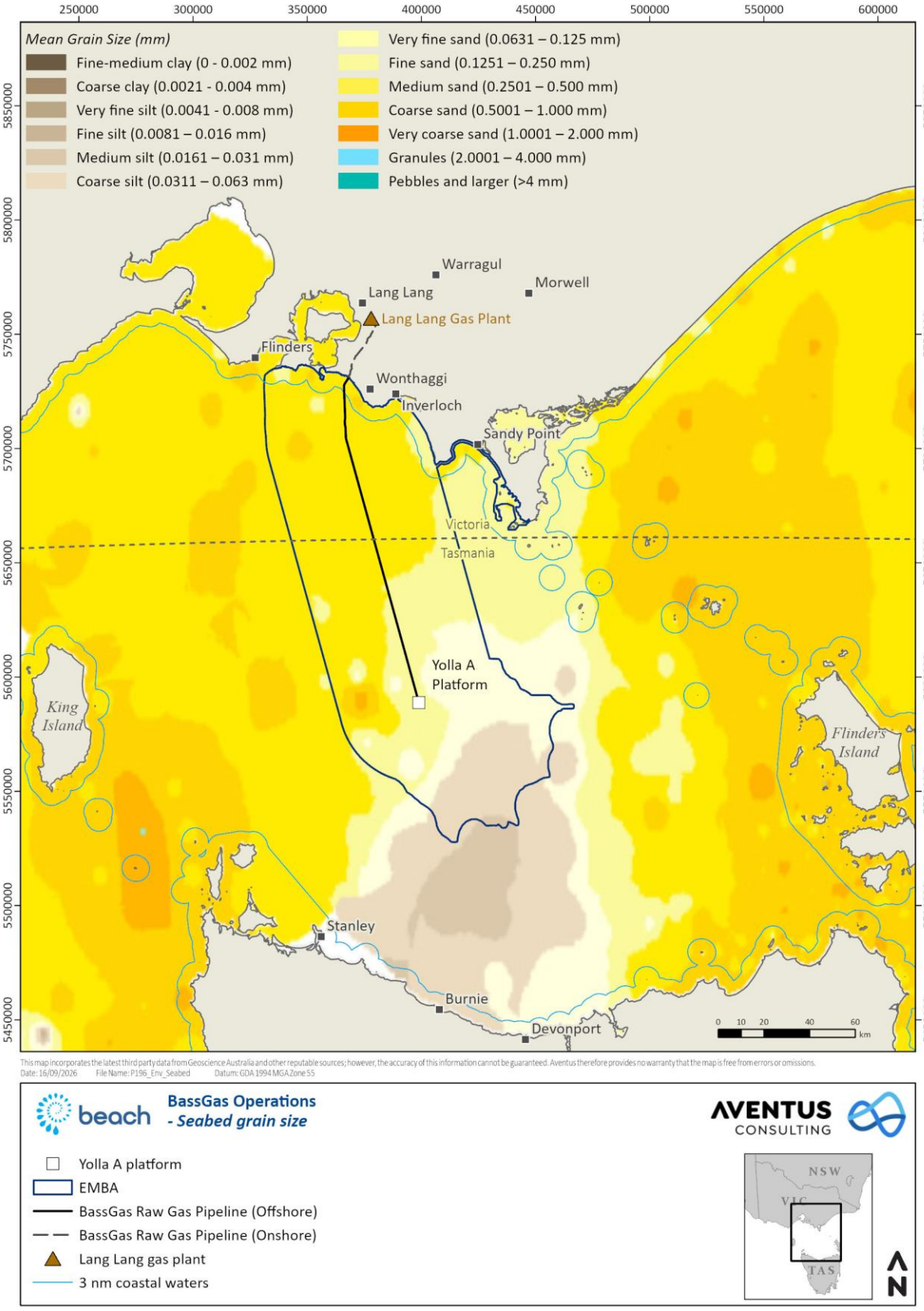


Figure 5.10. Average seabed sediment grain size across Bass Strait

5.4.6.2 Yolla Platform

Origin Energy (the previous operator of the BassGas development) undertook several geotechnical surveys in and around Yolla-A (Thales GeoSolutions, 2001; Benthic, 2001; Fugro, 2002; Benthic, 2009; Benthic, 2013). These surveys indicated that there are no obstructions or wrecks within the area. The seabed is generally flat and is typically comprised of bare substrate. Pre-construction surveys revealed that the seabed has very soft to soft alternating layers of silty carbonate clay and silty sands, containing fragile white shell fragments (Thales GeoSolutions, 2001; 2003).

Three depressions are located on the east of Yolla-A, formed from the spud cans of the jack-up drill rigs that drilled the Yolla wells. These depressions are shown in Figure 5.11, and the approximate dimensions are 5 m below mean seabed level and approximately 36 m in diameter. The shape and depth is preserved in a clay seabed base and the total spud can volume has not substantially changed over the course of surveys conducted between 2007 and 2024 (Fugro, 2007; Neptune, 2014; 2015, Beach, 2024).

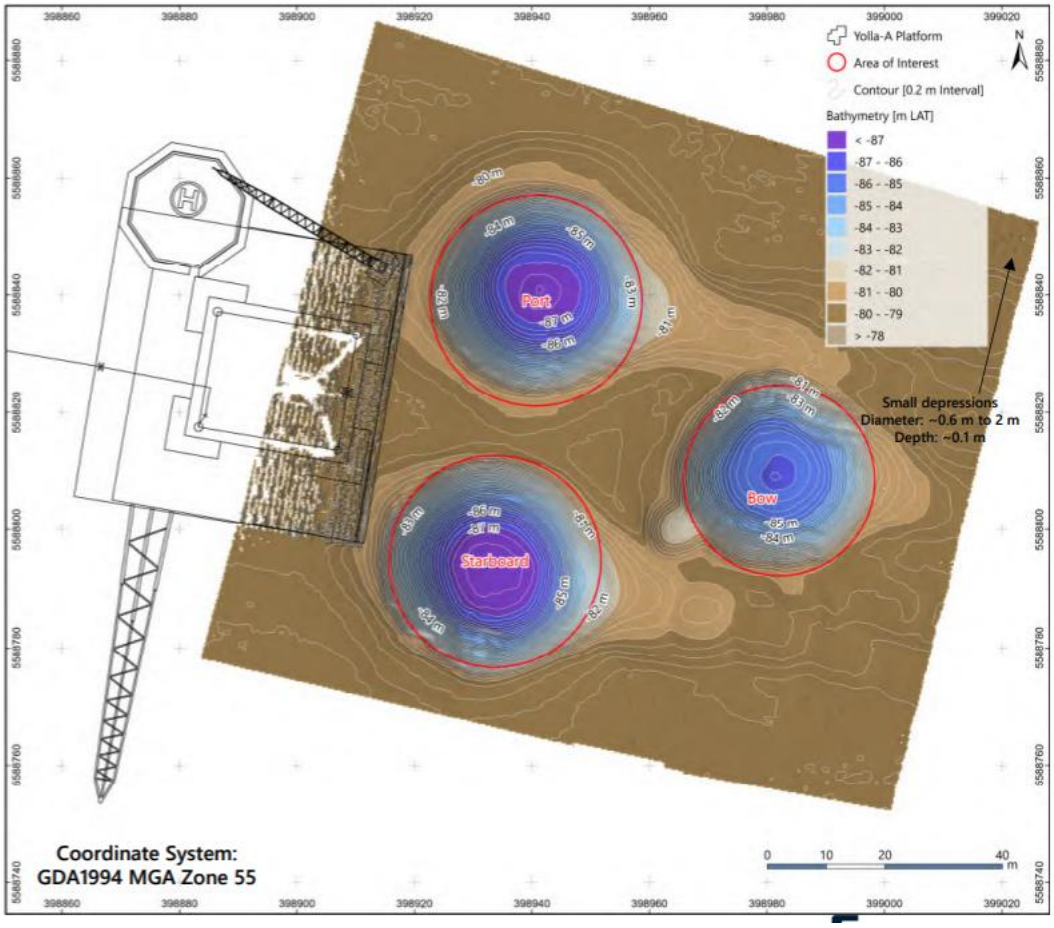


Figure 5.11: Yolla-A Platform Spudcan Depressions (Furgo, 2024)

A side scan sonar survey conducted by Origin (the previous BassGas operator) along the proposed raw gas pipeline (RGP) route in September 2000 (Thales GeoSolutions, 2001) indicated that the nearshore seabed comprises a range of soft sediments and patchy reefs.

A video reconnaissance survey undertaken to determine the nature of fixed epibiota in the nearshore area also revealed that the seabed comprises fine sands with distinct sand waves and areas of reef. The survey findings indicated that the nearshore sediments appear to be too mobile for the establishment of fixed biota such as seagrass communities. Diver inspection and video

images from the reef areas revealed that the shallow reefs are characterised by kelps (predominantly *Phylospora commosa* and *Ecklonia radiata*), various smaller seaweed species, sea squirts (predominantly the solitary ascidian *Herdmani amomus*) and sponges. Blacklip abalone are common in the fissures and under the crevices on the rocky reefs.

Few fish were observed during the initial survey of the pipeline route however it is known from previous inspections in the area and from discussions with fishers that a wide range of reef fish occur on the reefs in the area (CEE Consultants Pty Ltd, 2001). These include wrasse, box fish, leatherjackets, barber perch, magpie perch and hula fish.

5.4.6.3 Pipeline

Surveys along the raw gas pipeline route in Commonwealth waters indicate that the seabed consists predominantly of medium to loose sand with localised pockets of clay and gravel. Table 5.5 summarises the seabed sediment types encountered at various depths along the pipeline route. The shore crossing for the pipeline within State waters is generally through sedimentary rock (sandstone, mudstone) with sand and clay layers at the surface at both ends. There are numerous small reefs nearby on either side of the exit hole within state waters.

Table 5.5: Seabed types along the raw gas pipeline route

Pipeline segment (KP)	Maximum water depth (m)	Seabed type
KP0 (Yolla-A) to KP19	81.3	Clay
KP19 to KP53	79.2	Sand
KP53 to KP75	77.0	Sand
KP75 to KP90	77.0	Sand
KP90 to KP112	77.0	Sand
KP112 to KP118	74.5	Sand
KP118 to KP122	65.0	Sand
KP122 to KP143	51.6	Sand
KP143 to KP144	40.2	Sand
KP144 to KP146.4 (shore)	36.0 (minimum 18.5 m)	Sand

5.4.7 Shorelines

This section describes the shoreline in the areas intersected by the EMBA.

In October 2019 Bass Coast was declared a Distinctive Area and Landscape under the Planning and Environment Act 1987 by the Victorian Government as part of the Distinctive Areas and Landscapes Program. The Bass Coast contains distinctive rural and coastal landscapes, productive agricultural land, and sensitive environments of significant biodiversity value. The area attracts lifestyle residents, as well as holiday makers and includes the popular tourist destination of Phillip Island.

The declaration made in October 2019 triggered the requirement for DEECA to deliver a Statement of Planning Policy in March 2025, which included a 50-year vision and land use strategy. DEECA worked in collaboration with the Bass Coast Shire Council, and Traditional Owners, the Bunurong

People in preparing the Statement of Planning Policy, with input from local communities and other key stakeholders.

Note that the shorelines predicted to be exposed to hydrocarbons in the event of a spill (and not entrained and/or dissolved phase only) have been described below:

Modelled exposure to shoreline hydrocarbons

- Wilsons Promontory West – the western parts of Wilsons Promontory intersected by the EMBA are dominated by intertidal shore platforms and interspersed by sandy beaches, particularly in the bays (e.g., Oberon Bay, Norman Beach (Tidal River) and Darby Beach. The offshore islands in this sector (Kanowna, Cleft, Anser Group, Wattle, McHugh, Glennie Group and Norman islands) are all dominated by intertidal shore platforms and provide important breeding habitat for little penguins (see Section 5.6.4.3, Australian fur-seals and New Zealand fur-seals (see Section 5.6.6). In particular, Kanowa Island hosts the second largest breeding colony for Australian fur seals. All of the islands are protected within the Wilsons Promontory MNP.

- Cape Liptrap– the EMBA intersects most of Waratah Bay (which comprises mostly sandy beaches and intertidal shore platforms) and Cape Liptrap. The shoreline around Cape Liptrap is dominated by mixed sand beach and shore platform in the southern area, shifting to mixed cobble, shingle beach and shore platform on the western side of the cape. North of this point, the shoreline is dominated by sandy beaches with small sections of mixed sand beach and shore platform in the more southerly reaches. These sandy beaches are noted to have large numbers of hooded plovers and are backed by the Cape Liptrap Coastal Park.

- Kilcunda– starting near Venus Bay, the west-facing beaches continue to be dominated by sandy beaches (Plate 5.1). West of Anderson Inlet, the shoreline is dominated by mixed sand beach, shore platform and intertidal shore platform (see Plate 5.1). North of Harmers Haven, the shoreline is dominated by sandy beaches, interspersed by mixed sand beach and shore platform through to San Remo.

- Phillip Island– the EMBA intersects the southern side of Phillip Island. Cape Woolamai on Phillip Island is dominated by mixed sand beach and shore platform on the cape (with an isolated area of mixed cobble, shingle beach and shore platform), with sandy shorelines on the eastern and western facing isthmus. Seal Rocks is located 1.8 km off Phillip Island and provides an important breeding and nursery area for approximately 20,000 Australian Fur Seals, 25% of the total population (Phillip Island Nature Parks 2025).

Modelled exposure to dissolved and/or entrained phase hydrocarbons (no shoreline loading)

- Phillip Island– starting near Summerland on the western edge of Phillip Island and moving along the southern coastline, intertidal shore platform is the dominant shoreline type with intermittent areas of sandy beach and mixed cobble, shingle beach and shore platform. The Cape Woolamai coast on the east of the island is dominated by sandy beach and sand dunes with some isolated areas of cobble and shingle beach. The northeastern coast is dominated by saltmarsh and isolated patches of cobble and shingle beach, intertidal shore platform, mangrove and mixed cobble, shingle beach and shore platform. The northern coast is primarily sandy beach with mixed sand beach and shore platform dominant on the northwest coast.



Sandy beach at Venus Bay (view north), with the Cape Liptrap Coastal Park in the foreground (Aventus Consulting)

Plate 5.1: Shoreline typical of the Kilcunda section of the EMBA

- Wilsons Promontory East – the shoreline of Wilsons Promontory East is dominated by intertidal shore platform in areas exposed directly to the sea. Sheltered bays, such as Waterloo Bay and Sealers Cove, are dominated by sandy beach and mixed sand beach/shore platform. At these locations, Freshwater Creek estuary and Sealers Creek estuary meet Bass Strait.

The following are the values of the shoreline types described for the EMBA (noting these are focussed on the Bunurong MNP and Bunurong Marine Park areas (PV, 2025):

- Sandy beaches – provide important habitat for invertebrates such as amphipods, isopods, molluscs, polychaetes and crustaceans, while beach-washed material (wrack) provides food sources for birds and detritus for invertebrates such as bivalves.

- Intertidal reef platforms and rocky shores – upper areas of the rock platforms support green, red and blue-green algae while the extensive mid-intertidal communities are dominated by Neptune's necklace (*Hormosira banksii*) and the green algae sea lettuce (*Ulva* spp.), which grow in small rock pools and crevices. Lower intertidal platforms that are subject to regular submergence are dominated by brown algae and branching and encrusting coralline red algae. The intertidal reef platforms are feeding and roosting areas for many shorebird species.

- Subtidal reefs – provide habitat for fish, sessile invertebrates and sponges, as well as colonial organisms. These communities have a high diversity of red and green algae but are dominated

by two species of green algae. Epifauna present in algae and turf reveal that isopod crustaceans are present, including two families (Pseudidotheidae, Plakarthriidae).

5.5 Conservation Values and Sensitivities

The conservation values and sensitivities in and around the BassGas operational area and within the EMBA are described in this section, with Table 5.6 providing an outline of the conservation categories included.

Table 5.6: Conservation values in the EMBA

Category	Conservation classification	EP Section
MNES	World Heritage-listed properties	No places listed. Section 5.5.4
	National Heritage-listed places	No places listed. Section 5.5.5
	Ramsar Wetlands	Section 5.5.6
	Threatened ecological communities, threatened and migratory species	Throughout Sections 5.5.8 and Section 5.6
	Commonwealth marine areas	No places listed. Section 5.5.1
	Great Barrier Reef Marine Park	Not applicable
Other matters protected by the EPBC Act	Commonwealth heritage-listed places	No places listed. Section 5.5.7
	Listed Marine Species	Section 5.6
	Whales and Other Cetaceans	Section 5.6.5
	Australian Marine Parks	Section 5.5.1
Victorian protected areas and FFG species	MNPs, marine parks and sanctuaries	Section 5.5
	Coastal (onshore) conservation reserves	Not applicable
	FFG threatened species	Throughout Section 5.6

5.5.1 Australian Marine Parks

The South-east Commonwealth Marine Reserves Network was designed to include examples of each of the provincial bioregions and the different seafloor features in the region (DNP, 2025). Provincial bioregions are large areas of the ocean where the fish species and ocean conditions are broadly similar.

There are no AMPs that are intersected by the operational area or EMBA. Figure 5.12 illustrates the closest AMP is the Beagle AMP, which is located approximately 25 km east of the EMBA.

5.5.2 Victorian Protected Areas

Victoria has a large network of onshore and offshore protected areas that are established, protected and managed under the National Parks Act 1982 (Vic) by Parks Victoria. Offshore, there are 24 Victorian marine national parks and sanctuaries.

The RGP intersects the Kilcunda Conservation Reserve (drilled horizontally under). There are six marine protected areas and 11 onshore protected areas (i.e., reserves that extend to the low-water mark) intersected by the EMBA, described in Table 5.7 and shown in Figure 5.12.

Table 5.7: Marine and coastal protected areas in the EMBA

Name	Location	Description
Marine protected areas		
Mushroom Reef Marine Sanctuary	164 km northwest of Yolla-A.	Mushroom Reef Sanctuary is located on the Bass Strait coast at Flinders near the western entrance to Western Port Bay and is 80 ha in size. The sanctuary abuts the Mornington Peninsula National Parkland and extends from the high-water mark to approximately 1 km offshore. The sanctuary's key natural values are listed in the Mushroom Reef Marine Sanctuary Management Plan (Parks Victoria, 2005b) as: • Numerous subtidal pools and boulders in the intertidal area that provide a high complexity of intertidal basalt substrates and a rich variety of microhabitats; • Subtidal reefs that support diverse and abundant flora including kelps, other brown algae, and green and red algae; • Sandy bottoms habitats that support large beds of Amphibolis seagrass and patches of green algae; • Diverse habitats that support sedentary and migratory fish species; • A range of reef habitats that support invertebrates including gorgonian fans, seastars, anemones, ascidians, barnacles and soft corals; • A distinctive basalt causeway that provides habitat for numerous crabs, seastars and gastropod species; • Intertidal habitats that support resident and migratory shorebird species including threatened species; • An important landmark and area for gathering fish and shellfish for the Boonwurrung people; and • Excellent opportunities for underwater recreation activities such as diving and snorkelling among accessible subtidal reefs.
Churchill Island MNP	153 km northwest of Yolla-A.	Churchill Island is located south of Rhyll, on the eastern shore of Phillip Island. The park extends from Long Point to the north point of Churchill Island. Within the park are numerous marine habitats including mangroves, sheltered intertidal mudflats, seagrass beds, subtidal soft sediments and rocky intertidal shores. Churchill Island MNP is part of the Western Port Ramsar wetland site. Churchill Island is an important habitat for many bird species. Migratory waders roost and feed within the MNP including the bar-tailed Godwit and the red-necked stint. The seagrass beds are major food sources for many commercially viable species such as king George whiting, black bream and yellow-eyed mullet (Parks Victoria, 2007b).

Name	Location	Description
Bunurong MNP	Located 124 km north of Yolla-A. Extends over 5 km of coastline 2.5 km east of Cape Patterson in south Gippsland and reaches offshore for 3 nm to the limit of Victorian waters.	Bunurong MNP is significant because of the mixed assemblage of brown algae and seagrass, supporting a high proportion of Victoria's marine invertebrates, including brittle stars, sea cucumbers, barnacles, sea anemones and chitons. Bunurong MNP supports a considerable diversity of habitats and communities. These habitats provide important substrate, food, shelter and spawning and nursery areas for a variety of marine flora and fauna. Six marine ecological communities are present: sandy beaches, intertidal reef platform, subtidal reef, subtidal soft sediments, seagrass and open waters. Intertidal and subtidal reef communities are the most common habitat type and incorporate many microhabitats. Red, brown and green alga species, seagrass and seaweeds along with rocky substrate combine to form many microhabitats (Parks Victoria, 2006a). Sandy beaches of the park provide important habitat for invertebrates such as amphipods, isopods, molluscs, polychaetes and crustaceans, and are also a feeding ground for fish and seabirds. Beach-washed materials in sandy beach habitats provide a significant source of food for scavenging birds and contribute to the detrital cycle that nourishes many of the invertebrates, such as bivalves, living in the sand. Overall, the marine flora and fauna are considered largely representative of the Central Victorian Marine Bioregion (Parks Victoria, 2006a).
Bunurong Marine and Coastal Park	Located 126 km north of Yolla-A. Extends 7 km west and 3 km east along the coast from the national park and extends 1 km into the sea.	Bunurong Marine and Coastal Park has rugged sandstone cliffs, broad rock platforms and underwater reefs and significant fossil sites where dinosaur bones over 115 million years old have been excavated (Parks Victoria, 2006a). Bunurong Marine National Park is significant because of the mixed assemblage of brown algae and seagrass, supporting a high proportion of Victoria's marine invertebrates, including brittle stars, sea cucumbers, barnacles, sea anemones and chitons.
Wilsons Promontory MNP	Located 86 km northeast of Yolla-A. Extends along 70 km of coastline on the southern tip of Wilsons Promontory National Park including Victorian state waters.	Wilsons Promontory MNP is a distinct bioregion of Victoria’s coastline due to the different types of rock present and its position at the boundary between two major ocean currents. Its offshore islands support several colonies of Australian fur-seals and provide breeding sites for many seabirds, including cape barren geese, little penguins, gulls, mutton birds and ospreys (Parks Victoria, 2006b). Wilsons Promontory MNP is the first in Australia to receive a Global Ocean Refuge Award, joining a group of ten marine protected areas that comprise the Global Ocean Refuge System. The award signifies that the park meets the highest science-based standards for biodiversity protection and best practices for management and enforcement. Located at the southernmost tip of mainland Australia, it’s one of the country’s best examples of marine biodiversity protection (Parks Victoria, 2006b).

Name	Location	Description
Wilsons Promontory Marine Park	Located 91 km northeast of Yolla-A.	Wilsons Promontory Marine Park, together with the Marine Reserve and MNP, make significant contributions to Victoria's marine protected areas. The marine park includes biological communities with distinct biogeographic patterns, including shallow subtidal reeds, deep subtidal reefs, intertidal rocky shores, sandy beaches, seagrass, subtidal soft substrates and expansive areas of open water (Parks Victoria, 2006b). The marine park provides important habitat for several threatened shorebird species and islands within the park act as important breeding sites for Australian fur seals (Parks Victoria, 2006b).
Coastal/onshore protected areas (adjacent to the EMBA)		
Phillip Island Coastal Reserve	Located 148 km north northwest from Yolla-A.	Phillip Island Coastal Reserve forms part of the greater network of protected areas on Phillip Island and spans from Cowes in the north of the island to Cape Woolamai in the east. The coastal reserve protects much of the sandy beaches that the Island's settlements are built behind. These protected areas are popular with holiday makers who enjoy surfing, swimming, fishing, walking, running, bike riding and playing among the foreshore beaches (PINP, 2018).
Phillip Island Nature Park	Located 148 km north northwest from Yolla-A.	Phillip Island Nature Park spans multiple locations across the island from Cape Woolamai in the east, Smiths Beach in the South, Summerlands in the west and Cowes in the north. Due to its proximity to adjacent settlements, the Nature Park hosts a range of recreational activities including surfing, swimming, fishing, walking, running and bike riding. Cape Woolamai's cliffs are used by experienced rock climbers that allow for spectacular views of coastal scenery. The Cape is also the home to Phillip Island's largest shearwater rookery and numerous little penguin colonies. The penguins' nightly return from the ocean to their nests (the 'Penguin Parade' at Summerlands beach) is a key drawcard for tourists to Victoria and this part of the coastline. The Park also encapsulates Seal Rocks in the west, which is an important seal haul out site as the largest Australian Fur Seal colony (PINP, 2018).
Western Port Intertidal Coastal Reserve	161 km northwest of Yolla-A.	Western Port Intertidal Coastal Reserve is located on the eastern coast of Western Port Bay. The reserve protects substantial areas of unvegetated mudflats that provide important habitat for shorebirds and migratory waders. The reserve forms part of the Western Port Ramsar site (described in Section 5.4.4).
French Island National Park	162 km northwest of Yolla-A.	The French Island National Park is located 10 km south of Tooradin, and French Island MNP is adjacent to the northern shoreline of French Island National Park in Western Port Bay. Extending 15 km along the shoreline, the park covers an area of 2,800 ha. It includes one of Victoria's most extensive areas of saltmarsh and mangrove communities along with mudflats of state geomorphological significance (Parks Victoria, 1998).

Name	Location	Description
San Remo Coastal Reserve	Located 146 km north- northwest of Yolla-A.	San Remo Coastal Reserve protects the foreshore area adjacent to the township of San Remo. The protected area is primarily sandy beach, rocky cliffs and dunes, some of which faces Bass Strait and others towards Western Port Pay. The township of San Remo is separated from neighbouring Phillip Island by a strip of fast flowing water known as 'the narrows.' The coastal reserve is important in protecting the activities and aesthetic that makes San Remo part of the network of popular Bass Coast holiday destinations such as surfing, swimming, fishing, walking, running, bike riding and boating.
Punchbowl Coastal Reserve	Located 145 km north of Yolla-A, west of the pipeline coastal crossing.	Punchbowl Coastal Reserve is for the protection of the coastline that was previously grazing farmland. The low vegetation allows for observing bird life where pacific gulls exploit the strong updraught created by the high cliffs. Black-shouldered kites and nankeen kestrels feed in the neighbouring farmlands. Through winter the high cliffs provide a vantage point to view humpback whales and southern right whales on their annual migration to warmer waters.
Kilcunda Coastal Reserve	Located 145 km north of Yolla-A, west of the pipeline coastal crossing. Adjacent to the Kilcunda township.	Kilcunda Coastal Reserve is located on the Bass Coast adjacent the township of Kilcunda. The reserve protects coves of sandy beaches, rocky cliffs, intertidal rock formations and patchy vegetation that separates the township from the foreshore. The reserve is important in preserving the recreational beach activities as well as its supporting facilities such as its picnic area, playground, walking trails and shelter (Parks Victoria, 2006a). The RGP was drilled under/through this reserve.
Kilcunda Harmers Haven Coastal Reserve	Located 132 km north of Yolla-A. Located 1 km west of Cape Paterson west to Kilcunda.	Kilcunda-Harmers Haven Coastal Reserve is a 180 ha reserve for the protection of the coastal flora habitat. Coastal habitat at Harmers Haven has a high diversity of vegetation communities, many of which are considered rare, depleted or endangered within the Bass Coast Shire, with almost 300 recorded flora species including plants of national, state and regional conservation significance (Parks Victoria, 2006a).
Cape Liptrap Coastal Park	Located 102 km north of Yolla-A.	Cape Liptrap Coastal Park protects extensive heathland and coastal forest vegetation communities, including scented paperbark, common heath, scrub she-oak, dwarf she-oak, pink swamp-heath, prickly teatree, silver banksia and bushy hakea. Several rare fauna species occur in the park including the hooded plover, swamp antechinus and powerful owl (Parks Victoria, 2003).
Shallow Inlet Marine and Coastal Park	Located 113 km northeast of Yolla-A, adjoining Wilsons Promontory National Park near Sandy Point.	Shallow Inlet is a large tidal bay closed from the sea by a sand barrier complex of spits, bars and mobile dunes. The sheltered western side of the inlet is dominated by a salt marsh terrace. The park protects a diverse range of vegetation including foredunes of spinifex, heathy woodlands of messmate and coastal banksia, paperbark swamps and saltmarsh communities. Extensive mudflats and intertidal areas are exposed at low tide. Pied oystercatchers and red capped plovers nest in the dunes and on the spit. A diverse range of mammals including the koala, common ringtail possum, common wombat, swamp wallaby and echidna use the woodland and heathland habitats along the shoreline of Shallow Inlet (Parks Victoria, 2012).

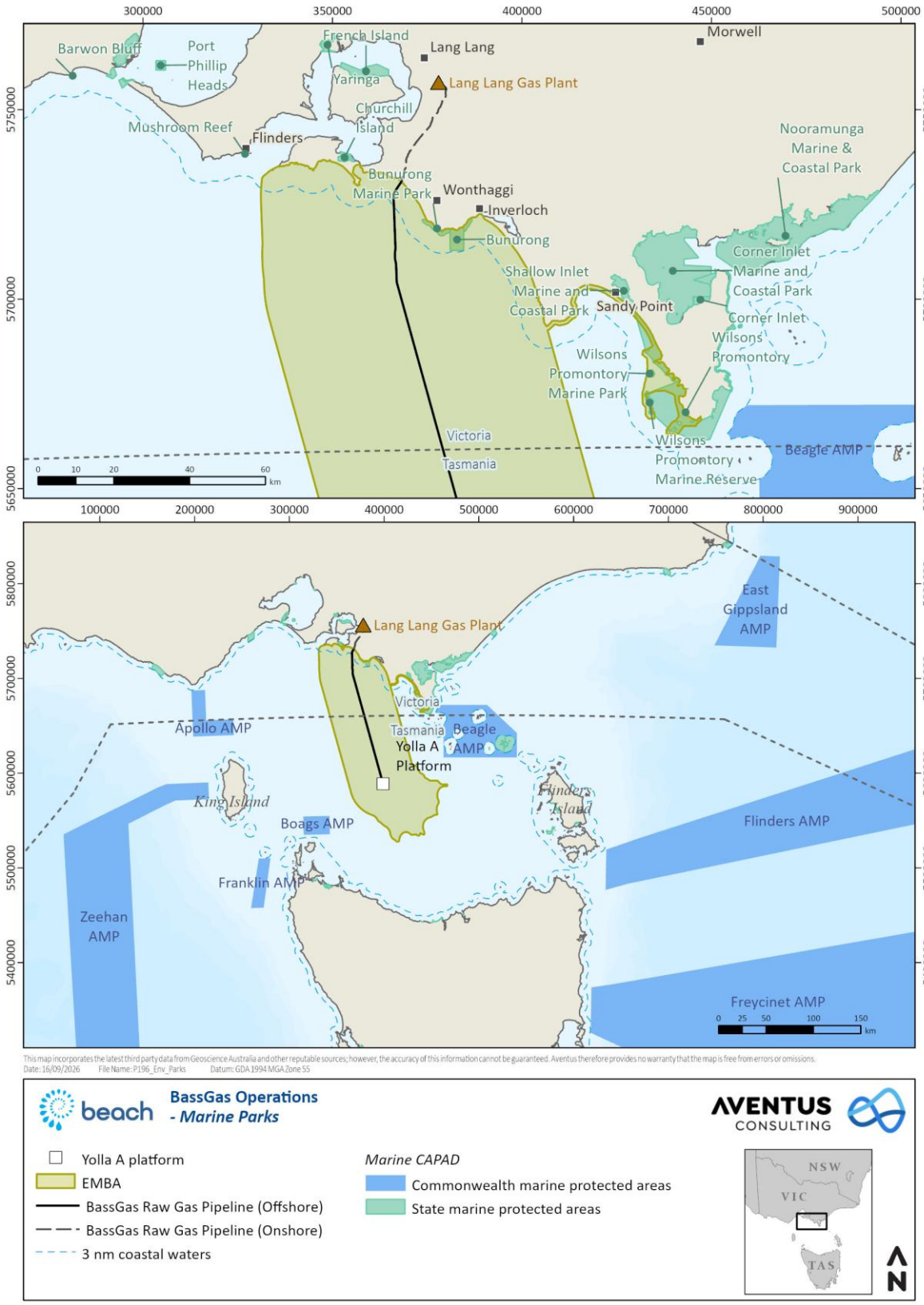


Figure 5.12: Protected Areas in the EMBA

5.5.3 Tasmania Protected Areas

Tasmania has a large network of onshore and offshore protected areas that are established, protected and managed under the National Parks and Reserves Management Act 2002 and Nature Conservation Act 2002 by DPIPWE. Offshore, there are seven marine reserves and 14 marine conservation areas (with the latter restricted to waters around Hobart in southern Tasmania).

There are no Tasmanian protected areas that are intersected by the operational area or EMBA. The closest Tasmanian protected area is Three Hummock Island, located approximately 60 km southwest of the EMBA.

5.5.4 World Heritage-listed Properties

World Heritage Listed properties are examples of sites that represent the best examples of the world's cultural and heritage values, of which Australia has 21 properties (DCCEEW, 2025d). In Australia, these properties are protected under Chapter 5, Part 15 of the EPBC Act.

No properties on the World Heritage List occur within the operational area or EMBA. The nearest site is the Tasmanian Wilderness; an onshore heritage area located 130 km south of the EMBA.

5.5.5 National Heritage-listed Places

The National Heritage List is Australia's list of natural, historic, and Indigenous places of outstanding significance to the nation (DCCEEW, 2026d). These places are protected under Chapter 5, Part 15 of the EPBC Act.

There are no national heritage-listed places that are intersected by the operational area or EMBA. The closest National Heritage Place is the Australian Alps National Parks and Reserves, which is located onshore approximately 96 km northeast of the EMBA.

5.5.6 Wetlands of International Importance

Australia has 67 Ramsar Wetlands that cover more than 8.3 million hectares (DCCEEW, 2026e). Ramsar Wetlands are those that are representative, rate, or unique wetlands, or are important for conserving biological diversity, and are included on the List of Wetlands of International Importance developed under the Ramsar Convention. These wetlands are protected under Chapter 5, Part 15 of the EPBC Act.

There are no wetlands of international importance that are intersected by the activity or planning areas. The closest Ramsar wetland is Western Port Ramsar Site, located adjacent to the EMBA.

5.5.7 Commonwealth Heritage-listed Places

Commonwealth Heritage-listed places are natural, indigenous and historic heritage places owned or controlled by the Commonwealth. In Australia, these properties are protected under Chapter 5, Part 15 of the EPBC Act.

No properties on the Commonwealth Heritage List occur within the operational area or EMBA. Though the PMST Report lists the Wilsons Promontory Lighthouse, which is located high above the high-water mark 33 km east of the EMBA. The lighthouses themselves are not considered part of the EMBA. The nearest place is the HMAS Cerberus Marine and Coastal Area , located approximately 11 km north of the EMBA.

5.5.8 Threatened Ecological Communities

Threatened Ecological Communities (TECs) are protected as MNES under Part 13, Section 181 of the EPBC Act and provide wildlife corridors and/or habitat refuges for many plant and animal species. Listing a TEC provides a form of landscape or systems-level conservation (including threatened species) (DCCEEW, 2026f).

There are no TECs that are intersected by the operational area or EMBA. Figure 5.13 illustrates the closest TEC is the subtropical and temperate coastal saltmarsh, located adjacent to the EMBA at Sandy Point.

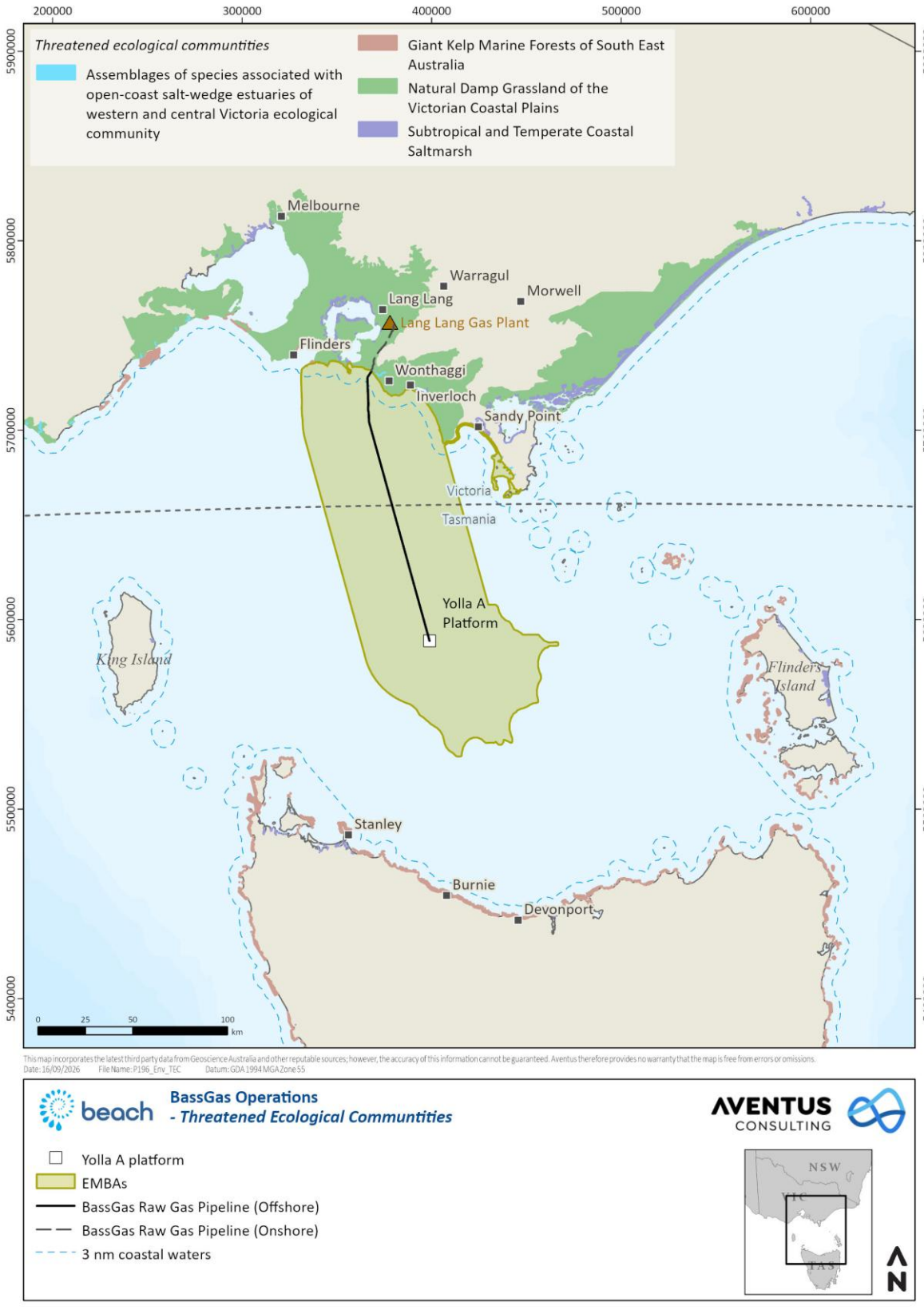


Figure 5.13: Nearest TECs to the EMBA

5.5.9 Key Ecological Features

Key Ecological Features (KEFs) are elements of the Commonwealth marine environment based on current scientific understanding. KEFs are considered to be of regional importance for the region's biodiversity, ecosystem functioning and integrity. KEFs have no legal status in decision-making under the EPBC Act but may be considered as part of the Commonwealth marine area.

There are no KEFs that are intersected by the operational area or EMBA. Figure 5.14 illustrates the closest KEF is the West Tasmania Canyons, located approximately 180 km km southwest from the EMBA.

5.5.10 Nationally Important Wetlands

Nationally important wetlands (NIW) are considered important due to maintaining ecological and hydrological roles in wetland systems, providing important habitat for animals during juvenile stages. NIW support approximately 1% of the national populations many native plant or animal taxa or for its outstanding historical or cultural significance (DAFF, 2020f). Four NIWs occur along the coast that are intersected by the EMBA (Figure 5.15). Many of these NIW would only be intersected by the EMBA if they are open to the sea at the time of a spill. The NIWs intersected by the EMBA are described below based on DAFF (2020f):

- Anderson Inlet (VIC062) – Anderson Inlet is one of the largest estuaries on the Victorian coast (2,230 ha) and is a significant site for 23 waterbird species recorded here, including many threatened species such as the hooded plover, fairy tern, eastern curlew and orange-bellied parrot. The site is popular for recreational line- fishing, sailing, powerboating, bait collection and duck hunting.

- Powlett River Mouth (VIC078) - The Powlett River Mouth provides valuable habitat for the orange-bellied parrot (endangered) by supporting saltmarsh vegetation.

- Western Port (VIC083) – Western Port is also a wetland of international significance and is described in Section 5.5.2. The site is significant for its ecological, recreational, tourism, scientific, educational, cultural and scenic values. It contains over 50% of Victoria’s mangroves and large areas of highly productive seagrass beds and mudflats.

- Shallow Inlet Marine and Coastal Park (VIC080) - Shallow Inlet is a large tidal bay closed from the sea by a sand barrier complex of spits, bars and mobile dunes. The sheltered western side of the inlet is dominated by a salt marsh terrace. The park protects a diverse range of vegetation including foredunes of spinifex, heathy woodlands of messmate and coastal banksia, paperbark swamps and saltmarsh communities. Extensive mudflats and intertidal areas are exposed at low tides.

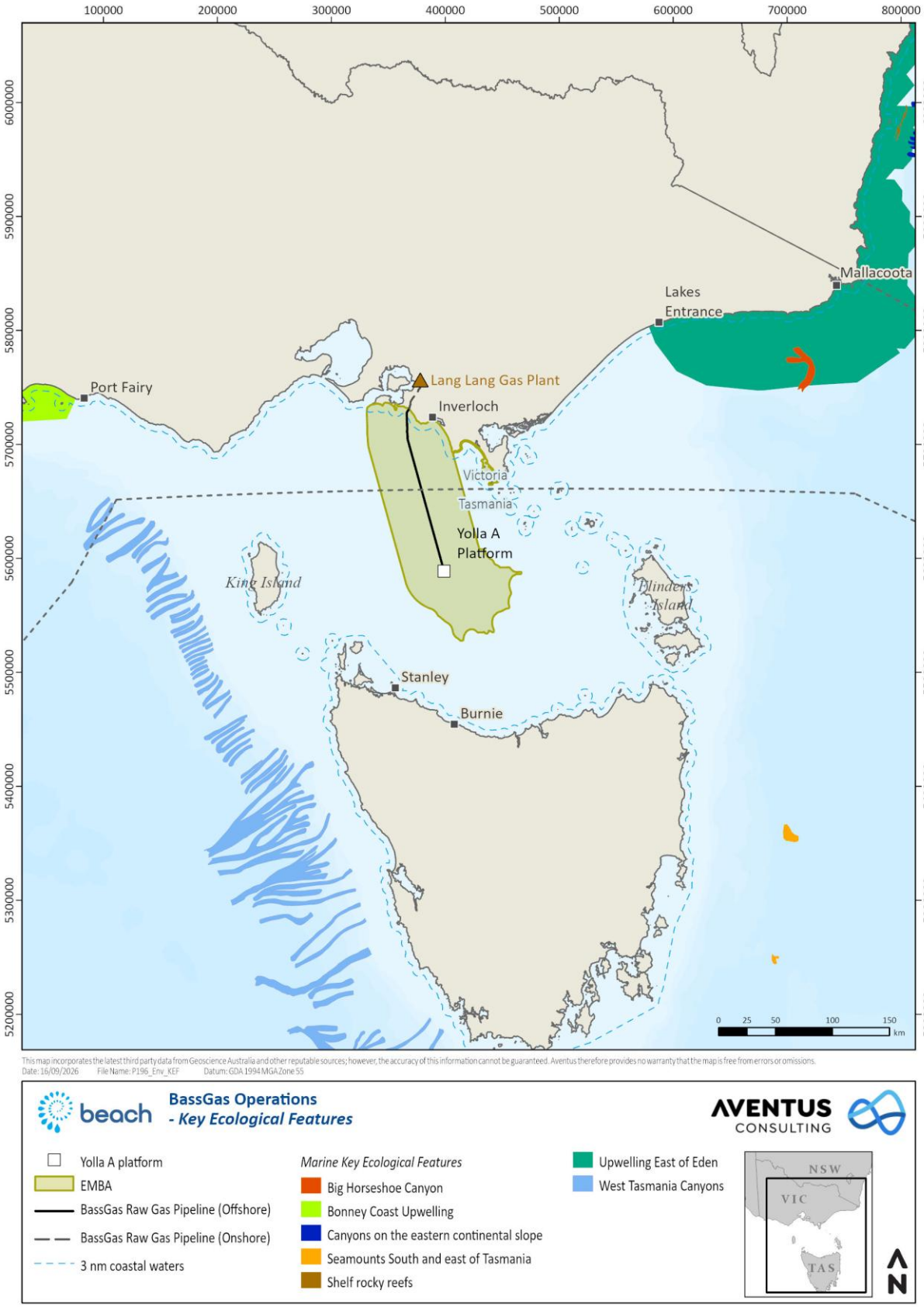


Figure 5.14: KEFs nearest to the EMBA

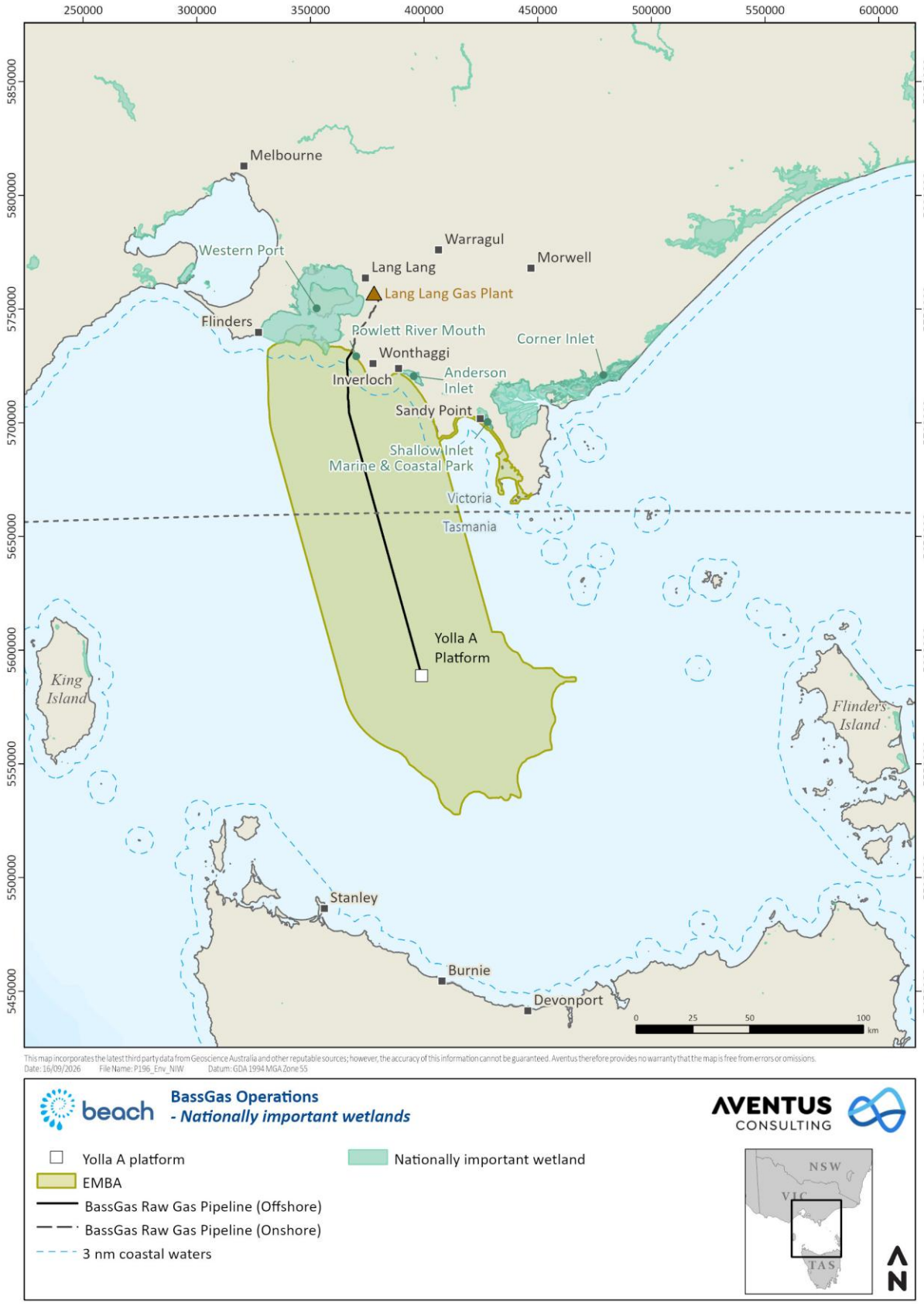


Figure 5.15: NIWs the EMBA

5.6 Biological Environment

The key source of information for the species that may be present in the operational area and EMBA is the EPBC Act PMST. Associated FFG Act threatened listings for identified species have also been provided. The EPBC categories are listed in Table 5.8. Key EPBC Act and FFG categories are provided in Table 5.9.

Table 5.8. Definitions of EPBC Matters associated with the biological environment

Definitions	
Listed threatened species:	A native species listed in Section 178 of the EPBC Act as either extinct, extinct in the wild, critically endangered, endangered, and vulnerable or conservation dependent.
Listed migratory species:	A native species that from time to time is included in the appendices to the Bonn Convention and the annexes of JAMBA, CAMBA and ROKAMBA, as listed in Section 209 of the EPBC Act.
Listed marine species:	As listed in Section 248 of the EPBC Act.

Table 5.9. Key EPBC and FFG Act categories

Key	
EPBC Act status	Conservation dependent
	Vulnerable
	Endangered
	Critically endangered
FFG Act status	Conservation dependent
	Vulnerable
	Endangered
	Critically endangered
BIA (Biologically Important Area)	Aggregation
	Breeding
	Distribution (i.e., presence only)
	Foraging
	Foraging, feeding or related behaviour
	Migration
	Roosting
Recovery plans	Action Statement
	Conservation Advice
	Conservation Management Plan
	Recovery Plan

5.6.1 Benthic Assemblages

5.6.1.1 Bass Strait

Marine invertebrates recorded in the Bass Strait include porifera (e.g., sponges), cnidarians (e.g., jellyfish, corals, anemones, sea pens), bryozoans, arthropods (e.g., sea spiders), crustaceans (e.g., crabs, rock lobster, brine and fairy shrimps), molluscs (e.g., scallops, sea slugs), echinoderms (e.g., sea cucumbers), and annelids (e.g, polychaete worms).

Benthic habitat characterisation surveys were undertaken for the Marinus Link project in 2019 and 2021, in an area that extends from Heybridge on Tasmania's north coast through central Bass Strait to Waratah Bay in Victoria. These surveys found that benthic invertebrate distribution were irregular and generally sparse in central Bass Strait. Epifauna present primarily consist of tangled sponges, with *Euncidae* and *Onuphidae* polychaete worms likely to be inhabiting the seabed due to the presence of opaque tubes and burrows. At shallower survey sites (31 m) species observed include doughboy scallops (*Mimachlamys asperrima*), eleven arm seastars (*Coscinasterias muricata*) and solitary anemones. Stalked bryozoans (*Lanceopora smeatoni*) were abundant at survey sites at depths of 35 m to 38 m, doughboy and commercial scallops (*Pecten fumatus* and *Chlamys asperrima),*) occurred less frequently. Survey sites at depth of 68 m to 80 m had sparse patches of sponges, bryzoan, ascidians and solitary eunicid worm tube stalks (CEE, 2024).

In the nearshore survey areas, a broader assemblage has been recorded, including spider crabs, sea cucumbers, sea pens, shrimp, brittle stars, burrowing worms (polychates), clams (bivalves), commercial scallops, were present, along with epibiota such as, sponges, bryozoans, ascidians and branching soft corals (CEE, 2024).

Further ROV surveys at an offshore oil and gas structure in Bass Strait recorded:

- Crustaceans, including the southern rock lobsters, shore and hermit crabs.
- Cephalopods, such as the Maori octopus (*Macroctopus maorum*), calamari squid and the giant cuttle fish (*Ascarosepion apama*).
- Echinoderms, including sea urchins and sea stars.
- Gastropods, including spindle shells and whelks.
- Sponges, bivalves (scallops and oysters), sea cucumbers, sea pens and feather stars (Sih et al., 2022).

According to DPIPWE (2020), surveys of the benthic biota in Tasmania's offshore marine ecosystems have been limited. However, unvegetated soft sediments (sand, mud and unconsolidated substrates) are the dominant feature of subtidal marine environment in Tasmania, comprising around 75% of the seabed in nearshore areas (Parsons, 2011). The apparently barren appearance of these areas is deceptive and hides a diversity of life, as well as important nursery habitats and rare species limited to Tasmanian waters. There are few places to hide, so many species living on sand and mud have developed special mechanisms for protection, such as camouflage or being adept at quickly burrowing into the sediment, such as the spotted flounder (*Ammoteris lituratus*) and girdled goby (*Nesogobius maccullochi*) (Parsons, 2011). These sediments generally have a lower productivity than seagrass and macroalgal beds (such as those found in abundance off the west coast of Flinders Island) due to the

absence of large photosynthesising plants and algae, however they are often rich in small invertebrates that live on microscopic algae, bacteria and food particles in the passing water. These in turn provide food for larger surface dwelling and burrowing invertebrates, which in Tasmanian waters are dominated by crustaceans, polychaete worms, gastropods and bivalve molluscs (Parsons, 2011).

5.6.1.2 EMBA

The images shown in Plate 3.4 indicate that the offshore RGP has been colonised by a diverse range of marine invertebrates, including sponges, corals, anemones and sea pens, which provides hard substrate habitat for species such as crustaceans (e.g., crabs) in a habitat otherwise largely devoid of such substrates.

The PMST results do not identify any benthic species within the EMBA. However, the Bunurong MNP, located 25 km southwest of the BassGas pipeline near Kilcunda in Victorian state waters, has extensive intertidal rock platforms that exhibit a diverse range of marine life. The subtidal rocky reefs include numerous microhabitats extending several kilometres offshore in relatively shallow water (Parks Victoria, 2006a).

The diversity of intertidal and shallow subtidal invertebrate fauna is the highest recorded in Victoria on sandstone. A high proportion of the common invertebrates occurring along the Victorian coast are found in the Bunurong MNP (Parks Victoria, 2006a), for example:

- Seven of the eight species of brittle stars.
- Nine of 11 sea cucumbers.
- Eight of 11 barnacles.
- All five sea anemones.
- 15 of 20 chitons.

The reefs in the Bunurong MNP are unique in terms of habitat forming species in contrast to other reefs of Victoria. For example, crayweed, a large brown seaweed present in many Victorian reefs, is mostly absent here. Seaweed species richness within the Bunurong MNP is comparatively high and includes green, brown and encrusting coralline red algal species, as well as blue-green algae (cyanobacteria) (Parks Victoria, 2006a).

The subtidal marine flora of the area is characterised by a mixed group of brown, red and green algae, as well as the seagrass species, *Amphibolis antarctica*. Invertebrates found in the subtidal zone include limpets, barnacles, blacklip abalone, crabs, seastars, urchins, feather stars and brittle stars, sea snails and small crustaceans (Parks Victoria, 2006a).

The Point Hicks MNP, located 371 km northeast of Yolla-A, features a diverse assemblage of sessile invertebrates that inhabit its subtidal reef areas including sponges, bryozoans, corals, gorgonians and octocorals (Parks Victoria, 2006c). Within the holdfasts of the marine flora present in and around the park, a rich assemblage of bryozoans, hydroids, sponges and ascidians has been recorded. Large invertebrates including sea stars, ophiuroids, crinoids, gastropods, fan worms and nudibranchs are also present.

5.6.2 Plankton

Plankton is a key component in oceanic food webs and comprises two functional groups; phytoplankton and zooplankton, as described herein.

Phytoplankton (photosynthetic microalgae) comprise 13 divisions of mainly microscopic algae, including diatoms, dinoflagellates, gold-brown flagellates, green flagellates and cyanobacteria (McLeay et al., 2003).

Phytoplankton drift with the currents, although some species have the ability to migrate short distances through the water column. Phytoplankton biomass is greatest at the extremities of Bass Strait (particularly in the northeast) where water is shallow and nutrient levels are high (Gibbs et al., 1991).

Zooplankton is the faunal group of plankton, comprising small crustaceans (such as krill), fish eggs and fish larvae. Zooplankton includes species that drift with the currents and those that are motile. More than 170 species of zooplankton have been recorded in eastern and central Bass Strait, with copepods making up approximately half of the species (Watson & Chaloupka, 1982). The high diversity may be due to considerable intermingling of distinctive water bodies and may be higher in eastern than in western Bass Strait. Although a high diversity of zooplankton has been recorded, Kimmerer and McKinnon (1984) found that seven dominant species make up 80% of individuals.

A marine seismic survey undertaken in early 2018, the CarbonNet Project commissioned plankton sampling across nine sites in shallow waters off Golden Beach, Gippsland (227 km to the northeast of Yolla-A). The results of this work (CarbonNet, 2018) found that:

- The composition of zooplankton was a typical healthy example of those expected for temperate coastal waters; and
- Copepods were the dominant group, with varying proportions of appendicularians, cladocerans and doliolids. Numerous other groups occurred in small numbers, including siphonophores, fish larvae, fish eggs, polychaetes, ghost shrimps and cnidarians (jellies).

Although this work was undertaken to the northeast of the BassGas development, it is likely that a similar plankton assemblage would occur in the EMBA given the well-mixed nature of Bass Strait waters.

5.6.3 Marine Flora

The EPBC PMST identified no marine flora in the EMBA. The Marine Brown Algae (*Nereia lophocladia*) is listed as endangered as of February 2026, however the closest recorded habitat is located approximately 100 km south of the EMBA in a small area located adjacent to the Rocky Cape National Park and is therefore not described here.

Literature searches indicate there is a paucity of public information regarding the distribution and abundance of marine flora in Bass Strait, particularly in relation to the deeper water of the operational area and EMBA.

There are VBA occurrences of marine flora including a mix of brown (*Acrocarpia paniculata*, *Carpoglossum confluens* and *Cystophora monilifera*), red (*Hypnea ramentacea*, *Melanthalia concinna*

and *Phacelocarpus peperocarpus*) and green algae (*Caulerpa brownii*, *Caulerpa flexilis* and *Caulerpa geminata*). The subtidal and intertidal rocky reefs of Bass Strait, located closer to the shoreline of Victoria and Tasmania, are understood to have a high diversity of plant and algal species, including seagrasses and macroalgae. In sheltered parts of bays, inlets and estuaries, (such as those found in Western Port Bay or on the west coast of Flinders Island) seagrasses establish extensive underwater meadows that are critical habitat in the early life stages of many fish species. Seagrasses trap sediment which improves water quality and increases the photosynthetic rates via enhanced sunlight, therefore increasing productivity in seagrass meadows (DELWP, 2017).

Variation among rocky reefs such as the level of wave exposure, rock type, weathering and structural complexity (rock pools, crevices and boulders) determine the composition of marine fauna. In the nearshore environment, seaweed forests are made up of a large brown kelp. In these environments, algae attach themselves to solid structures and extend their blades into the waters reaching toward the sunlight. Together the algae form a dense canopy of blades that block out light and shade the surface of the substrate, allowing smaller species of algae to form. The kelp species typically populating these forests include giant kelp (*Macrocystis pyrifera*) and bull kelp (*Durvillea potatorum*). Common/golden kelp (*Ecklonia radiata*) and crayweed (*Phyllospora comosa*) are found along the open coast in dense stands (Parks Victoria, 2006c).

5.6.4 Birds

The EPBC PMST identified 88 bird species that utilise the marine environment as threatened or migratory whose habitat or migratory path may occur within the EMBA (listed in Table 5.11). These primarily comprise 15 albatross, eight petrels, three parrots, three shearwaters, two godwits, four terns, one swift, two curlew, one prion, four snipes, three gulls, six plovers, two tattlers and eight sandpipers. Four of these bird species are listed as critically endangered, ten are endangered and 32 are listed as vulnerable.

Table 5.10 includes the BIAs that overlap the operational area and EMBA noting that the little penguin and white-faced storm-petrel reproduction BIAs were identified by the PMST search but do not overlap the operational area or EMBA and not discussed further.

Table 5.10. BIAs of bird species overlapping the operational area and EMBA

Scientific name	Common name	BIA	Overlap with the operational area	Overlap with the EMBA
Thalassarche cauta	Shy albatross	Foraging	0.012%	1.18%
Diomedea exulans (sensu lato)	Wandering albatross	Foraging	0.012%	1.02%
Thalassarche bulleri	Buller's albatross	Foraging	0.02%	1.72%
Thalassarche carteri	Indian yellow-nosed albatross	Foraging	0.013%	1.15%
Thalassarche impavida	Campbell albatross	Foraging	0.008%	0.723%
Thalassarche melanophris	Black-browed albatross	Foraging	0.008%	0.723%
Ardenna tenuirostris	Short-tailed shearwater	Foraging	0.59%	5.59%
Eudyptula minor	Little penguin	Foraging	No overlap	1.27%

Pelagodroma marina	White-faced storm-petrel	Foraging	0.047%	4.83%
Pelecanoides urinatrix	Common diving petrel	Foraging	0.033%	3.22%

The Australian gull-billed tern (*Gelochelidon macrotarsa*) was not listed in the EPBC PMST, however, is a marine species and is listed as endangered by the FFG and therefore has been included in Table 5.11. Similarly, the Little egret (*Egretta garzetta*), Caspian tern (*Hydroprogne caspia*) and the Australasian shoveler (*Spatula rhynchotis*) are listed as vulnerable by the FFG and are included in Table 5.11.

Many of the bird species listed in Table 5.11 are protected by international agreements (Bonn Convention, JAMBA, CAMBA and ROKAMBA) and periodically pass through Bass Strait to and from the Bass Strait islands, mainland Victoria and Tasmania (DAFF, 2020b).

Table 5.11: EPBC Act-listed and FFG Act-listed marine bird species that may occur within the operational area and EMBA

Scientific name	Common name	Listed migratory species	Presence in EMBA	BIA within the EMBA	FFG Act status
EPBC Act-listed critically endangered species					
Calidris ferruginea	Curlew sandpiper	Yes	Likely	-	Critically Endangered
Lathamus discolor	Swift parrot	-	Likely	-	Critically Endangered
Neophema chrysogaster	Orange-bellied parrot	-	Likely	-	Critically Endangered
Numenius madagascariensis	Eastern curlew	Yes	Likely	-	Critically Endangered
EPBC Act-listed endangered species					
Botaurus poiciloptilus	Australasian Bittern	-	Likely	-	Critically Endangered
Charadrius mongolus	Lesser sand plover	Yes	Likely	-	Endangered
Diomedea sanfordi	Northern royal albatross	Yes	Likely	-	-
Limosa limosa	Black-tailed godwit	Yes	Likely	-	Endangered
Macronectes giganteus	Southern giant petrel	Yes	Likely	-	Endangered
Rostratula australis	Australian painted snipe	-	Likely	-	Critically Endangered
Pterodroma leucoptera leucoptera	Gould's petrel	-	May	-	-
Thalassarche cauta	Shy albatross	Yes	Likely	Foraging	Endangered
Thalassarche chrysostoma	Grey-headed albatross	Yes	May	-	Endangered
Tringa nebularia	Common greenshank	Yes	Likely	-	Endangered
EPBC Act-listed vulnerable species					

Scientific name	Common name	Listed migratory species	Presence in EMBA	BIA within the EMBA	FFG Act status
Actitis hypoleucos	Common sandpiper	Yes	Likely	-	Vulnerable
Ardenna grisea	Sooty shearwater	Yes	May	-	Vulnerable
Arenaria interpres	Ruddy turnstone	Yes	Likely	-	Vulnerable
Calidris acuminata	Sharp-tailed sandpiper	Yes	Likely	-	Vulnerable
Calidris tenuirostris	Great knot	Yes	Likely	-	Vulnerable
Calidris canutus	Red knot	Yes	Likely	-	Vulnerable
Charadrius leschenaultii	Greater sand plover	Yes	Likely	-	Vulnerable
Diomedea antipodensis	Antipodean albatross	Yes	Likely	-	-
Diomedea antipodensis gibsoni	Gibson's albatross	Yes	Likely	-	-
Diomedea exulans (sensu lato)	Wandering albatross	Yes	Likely	Foraging	Critically Endangered
Diomedea epomophora (sensu stricto)	Southern royal albatross	Yes	Likely	-	Critically Endangered
Fregetta grallaria grallaria	White-bellied storm-Petrel	-	Likely	-	-
Gallinago hardwickii	Latham's snipe	Yes	Likely	-	Vulnerable
Halobaena caerulea	Blue petrel	-	May	-	-
Hirundapus caudacutus	White-throated needletail	Yes	Likely	-	Vulnerable
Macronectes halli	Northern giant petrel	Yes	Likely	-	Endangered
Pachyptila turtur subantarctica	Fairy prion (southern)	-	Likely	-	-
Phoebetria fusca	Sooty albatross	Yes	Likely	-	Critically Endangered
Pluvialis squatarola	Grey plover	Yes	Likely	-	Vulnerable

Scientific name	Common name	Listed migratory species	Presence in EMBA	BIA within the EMBA	FFG Act status
Pterodroma mollis	Soft-plumaged petrel	-	May	-	-
Neophema chrysostoma	Blue-winged parrot	-	Likely	-	Vulnerable
Thalassarche bulleri	Buller's albatross	Yes	May	Foraging	Endangered
Thalassarche bulleri platei	Northern Buller's Albatross	-	May	-	-
Thalassarche carteri	Indian yellow-nosed albatross	Yes	Likely	Foraging	Endangered
Thalassarche impavida	Campbell albatross	Yes	Likely	Foraging	-
Thalassarche melanophris	Black-browed albatross	Yes	Likely	Foraging	-
Thalassarche salvini	Salvin's albatross	Yes	Likely	-	-
Thalassarche steadi	White-capped albatross	Yes	Likely	-	-
Thinornis cucullatus cucullatus	Eastern hooded plover	-	Likely	-	Vulnerable
Sternula albifrons	Little tern	Yes	May	-	Critically endangered
Sternula nereis nereis	Australian fairy tern	-	Known	-	Critically endangered
Xenus cinereus	Terek sandpiper	Yes	Likely	-	Vulnerable
EPBC Act-listed not threatened species					
Apus pacificus	Fork-tailed swift	Yes	Likely	-	-
Ardenna tenuirostris	Short-tailed shearwater	Yes	Likely	Reproduction and foraging	-
Ardenna carneipes	Flesh-footed shearwater	Yes	Likely	-	-
Bubulcus ibis	Cattle egret	-	May	-	-
Calidris alba	Sanderling	Yes	Likely	-	-

Scientific name	Common name	Listed migratory species	Presence in EMBA	BIA within the EMBA	FFG Act status
Calidris melanotos	Pectoral sandpiper	Yes	Likely	-	-
Calidris ruficollis	Red-necked stint	Yes	Likely	-	-
Charadrius ruficapillus	Red-capped plover	-	Likely	-	-
Chroicocephalus novaehollandiae	Silver gull	-	Likely	-	-
Eudyptula minor	Little penguin	-	Likely	Reproduction and foraging	-
Gallinago megala	Swinhoes snipe	Yes	Likely	-	-
Gallinago stenura	Pin-tailed snipe	Yes	Likely	-	-
Haliaeetus leucogaster	White-bellied sea-eagle	-	Likely	-	Endangered
Himantopus Himantopus	Pied stilt	-	Likely	-	-
Larus dominicanus	Kelp gull	-	Likely	-	-
Larus pacificus	Pacific gull	-	Likely	-	-
Limicola falcinellus	Broad-billed sandpiper	Yes	Likely	-	-
Limosa lapponica baueri	Bar-tailed godwit	Yes	Likely	-	Endangered
Merops ornatus	Rainbow bee-eater	-	May	-	-
Myiagra cyanoleuca	Satin flycatcher	-	Likely	-	-
Monarcha melanopsis	Black-faced monarch	-	May	-	-
Motacilla flava	Yellow wagtail	Yes	May	-	-
Numenius minutus	Little curlew	Yes	Likely	-	-
Numenius phaeopus	Whimbrel	Yes	Likely	-	Endangered
Pandion haliaetus	Osprey	Yes	Likely	-	-
Phalacrocorax fuscescens	Black-faced cormorant	Yes	Likely	-	-

Scientific name	Common name	Listed migratory species	Presence in EMBA	BIA within the EMBA	FFG Act status
Pelagodroma marina	White-faced storm-petrel	-	Known	Foraging	Endangered
Pelecanoides urinatrix	Common diving petrel	-	Likely	Foraging	-
Pluvialis fulva	Pacific golden plover	Yes	Likely	-	Vulnerable
Recurvirostra novaehollandiae	Red-necked avocet	-	Likely	-	-
Rhipidura rufifrons	Rufous fantail	-	Likely	-	-
Sterna striata	White-fronted tern	-	Likely	-	-
Stercorarius antarcticus	Brown skua	-	May	-	-
Thalasseus bergii	Greater crested tern	Yes	Likely	-	-
Tringa glareola	Wood sandpiper	Yes	Likely	-	Endangered
Tringa brevipes	Grey-tailed tattler	Yes	Likely	-	Critically Endangered
Tringa incana	Wandering tattler	Yes	Likely	-	-
Tringa stagnatilis	Marsh sandpiper	Yes	Likely	-	Endangered
FFG Act-listed only species					
Egretta garzetta	Little Egret	-	-	-	Vulnerable
Gelochelidon macrotarsa	Australian Gull-billed Tern	-	-	-	Endangered
Hydroprogne caspia	Caspian Tern	-	-	-	Vulnerable
Spatula rhynchotis	Australasian Shoveler	-	-	-	Vulnerable

5.6.4.1 Albatross and Petrels

The PMST report detected 15 albatross and eight petrel species (shown in Table 5.11) that have the potential to occur within the operational area and EMBA. Table 5.10 lists the detected BIAs by the PMST that overlap the operational area and EMBA and shown in Table 5.10, Figure 5.16, Figure 5.17, Figure 5.18 and Figure 5.19.

Albatrosses and petrels are mostly surface capturing, pelagic predators that feed on live and dying prey. Their ability to dive varies across species and involves either surface plunge dives or shallow dives to catch prey (generally less than 15 m deep). Both bird groups are wide-ranging opportunistic predators, where individuals will forage singly and will then aggregate in larger numbers where there is a rich food source. Some species forage during the day, while some forage during the night (often by moonlight) (CoA, 2022).

Albatross and petrels have a diverse diet, depending on the availability of food, including cephalopods, crustaceans, cyclostomes, fish, and tunicates, although diet is not well known for several species. Both species have a tendency to follow fishing vessels. Competition for fishers' discards and baited hooks can be intense with smaller birds subject to secondary attacks by other larger birds (CoA, 2022).

Albatross and petrel species occurring in Australia's jurisdiction predominantly breed on remote, offshore islands in the higher latitudes, to which both species are extremely site faithful. None of the remote offshore islands listed in the National Recovery Plan for Albatrosses and Petrels (CoA, 2022) as 'habitat that is potentially critical to the survival of albatrosses and petrels in Australia' are within the planning area or in close proximity. Due to their extensive ranges and the presence of BIAs, albatross and petrel species have the potential to occur within the EMBA.

5.6.4.2 Shearwaters

Shearwaters are medium-sized long-winged seabirds most common in temperate and cold waters. They come to islands and coastal cliffs to breed, nesting in burrows and laying a single white egg. Shearwaters feed on small fish, cephalopod molluscs (squid, cuttlefish, nautilus and argonauts), crustaceans (barnacles and shrimp), and other soft-bodied invertebrates and offal. These species forage almost entirely at sea and very rarely on land. (TSSC, 2014)

The three EPBC Act-listed species; sooty (*Ardenna grisea*), flesh-footed (*Ardenna carneipes*) and short-tailed shearwaters (*Ardenna tenuirostris*) are trans-equatorial migrants that cross the Pacific Ocean for the Northern Hemisphere summer (TSSC, 2014). The PMST report detected the short-tailed shearwater BIA within the planning area shown in Table 5.10 and Figure 5.20. It is possible these species may overfly the EMBA. Of the three species, the short-tailed shearwater is most likely to be encountered in the EMBA due to the presence of foraging and reproduction BIAs within the EMBA and proximity of breeding locations among the Furneaux Group (Flinders Island, etc).

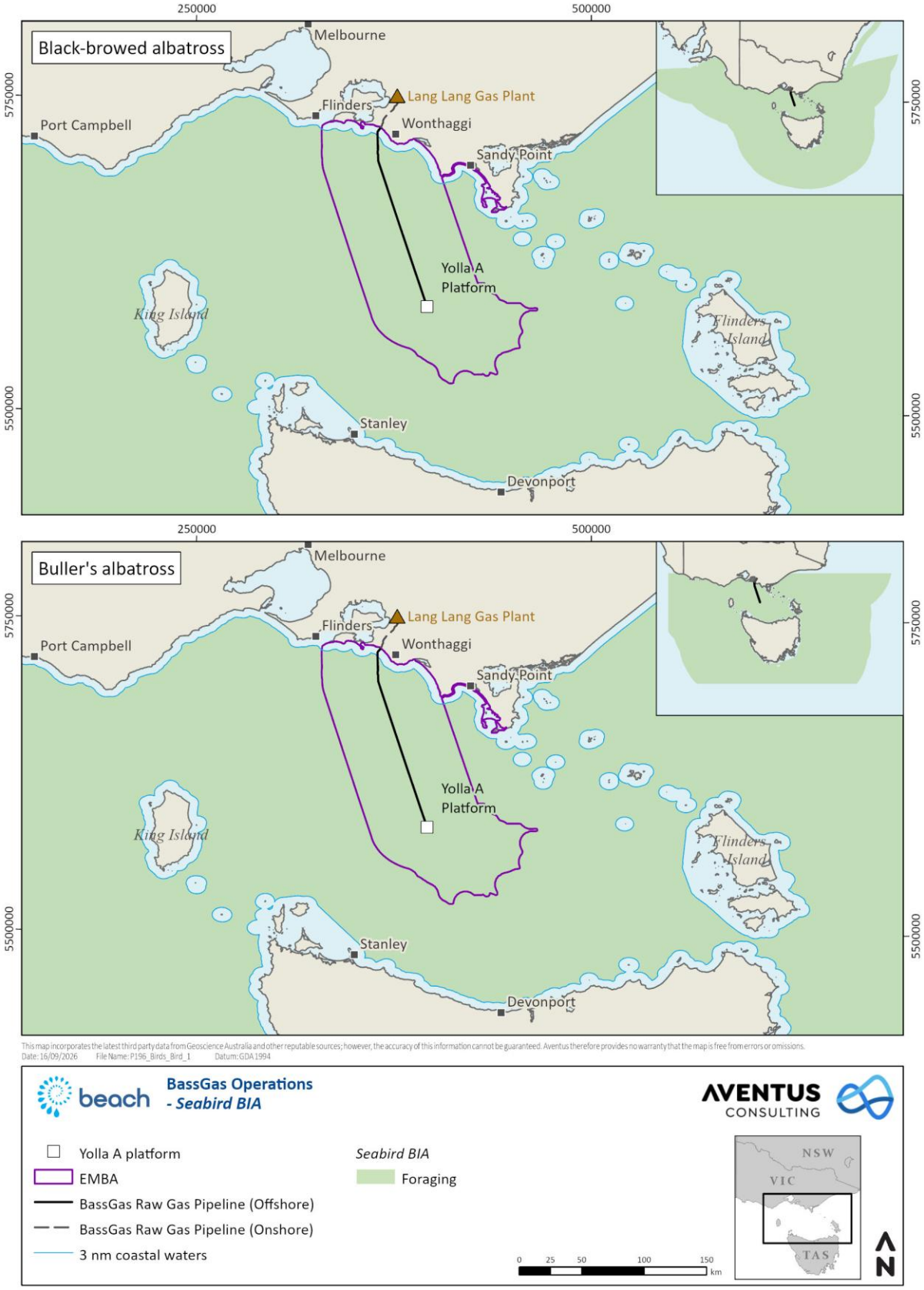


Figure 5.16. Foraging BIAs of the black-browed and Buller's albatross overlapping the operational area and the EMBA.

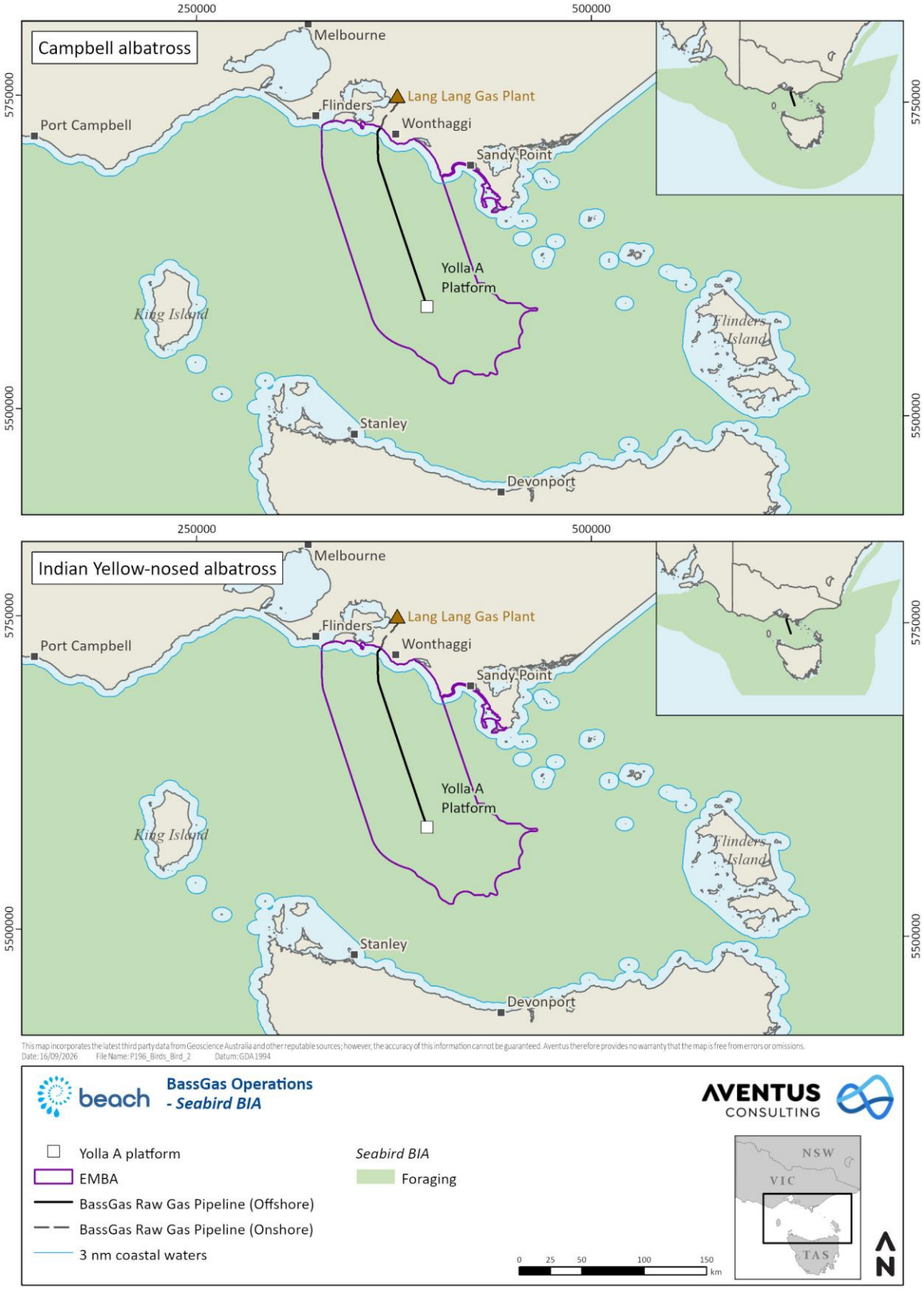


Figure 5.17. Foraging BIAs for the Campbell and Indian yellow-nosed albatross overlapping the operational area and the EMBA.

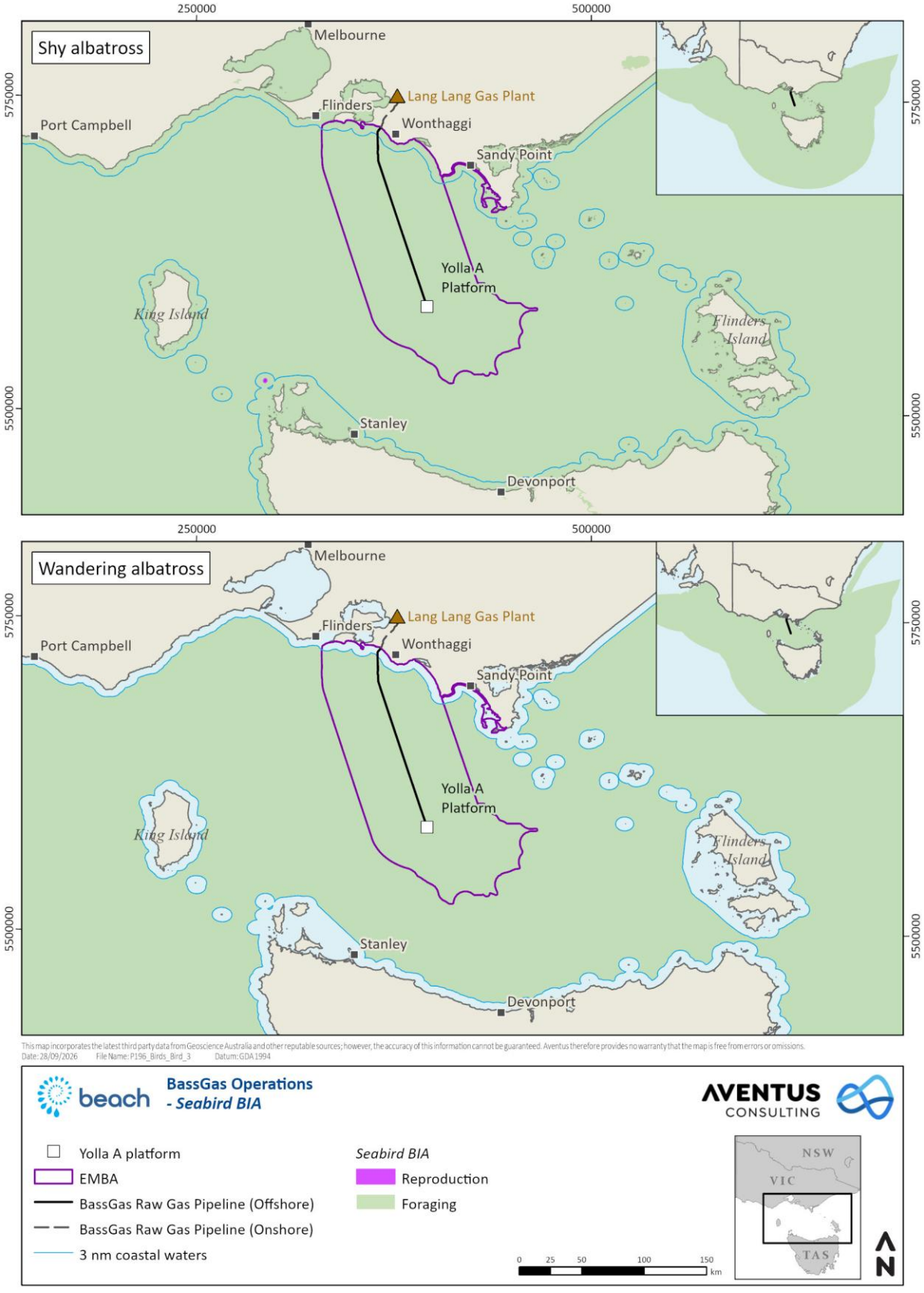


Figure 5.18. Foraging BIAs of the shy and wandering albatross overlapping the operational area and the EMBA.

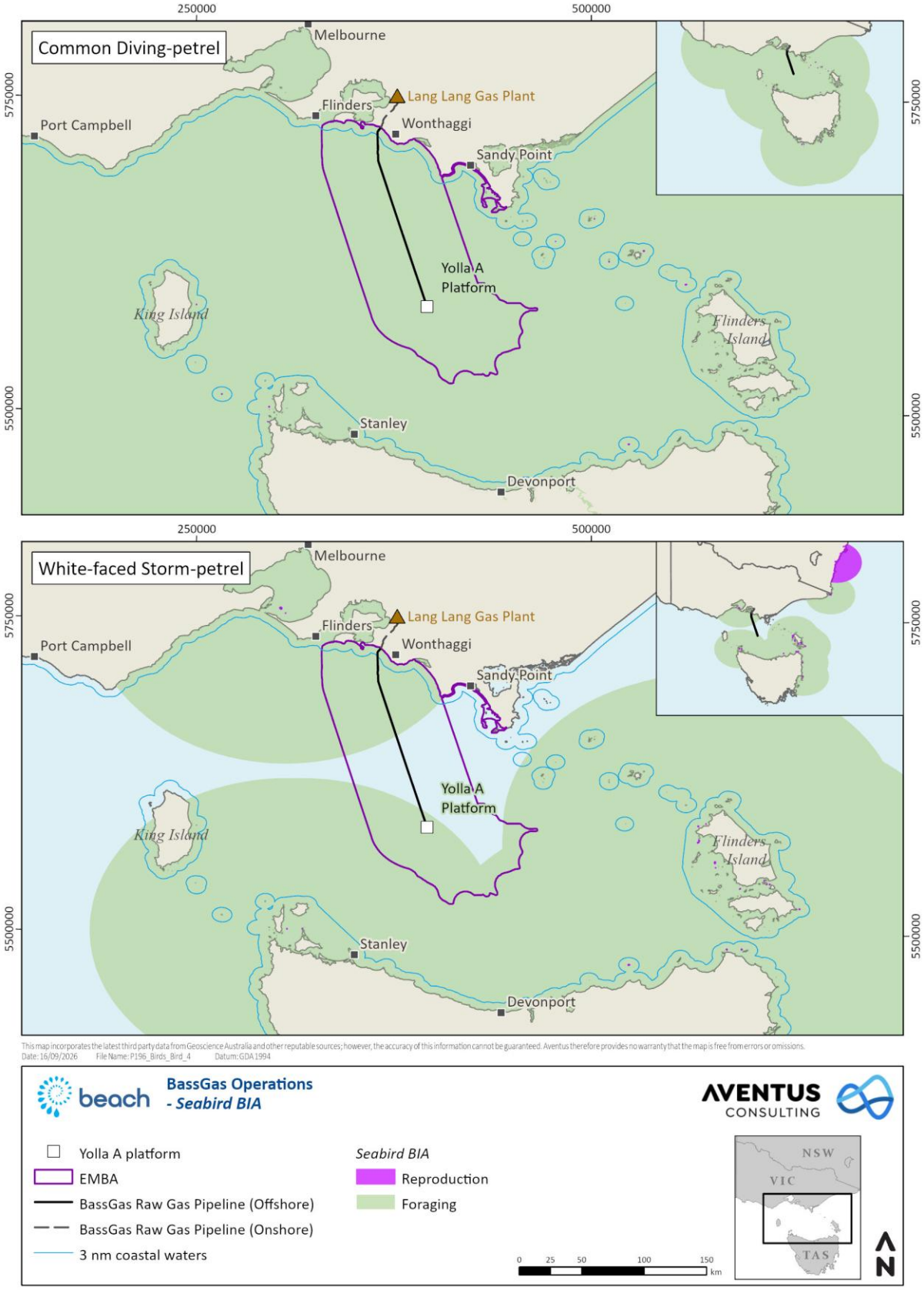


Figure 5.19. Foraging BIAs of the common diving and white-faced storm petrel overlapping the operational area and the EMBA.

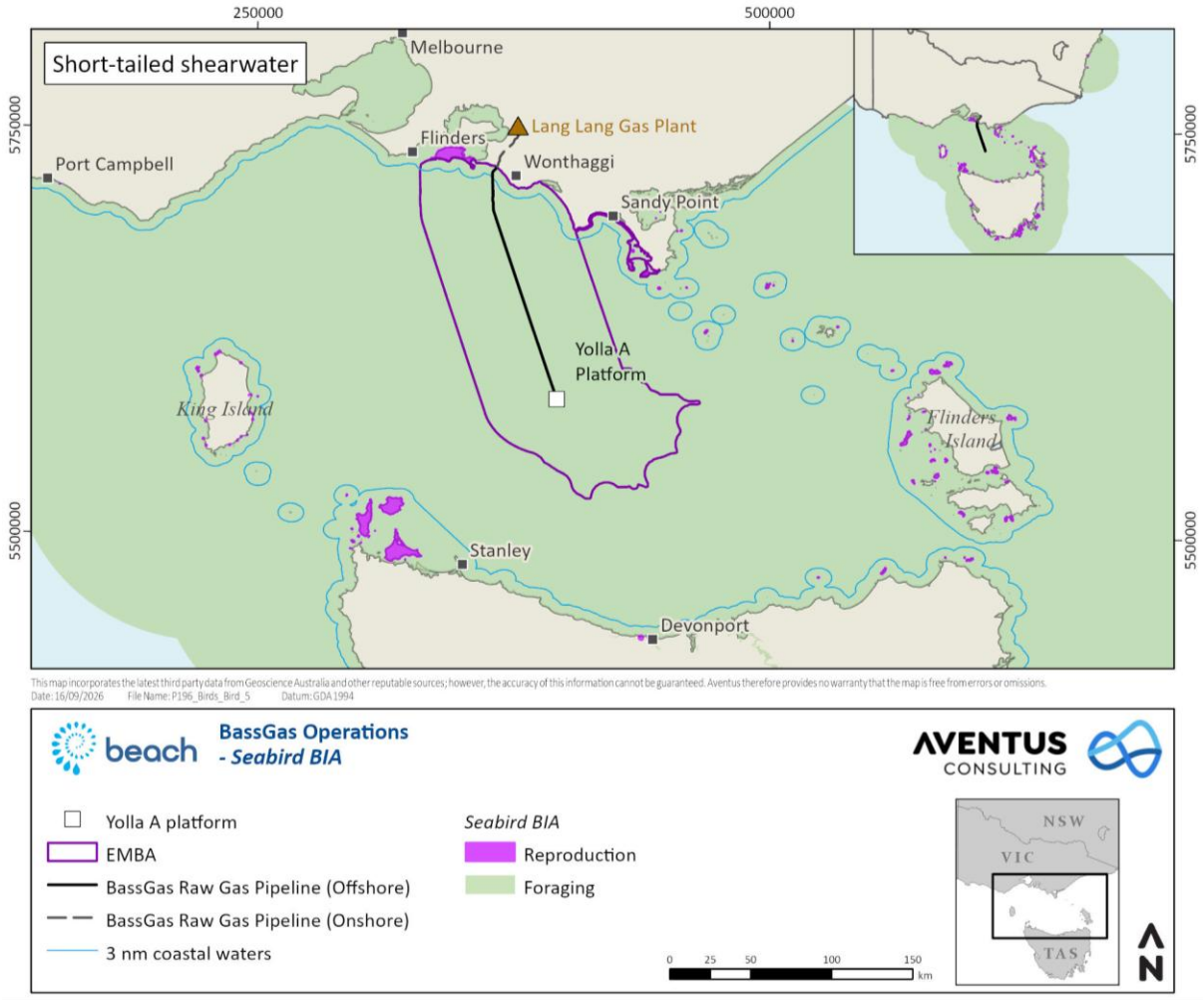


Figure 5.20. Foraging BIA of the short-tailed shearwater overlapping the operational area and the EMBA.

5.6.4.3 Other Seabirds

Other seabirds listed in the PMST that may occur within the operational area and the EMBA are described here.

- The eastern osprey (*Pandion haliaetus*) is listed as migratory on the EPBC Act and is a common, medium-sized raptor that is present around the entire Australian coastline, with the breeding range restricted to the north coast of Australia (including many offshore islands) and an isolated breeding population in South Australia (DAFF, 2020b). Breeding occurs from February to April. Ospreys occur mostly in coastal areas but occasionally travel inland along waterways, where they feed on fish, molluscs, crustaceans, reptiles, birds and mammals. They are mostly resident or sedentary around breeding territories, and forage more widely and make intermittent visits to their breeding grounds in the non-breeding season (BirdLife Australia, 2019). Due to their broad habitat, osprey may be present in the EMBA.

- The southern fairy prion (*Pachyptila turtur subantarctica*) is listed as vulnerable and mainly found offshore. The species' diet is comprised mostly of crustaceans (especially krill), though occasionally includes some fish and squid. It feeds mainly by surface-seizing and dipping but can also catch prey by surface-plunging or pattering (TSSC, 2015a). In Australia, it is known to breed only on

Macquarie Island (1,910 km southeast of Yolla-A), and on the nearby Bishop and Clerk islands (TSSC, 2015a).

- The white-bellied sea eagle (*Haliaeetus leucogaster*) is distributed along the coastline in coastal lowlands with breeding from Queensland to Victoria in coastal habitats and terrestrial wetlands in temperate regions (DAFF, 2020b). The breeding season is from June to January, with nests built in tall trees, bushes, cliffs or rock outcrops. Breeding pairs are generally widely dispersed. The species forages over open water (coastal and terrestrial) and feeds on fish, birds, reptiles, mammals and crustaceans and normally launches into a glide to snatch its prey, usually with one foot, from the ground or water surface (BirdLife Australia, 2019). The species is widespread and makes long-distance movements. This species may be present along the coastlines adjacent to the EMBA.

5.6.4.4 Terns

There are four EPBC Act-listed tern species that may occur within the EMBA (Fairy (*Sternula nereis nereis*), little (*Sterna (Sternula) albifrons*), white- fronted (*Sterna striata*) and crested tern (*Thalasseus bergii*)). Many of the tern species present along the southern Australian coastline are widespread and occupy beach, wetland, grassland and beach habitats. Terns rarely swim; they hunt for prey in flight, dipping to the water surface or plunge-diving for prey usually small baitfish in coastal waters and typically close to land (DSEWPaC, 2011b).

The National Conservation Values Atlas (NCVA) (DAFF, 2020c) indicates that the foraging BIA for the fairy tern (listed as vulnerable under the EPBC Act and critically endangered under the FFG Act) occur in and offshore of the gulfs of South Australia. They are also known to breed on the offshore islands and coast of Spencer Gulf (Edyvane, 1999). Flegg (2002) reports that the species is widespread on southern and western Australian coasts, and breeds on coastal beaches and islands.

There are three subpopulations of little tern in Australia, with the south-eastern population (occurring within the EMBA. Population estimations for the south-eastern population remain uncertain, however, the combined subpopulations for the little tern (listed as migratory and marine under the EPBC Act) has an estimated population of 2,700 mature individuals (DAFF, 2020b; DEECA, 2022). It is a migratory species that breeds in eastern Australia during spring and summer, leaving the colonies in late summer-autumn and vacating southern Australia (BirdLife Australia, 2019). In eastern Australia, breeding normally occurs within wetland areas. Little terns inhabit sheltered coastal environments, including lagoons, estuaries, river mouths, lakes and exposed ocean beaches (BirdLife Australia, 2019). Near the EMBA, habitat for this species occurs at the Gippsland Lakes, Corner Inlet and Western Port Bay (BirdLife Australia, 2019). Little terns feed on small fish, crustaceans, insects and molluscs by plunging in shallow water or gleaning from the water surface. The little tern may occur within the EMBA.

The crested tern is widely distributed around the coast of Australia and breeds on offshore islands in nests densely packed together. The crested tern lives along the coast of ocean beaches and in coastal lagoons. The species rarely flies far from shore out to sea or inland. It flies above the water in search of prey on the surface before plunging down to take small fish from the surface (BirdLife Australia, 2019). Due to its known distribution in Bass Strait, it is likely that the crested tern will be present in the EMBA.

5.6.4.5 Knots

The red knot (*Calidris canutus*) and great knot (*Calidris tenuirostris*) are the only two EPBC Act-listed species of knot that may occur within the EMBA. These species have a coastal distribution around the entire Australian coastline when they are present during the southern hemisphere summer (breeding in eastern Siberia in the northern hemisphere summer). Knots are a medium-sized wader that prefer sandy beach, tidal mudflats and estuary habitats, where they feed on bivalve molluscs, snails, worms and crustaceans (BirdLife Australia, 2019). Lake Reeve has supported the largest concentration (5,000) of red knot (*Calidris canutus*) recorded in Victoria. Knots may be present along shorelines of the EMBA.

5.6.4.6 Sandpipers

There are eight EPBC Act-listed sandpiper species (common (*Actitis hypoleucos*), sharp-tailed (*Calidris acuminata*), curlew (*Calidris ferruginea*), pectoral (*Calidris melanotos*), wood (*Tringa glareola*), broad-billed (*Limicola falcinellus*), marsh (*Tringa stagnatilis*), terek (*Xenus cinereus*)) that may occur within the operational area and the EMBA. They breed in Europe and Asia and migrate to Australia during the southern summer. Sandpipers are small wader species found in coastal and inland wetlands, particularly in muddy estuaries, feeding on small marine invertebrates (BirdLife Australia, 2019; DCCEEW, 2015b). Up to 3,000 sharp-tailed sandpiper and up to 1,800 curlew sandpipers are known to congregate to feed at the Gippsland Lakes. Sandpipers may be present along shorelines of the EMBA.

5.6.4.7 Swift parrot

The swift parrot (*Lathamus discolour*) is listed as endangered under the EPBC Act. During summer, it breeds in colonies in blue gum forest of south-east Tasmania. Infrequent breeding also occurs in north-west Tasmania. The entire population migrates through Bass Strait to the mainland for winter. On the mainland it disperses widely and forages on flowers and psyllid lerps in eucalypts. The birds mostly occur on inland slopes, but occasionally occur on the coast (TSSC, 2016b). The swift parrot may fly over the EMBA on its migration, however due to their habitat preferences, it is unlikely the swift parrot will spend considerable time within the EMBA.

5.6.4.8 Orange-bellied parrot

The orange-bellied parrot (*Neophema chrysogaster*) breeds in coastal south-west Tasmania during October to February and migrates north across Bass Strait via King Island to Victoria and South Australia during March and April (Government of Tasmania, 2025). The parrot's breeding habitat is restricted to southwest Tasmania, where breeding occurs from November to mid- January, mainly within 30 km of the coast (DEWLP, 2016). The species forage on the ground or in low vegetation (Brown and Wilson, 1980; DEWLP, 2016, Loyn et al., 1986).

During winter, on mainland Australia, orange-bellied parrots are found mostly within 3 km of the coast (DEECA, 2016) (Figure 5.21). In Victoria, they mostly occur in sheltered coastal habitats, such as bays, lagoons and estuaries, or, rarely, saltworks. They are also found in low samphire herbland dominated by beaded glasswort (*Sarcocornia quinqueflora*), sea heath (*Frankenia pauciflora*) or sea-blite (*Suaeda australis*), and in taller shrubland dominated by shrubby glasswort (*Sclerostegia arbuscula*).

The current breeding range occurs within 10 km of Melaleuca Lagoon, outside of the EMBA and 393 km from the Yolla-A platform. Key non-breeding habitat is known to occur around Corner Inlet in Victoria which is outside of the EMBA and 114 km from the Yolla-A platform (Figure 5.21). King Island

is known as a key location in the migration route between breeding and non-breeding sites and is located 140 km from the Yolla-A platform and outside the EMBA (DELWP, 2016).

5.6.4.9 Curlews

The two EPBC Act-listed curlews the eastern (*Numenius madagascariensis*) and little curlew (*Numenius minutus*) are medium-sized migratory birds that breed in the far north of Siberia and winters in Australasia. The eastern curlew is the world's largest shorebird and is widespread in coastal regions in the north-east and south of Australia, including Tasmania. It is commonly found on intertidal mudflats and sandflats where it uses its long beak to pick the surface and probes for crabs. Curlews are also found on sheltered coasts, especially estuaries, mangrove swamps, bays, harbours and lagoons (DCCEEW, 2015c).

The eastern curlew was amended from endangered to critically endangered in 2015 due to population decline potentially caused by wetland reclamation in some areas of Asia. In Victoria, the main strongholds are in Corner Inlet (115 km north from Yolla-A) and Western Port Bay (160 km from Yolla-A), with smaller populations in Port Phillip Bay and scattered elsewhere along the coast. Eastern curlews are found on islands in Bass Strait and along the northwest, northeast, east and southeast coasts of Tasmania. Historically, sightings have been recorded in Bass Strait and depending on the time of year, curlews may be present in the EMBA. (DCCEEW, 2015c).

The little curlew breeds in Siberia and is seen on passage through Mongolia, China, Japan, Indonesia and New Guinea. In Australia, the little curlew is a bird of coastal and inland plains of the north where it often occurs around wetlands and flooded ground. They often form large flocks, occasionally comprising thousands of birds and sometimes associate with other insectivorous migratory shorebirds. Given the little curlew is present in Queensland and the Northern Territory but not in Victoria, it is unlikely to be encountered in the operational area or the EMBA (BirdLife Australia, 2019).

5.6.4.10 Little penguin

The little penguin (*Eudyptula minor*) was identified by the PMST search as having a BIA (foraging) that is intersected by the EMBA off the south coast of Phillip Island (Figure 5.22). Little penguins attract significant tourism to the region, with the number of tourists visiting the nightly penguin parade at the Phillip Island Nature Parks near Seal Rocks in 2016-17 reported as 730,000 (PINP, 2018).

Little penguins are known to breed throughout southern Australia from Western Australia to New South Wales, including Bass Strait and Tasmania. Most little penguins stay at sea throughout autumn and winter, although some will return frequently to their burrows all year round. Little penguins breed from August to October, nesting from late September to about late October with incubation through to mid-November while chick raising occurs over the subsequent summer months (Arnould and Berlincourt, 2013; CSIRO, 2000; Gormley and Dann, 2009). Table 5.12 summarises little penguin daily and seasonal behaviour.

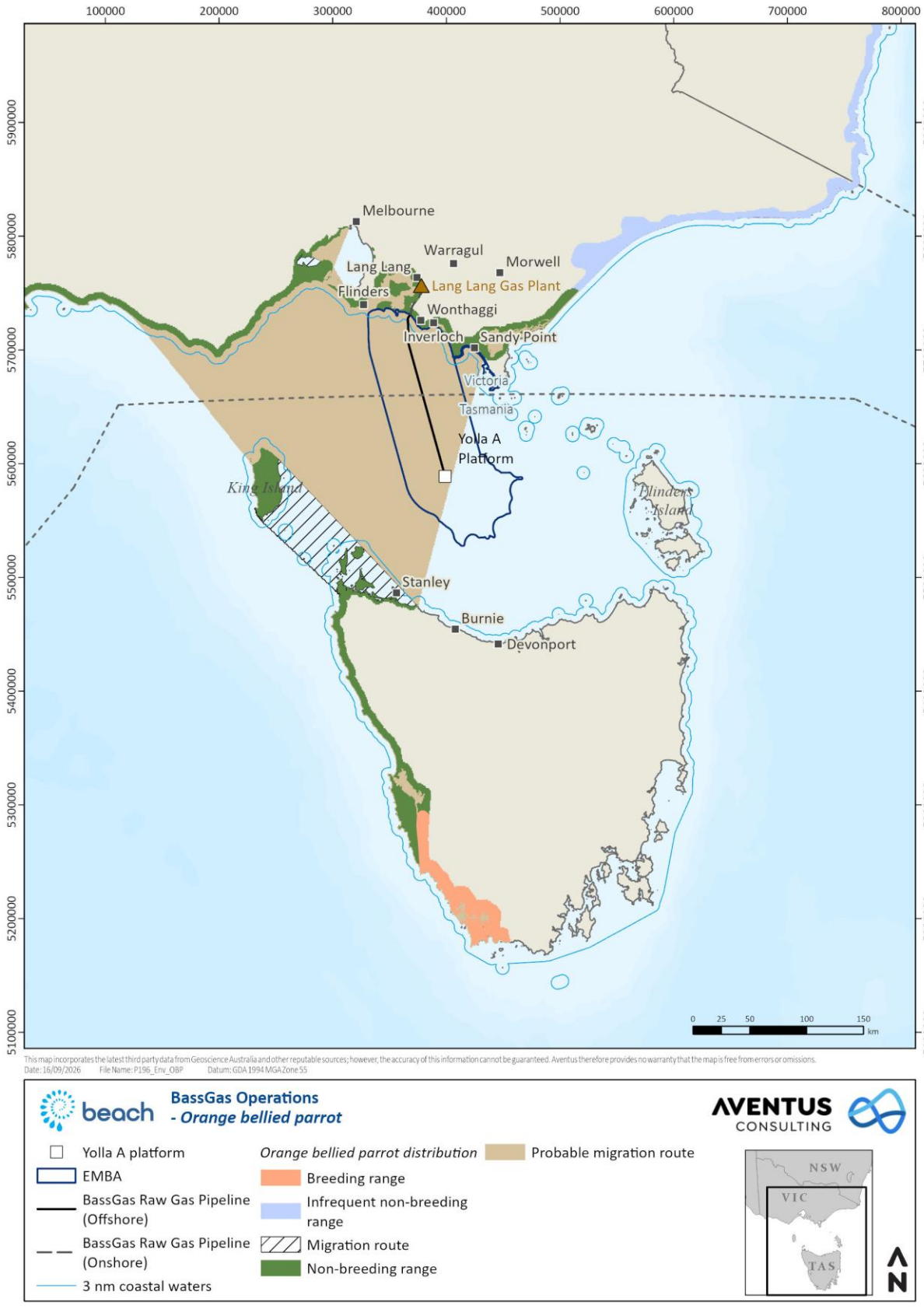


Figure 5.21. Orange bellied parrot distribution in relation to the EMBA

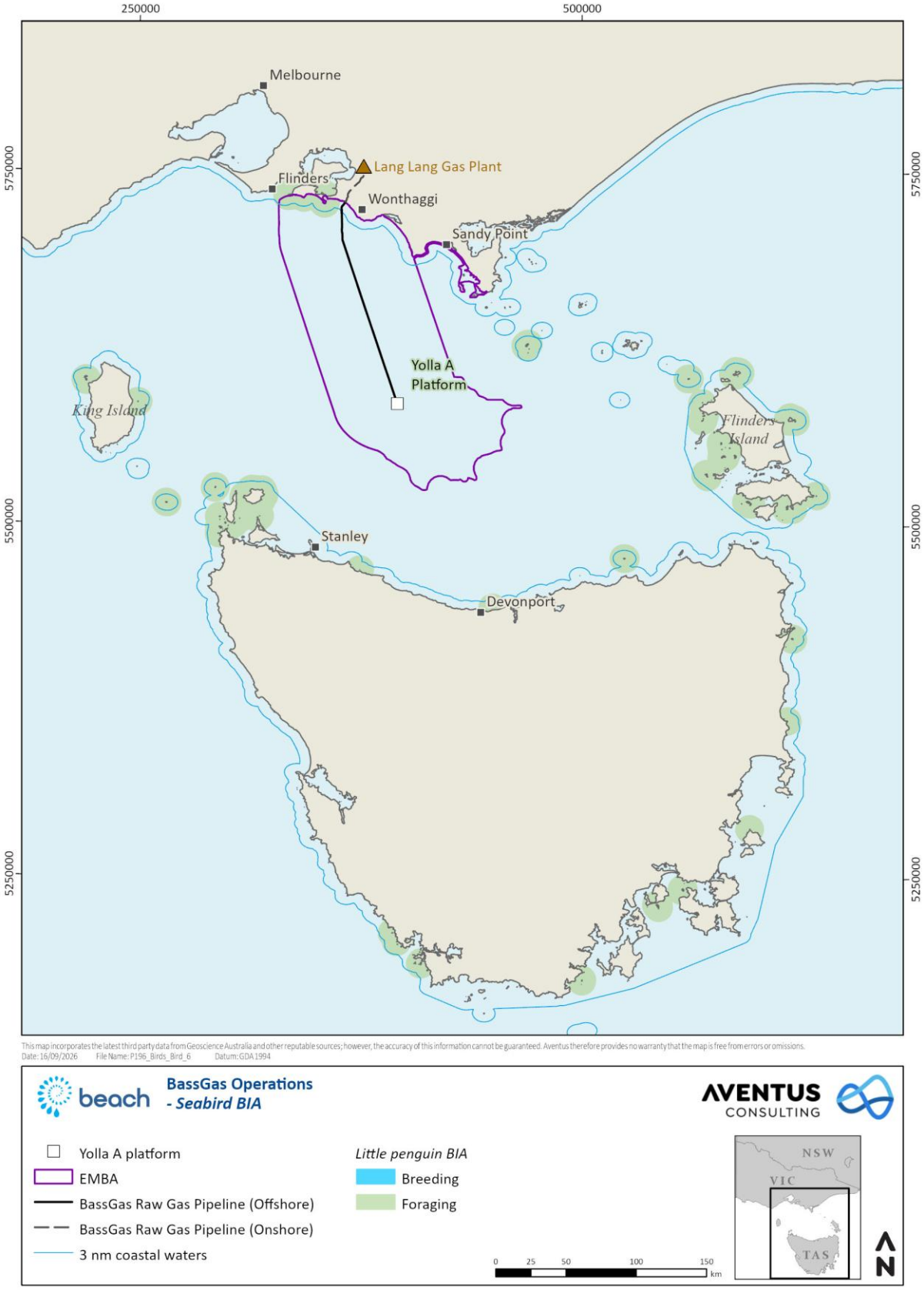


Figure 5.22. Little Penguin Breeding and Foraging BIA

Little penguins have an annual breeding cycle that results in their behaviour and activity changing considerably throughout the year. Little penguins are known to travel considerable distance during the non-breeding season and display much shorter foraging behaviour during the chick raising phase of their cycle. During the breeding period, the penguins forage close to the colonies to attend to their chicks daily. By winter the chicks have fledged and the adults have moulted and can undertake foraging trips of extended duration in order to regain the weight lost during the autumn moulting period (CSIRO, 2000; Gormley and Dann, 2009). Little penguins tracked from Phillip Island during the winter were shown to travel hundreds of kilometres and stay away from the colony for periods lasting a couple of weeks. Port Phillip Bay was heavily utilised, suggesting that this area is an important feeding ground for the little penguin (Arnould and Berlincourt, 2013).

There are many little penguin colonies along the Victorian coast and their size varies. One of Australia's largest little penguin colonies of approximately 26,000 breeding individuals exist on the Summerland Peninsula, Phillip Island (within the EMBA). There are also smaller colonies on rocky islands off Wilsons Promontory, Flinders Island and King Island (Arnould and Berlincourt, 2013).

Table 5.12: Summary of little penguin seasonal behaviour

Behaviour	Description
Residency at nesting sites	All year
Daily cycle to and from shore: Leaving Arriving	 1 - 2 hr before sunrise Majority (60%) arrive in the first 50 min of sunset, the rest within 2 hours
Feeding	Mainly small fish such as pilchards, anchovies and squid
Swimming speed	1 -4 km per hr
Diving depth	Usually less than 10 m but can dive to 70 m
Underwater time	Usually 4 - 45 seconds
Travel distance each day	15 – 50 km
Mating period	August - October
Egg laying	September - October (on Phillip Island)
Incubation period	35 days
Age when chicks go to sea	8 - 10 weeks after hatching
Moulting	Feb - April for about 17 days - birds remain onshore
Renovation of burrows and courtship	May – August, depending on food supply

5.6.5 Cetaceans

The EMBA PMST Report identified 7 whale and 8 dolphin species may reside within or migrate through the operational area and EMBA, as listed in Table 5.13. In addition to these the burrunan dolphin has been included due to its listing under the FFG. Detailed descriptions of the threatened species are provided below.

The operational area and EMBA overlap the foraging BIA for the pygmy blue whale (PBW) and the migration and reproduction BIAs for the southern right whale (SRW). The PMST reports identified foraging behaviour likely for the fin and sei whale and foraging behaviour likely to occur for the PBW. A description of threatened and migratory listed species in this section.

Figure 5.23 illustrates the presence and absence of the threatened cetacean species through the year.

Table 5.13: EPBC Act-listed and FFG Act-listed cetaceans that may occur within the operational area and EMBA

Scientific name	Common name	Listed migratory species	Presence in EMBA	BIA within the EMBA	EPBC Act status	FFG Act status
Whales						
Balaenoptera musculus	Blue whale	Yes	Likely	Foraging	Endangered	Endangered
Balaenoptera acutorostrata	Minke whale	-	May	-	-	-
Balaenoptera physalus	Fin whale	Yes	Likely	-	Vulnerable	-
Balaenoptera borealis	Sei whale	Yes	Likely	-	Vulnerable	-
Caperea marginata	Pygmy right whale	Yes	May	-	-	-
Eubalaena australis	Southern right whale	Yes	Likely	Migration and reproduction	Endangered	Endangered
Megaptera novaeangliae	Humpback whale	Yes	Known	-	-	-
Dolphins						
Delphinus delphis	Common dolphin	-	-	-	-	-
Globicephala macrorhynchus	Short-finned pilot whale	-	-	-	-	-
Grampus griseus	Risso's dolphin	-	-	-	-	-
Lagenorhynchus obscurus	Dusky dolphin	Yes	May	-	-	-
Orcinus orca	Killer whale	Yes	Likely	-	-	-
Pseudorca crassidens	False killer whale	-	Likely	-	-	-
Tursiops aduncus	Indian ocean bottlenose dolphin	-	Likely	-	-	-
Tursiops truncates	Bottlenose dolphin	-	May	-	-	-

Cetacean Species Presence	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Pygmy blue whale	Peak			Non-peak							Non-peak	Peak
Southern right whale					Non-peak	Peak				Non-peak		
Fin whale						Peak (rarely observed in Victoria)						
Sei whale	Peak (rarely observed in Victoria)										Peak (rarely observed in Victoria)	

Figure 5.23: Annual presence and absence of EPBC listed threatened cetacean species migrating through Victoria

5.6.5.1 Blue Whale

The blue whale (*Balaenoptera musculus*) is listed as an endangered and migratory species under the EPBC Act. The blue whale has four subspecies, two of which occur within Australian waters, including the Antarctic blue whale (*Balaenoptera musculus intermedia*) and the PBW (*Balaenoptera musculus brevicauda*) (Rice 1998, in Department of the Environment, 2023).

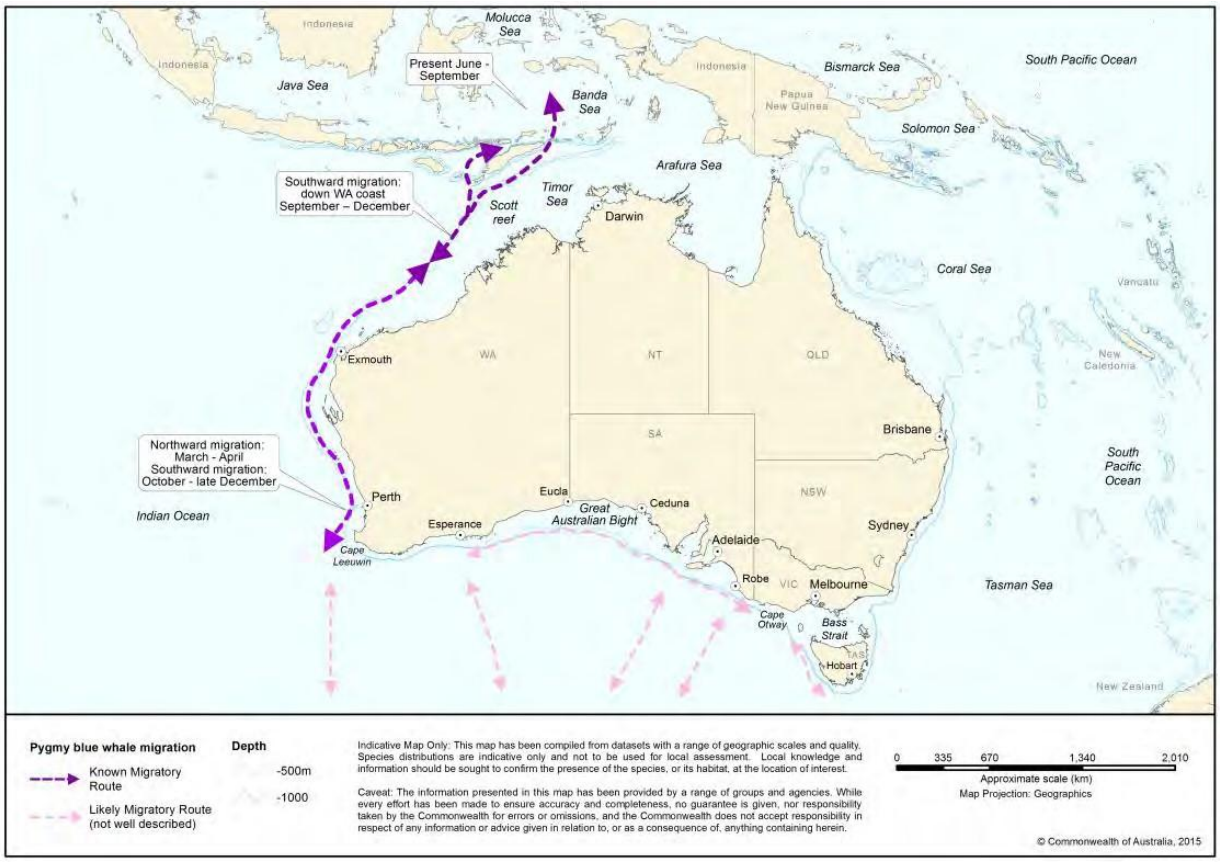
1. Migration

The CoA (2015c) states that migratory routes for PBW off the east coast of Australia are unknown (as seen by the absence of migratory routes in Figure 5.24, with migratory patterns generally involving this species travelling up the west coast of Australia to Indonesia, rather than migrating through Bass Strait and along the east coast (Barlow, Klinck, Ponirakis, Colberg, & Torres, 2023). However, PBW migration patterns are thought to be similar to those of the humpback whale, with the species feeding in mid-to high latitudes (south of Australia) during the summer months and moving to temperate/tropical waters in the winter for breeding and calving. PBW migration is oceanic and no specific migration routes have been identified in the Australasian region (CoA, 2015c).

2. Foraging

Krill is the key to understanding the ecology and behaviour of blue whales, yet little is known of its ecology. Krill is sensitive to temperature and migrates vertically and horizontally to maintain optimal positioning with respect to nutrients, often being found along thermal fronts and thermoclines. Krill abundance in a given season may be linked to oceanographic conditions of the previous year. Unlike most krill species, Nyctiphanes australis frequently swarm at or near the surface, making it easily available to foraging blue whales. However, it is often found at depth, when blue whales must dive to search for and consume it. Foraging is energetically expensive for these giant mammals, which must regularly find sufficient food to balance their enormous energy requirements (Gill, 2020). Blue whales typically feed during daylight hours when krill is visible to them (Gill, 2020).

In September 2021, the then Department of Agriculture, Water and Environment (DAWE, now DCCEEW) released guidance on key terms within the Blue Whale Conservation Management Plan (DAWE, 2021). The guidance defines foraging as ''to wander in search of supplies" and feeding as "to take food; eat; graze."



Source: CoA (2015c).

Figure 5.24: Pygmy blue whale migration routes

3. Biologically Important Areas

It is not currently possible to define habitat critical to the survival of blue whales due to the limited knowledge about the distribution and abundance of the subspecies and populations that inhabit Australian waters. However, through the development of marine bioregional plans, BIAs have been identified for blue whales. Biologically important areas for blue whales are defined for areas where foraging occurs. These foraging areas can be considered important to the survival of blue whales as they seasonally support highly productive ecosystem processes on which significant aggregations of whales rely. According to BIA mapping, there are no breeding grounds that occur within the operational area or EMBA (Figure 5.25).

During construction of the Yolla-A platform, a sea noise logger was deployed from April to October 2004. The presence of several whale species was evident in the recordings although the proximity of the whales could not be determined; blue whales were mainly evident in winter and in late autumn pygmy blue whales passed through Bass Strait. There was no obvious evidence of humpback whales, other whale species or fish choruses (McCauley, 2005).

The operational area and EMBA overlap with 0.8% and 7.8% of the foraging BIA for the blue whale (Figure 5.25). The spatially defined BIA coincides with the possible foraging area within central and eastern Bass strait identified by the CoA (2015c) (Figure 5.25), which states that evidence for feeding is based on limited direct observations or through indirect evidence, such as occurrence of krill in close proximity of whales, or satellite tagged whales showing circling tracks. Blue whales have the potential to travel through the planning area on a seasonal basis, possibly as part of their migratory route (CoA,

2015c). Based on the presence of the foraging BIA and possible movement within the planning area, it is possible that blue whales will be encountered. There are higher concentrations of PBW in western Victoria.

Threats posed to the PBW are the same as those identified for the southern right whale (CoA, 2015c; DCCEEW, 2024). According to the Australian Living Atlas (ALA), there is a higher distribution of PBW in the Bonney Upwelling region, where there were 22 reported sightings of PBW, while the eastern side (Gippsland region) only had 1 sighting from 2000 – 2022 (ALA, 2024) (Figure 5.25).

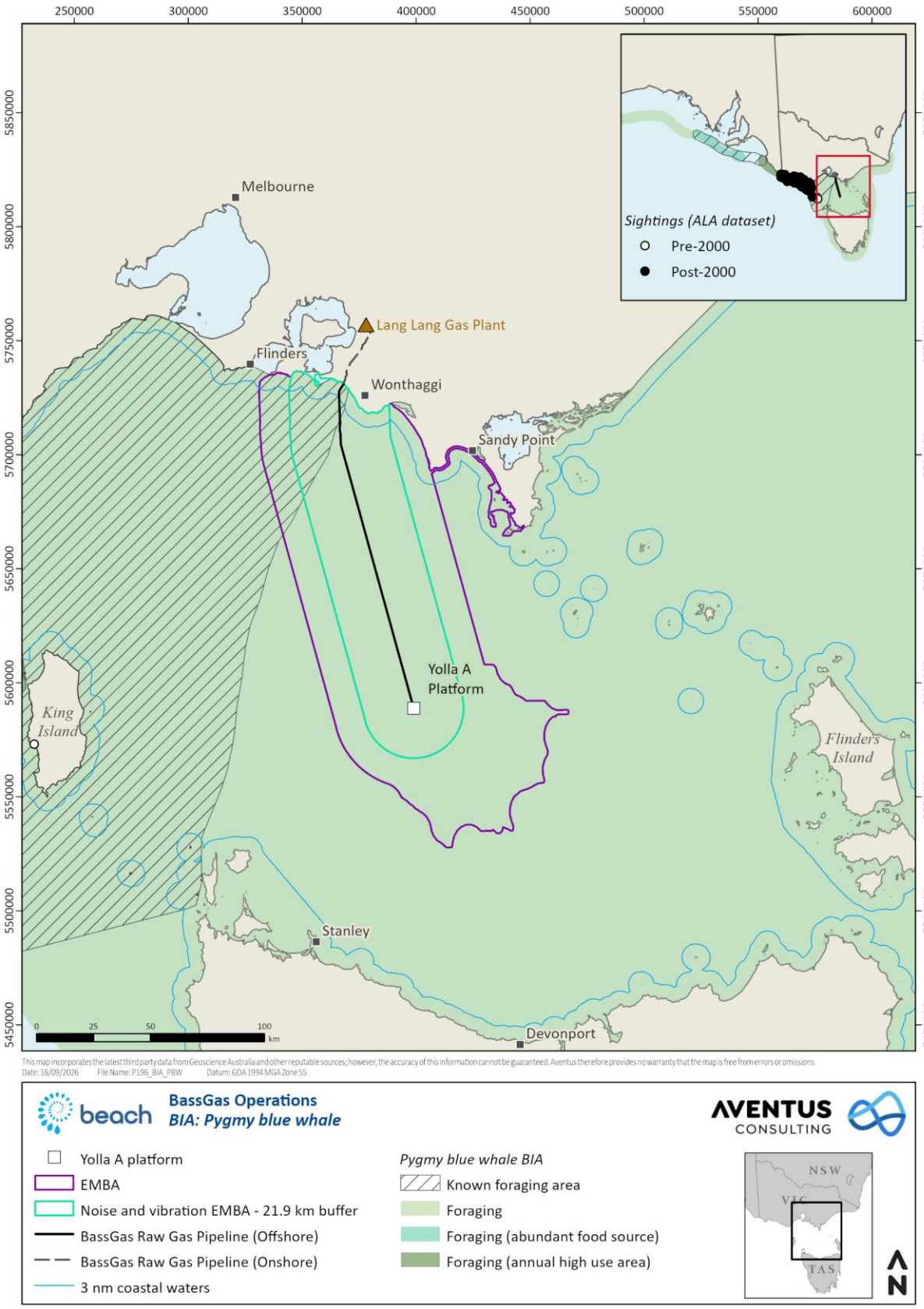


Figure 5.25: Pygmy blue whale BIA intersected by the activity area and planning area and ALA sightings.

5.6.5.2 Southern Right Whale

The SRW (*Eubalaena australis*) is listed as an endangered and migratory species under the EPBC Act. The SRW are medium to large in size, black (or less commonly grey-brown) baleen whales (DSEWPC, 2012b). They are recognisable by the lack of a dorsal fin, rotund body shape and white callosities (patches of keratinised skin colonised by cyamids - small crustaceans) on the head. They have a maximum length of approximately 17.5 m and an approximate weight of 80 tonnes, with mature females slightly larger than males (DSEWPC, 2012b).

1. Distribution

Two populations of the southern right whale inhabit Australian waters; eastern and western, with the eastern SRW being the population of interest for the planning area. Figure 5.26 includes records of SRW sightings (from the ALA) in and around activity area, primarily around Wilsons Promontory (four sightings pre-2000 and eight sightings post-2000). However, higher aggregation and breeding activity occurs around western Victoria and Warrnambool. Most records of reproductive activity within Victoria occur in an area closer to the South Australian border, near Warrnambool, with the species present in Australia in winter months. Threats posed to the SRW include entanglement, underwater noise and collision (DCCEEW, 2024).

2. Migration

Individual SRW are known to use widely separated coastal waters (200-1,500 km apart) within a season, indicating substantial coast-wide movements (Charlton, Guggenheimer, Burnell, & Bannister, 2014). The longest movements are undertaken by non-calving whales, though calving whales have also been recorded to move up to 700 km in a single season. Such vast seasonal movements indicate the connectivity of coastal habitat is important for the species (DSEWPC, 2012; Charlton, Guggenheimer, Burnell, & Bannister, 2014). Exactly where whales approach and leave the coast from and to offshore areas is not well understood (DSEWPC, 2012).

A predominance of westward movements amongst long-range photo-identification may indicate a seasonal westward movement in coastal habitats (DSEWPC, 2012). More or less direct approaches and departures from the coast are also likely (DSEWPC, 2012). SRW are thought to be solitary during migration or accompanied by a dependent calf (DSEWPC, 2012).

3. Foraging

The foraging ecology for SRW is poorly understood and observations of feeding are rare (DSEWPC, 2012). Southern right whales have been observed feeding in the region of the Subtropical Front (41-44°S) in January and December. In that region copepods are mainly consumed, whereas at higher latitudes krill is the main prey item. Coastal Australian waters are not generally used for feeding (DSEWPC, 2012).

4. Biologically Important Areas

In mid-2023, AMSIS updated the BIA data for the SRW, which now identifies two BIA categories:

- Reproductive areas (May to October) - where mating, calving, nursing and/or presence of neonates are known, or likely to occur. Reproduction is spatially defined along the entire coast of Victoria including Port Phillip Bay and Western Port. Note that mapping in the National Recovery Plan for the Southern Right Whale (DCCEEW, 2024) indicates a temporal presence of

approximately May to September in the reproduction BIA, whereas written advice from DCCEEW indicates this should be 1st May to 31st October.

- Migration/resting on migration areas (approximately April to October) - where SRW are known, or likely to use for movement between regions that support biologically important behaviours (e.g., coastal movement between reproductive areas). Migration for the SRW covers all Commonwealth waters in southern Australia.

The operational area and EMBA fall within the migration and reproduction BIA for the SRW. The operational area overlaps with 0.006% of the migration BIA and 0.008% of the reproduction BIA. The EMBA overlaps with 0.6% of the migration BIA and 0.92% of the reproduction BIA for the SRW (Figure 5.26). Given the known distribution of the SRW and the presence of the migration BIA, it is possible that the SRW will be present in the activity area, particularly during May – October.

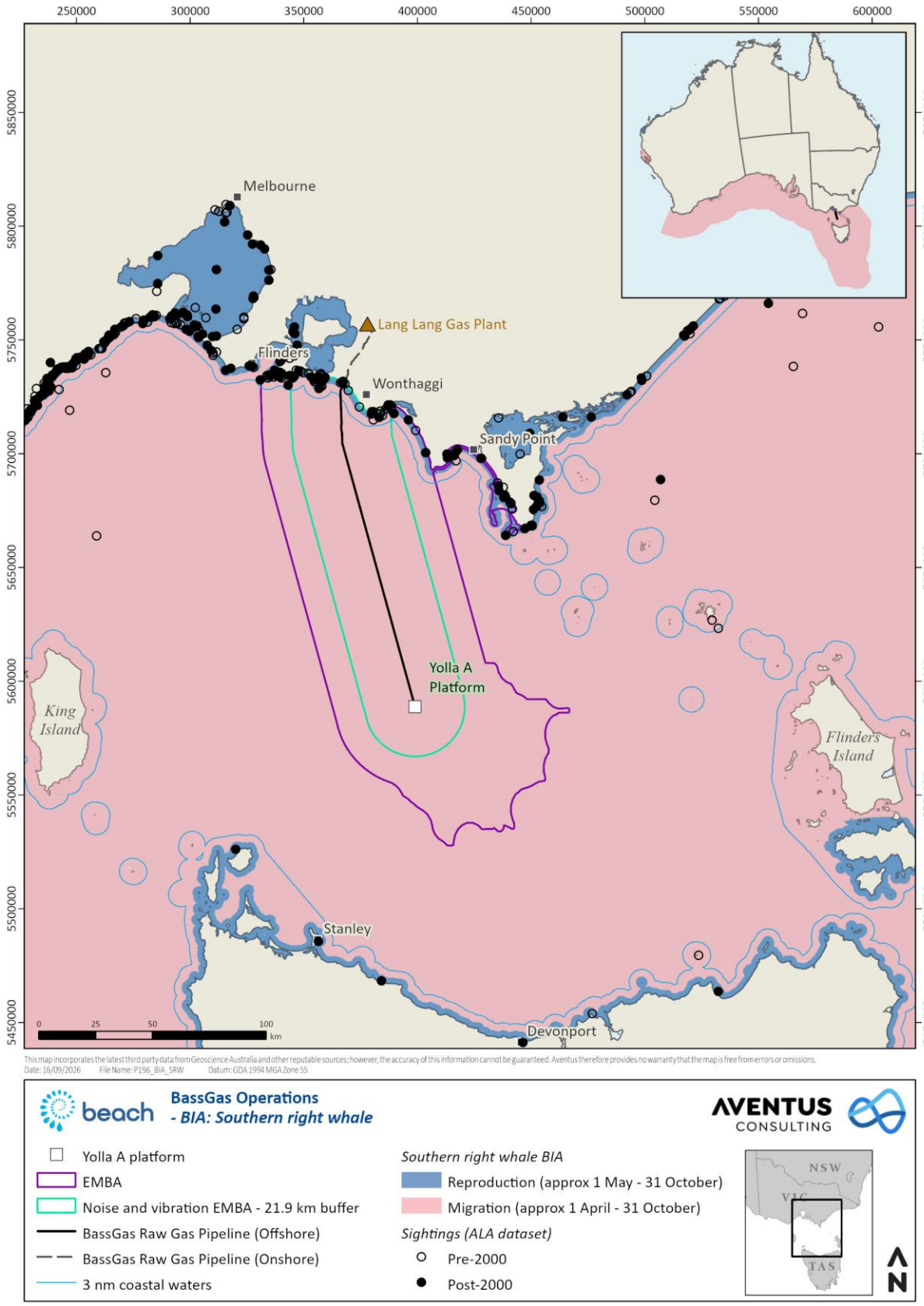


Figure 5.26: Southern Right Whale BIA and ALA sightings

5.6.5.3 Humpback Whale

The humpback whale (*Megaptera novaeangliae*) is a moderately large (15-18 m long) baleen whale that has a worldwide distribution and a geographic segregation. In the 19th and 20th centuries, humpback whales were hunted extensively throughout the world's oceans and as a result it is estimated that 95% of the population was eliminated. Commercial whaling of humpback whales ceased in 1963 in Australia, at which time it is estimated that humpback whales were reduced to between 3.5 and 5% of pre-whaling abundance (TSSC, 2015d).

In late February 2022, the humpback whale was removed from the vulnerable category and now holds no threatened status under the EPBC Act. DAWE (2022) listing advice states that humpback whales have been recovering strongly for the past five decades, since their severe decline due to commercial whaling which ceased in 1963. However, they remain a MNES Significance under the EPBC Act as a listed migratory species, and the species remains listed as a cetacean, where it is an offence to kill, injure, take, trade, keep, move, or interfere with a cetacean (DAWE, 2022).

The conservation advice for the humpback whale (TSSC, 2015d) identifies vessel strike and anthropogenic noise as threats to the species. The activity and planning areas overlap the core migration range of humpback whales. It is likely that humpback whales migrate through the planning area during April, May, November and December.

5.6.5.4 Fin whale

The fin whale (*B. physalus*) is the second largest whale species after the blue whale, growing up to 27 m long and weighing up to 70 tonnes (TSSC, 2015c). Fin whales are considered a cosmopolitan species and occur from polar to tropical waters, and rarely in inshore waters. The full extent of their distribution in Australian waters is uncertain but they occur within Commonwealth waters and have been recorded in most state waters and from Australian Antarctic Territory waters (TSSC, 2015c).

Fin whales are generally thought to undertake long annual migrations from higher latitude summer breeding grounds to lower latitude winter feeding grounds (TSSC, 2015c). It is likely they migrate between Australian waters and Antarctic feeding areas (the Southern Ocean), sub-Antarctic feeding areas (the Southern Subtropical Front) and tropical breeding areas (Indonesia, the northern Indian Ocean and south-west South Pacific Ocean waters) (TSSC, 2015c).

Fin whales have been sighted inshore in the proximity of the Bonney Upwelling along the continental shelf in summer and autumn months (TSSC, 2015c). The sighting of a cow and calf in the Bonney Upwelling in April 2000 and the stranding of two fin whale calves in South Australia suggest that this area may be important to the species' reproduction, perhaps as a provisioning area for cows with calves (TSSD, 2015c). In 2024, a fin whale washed up on the Bellarine Peninsula suggesting there may be a recent presence of fin whales in Victorian waters (ABC News, 2024). There are no defined mating or calving areas in Australia waters.

The conservation advice (TSSC, 2015c) identifies vessel strike and anthropogenic noise as threats to the species. Based on the fin whale preference for offshore waters, the absence of a BIA in Australian waters and the minimal sightings in Bass Strait, if present fin whales are likely to be infrequent visitors within the operational area or EMBA.

5.6.5.5 Sei whale

Sei whales (*Balaenoptera borealis*) are primarily found in deep water oceanic habitats and their distribution, abundance and latitudinal migrations are largely determined by seasonal feeding and breeding cycles (Horwood 2009 in TSSC, 2015b).

Sei whale global population is estimated to have declined by 80% over the previous three generation period (TSSC, 2015b). Sei whales were the most commonly observed whales during Australian National Antarctic Research Expedition voyages in the 1960s and 1970s, with the majority recorded south of 60°S in the Southern Ocean (TSSC, 2015b).

These whales are thought to complete long annual seasonal migrations from subpolar summer feeding grounds to lower latitude winter breeding grounds (TSSC, 2015b); details of this migration and whether it involves the entire population are unknown.

In the Australian region, sei whales occur within Australian Antarctic Territory waters and Commonwealth waters, and have been infrequently recorded off Victoria, Tasmania, New South Wales, Queensland, the Great Australian Bight, Northern Territory and Western Australia (Department of Sustainability and Environment 2010), (TSSC, 2015b).

Sightings of sei whales within Australian waters include areas such as the Bonney Upwelling off South Australia (TSSC, 2015b), where opportunistic feeding has been observed between November and May (TSSC, 2015b). There are no Atlas of Living Australia occurrences of sei whales within the EMBA, with the nearest sighting, a stranding record near Ocean Grove (Atlas of Living Australia 2025).

Based upon the species preference for offshore waters, the absence of a BIA for the species in Australia and the small number of sei whale sightings in southeast Australia, it is considered unlikely that this species would frequently occur within the operational area, however, may occur at the extremities of the EMBA where there is very deep water. If present, sei whales are likely to be infrequent visitors within the operational area or EMBA.

5.6.6 Pinnipeds

There are two pinniped species recorded under the EPBC Act as potentially occurring within the operational area and the EMBA (Table 5.14), including the Australian fur seal (*Arctocephalus pusillus doriferus*) and the New Zealand fur-seal (long-nosed fur seal) (*Arctophoca forsteri*).

Table 5.14: EPBC Act-listed and FFG Act listed pinnipeds that may occur in the operational area and EMBA

Scientific name	Common name	Listed migratory species	Presence in EMBA	BIA within the EMBA	FFG Act status
EPBC Act-listed not threatened species					
Arctocephalus forsteri	New Zealand fur-seal	-	May	-	Vulnerable
Arctocephalus pusillus	Australian fur-seal	-	Likely	-	-
FFG Act-listed only species					
Arctocephalus tropicalis	Subantarctic fur-seal	-	-	-	Endangered
Neophoca cinerea	Australian sea-lion	-	-	-	Endangered

5.6.6.1 Australian fur-seal

The Australian fur-seal is common in the operational area and EMBA and is not listed as a threatened or migratory species under the EPBC Act.

Australian fur seals are endemic to south-eastern Australian waters and have a relatively restricted distribution around the rocky islands of Bass Strait (Figure 5.27). It is estimated that there are 85,000-120,000 individual Australian fur seals in Bass Strait and the waters around Tasmania (Speakman, 2025). The species has been recorded in the waters off South Australia, Victoria, Tasmania and New South Wales and are the only species of seal known to breed on Victorian and Tasmanian islands in Bass Strait (Kirkwood et al., 2009).

There are 10 established breeding colonies of the Australian fur-seal that are restricted to islands in the Bass Strait; six occurring off the coast of Victoria and four off the coast of Tasmania (Kirkwood et al., 2009). The closest of the established colonies occur at Seal Rocks and Kanowna Island located adjacent to the EMBA (Figure 5.27).

Other Australian fur-seal breeding colonies in Bass Strait include:

- Rag Island;
- Kanowna Island;
- Anser Group of Islands;
- The Skerries ; and
- Judgment Rock in the Kent Island Group (Kirkwood et al., 2009, Shaughnessy, 1999; OSRA).

Barton et al (2012), Carlyon et al (2011) and OSRA (2015) list the haul-out sites known in Bass Strait (only Beware Reef is not located within the EMBA):

- Beware Reef (341 km northeast of Yolla-A);
- Gabo Island (435 km northeast of Yolla-A); and
- The Hogan Island group (120 km northeast of Yolla-A).

Australian fur-seals have a relatively restricted distribution around the islands of Bass Strait where it is the most common seal species (Kirkwood et al., 2005). Adult tagged seals have shown travel paths from Flinders Island to King Island presumably passing through central Bass Strait. Their preferred habitat, especially for breeding, is a rocky island with boulder or pebble beaches and gradually sloping rocky ledge.

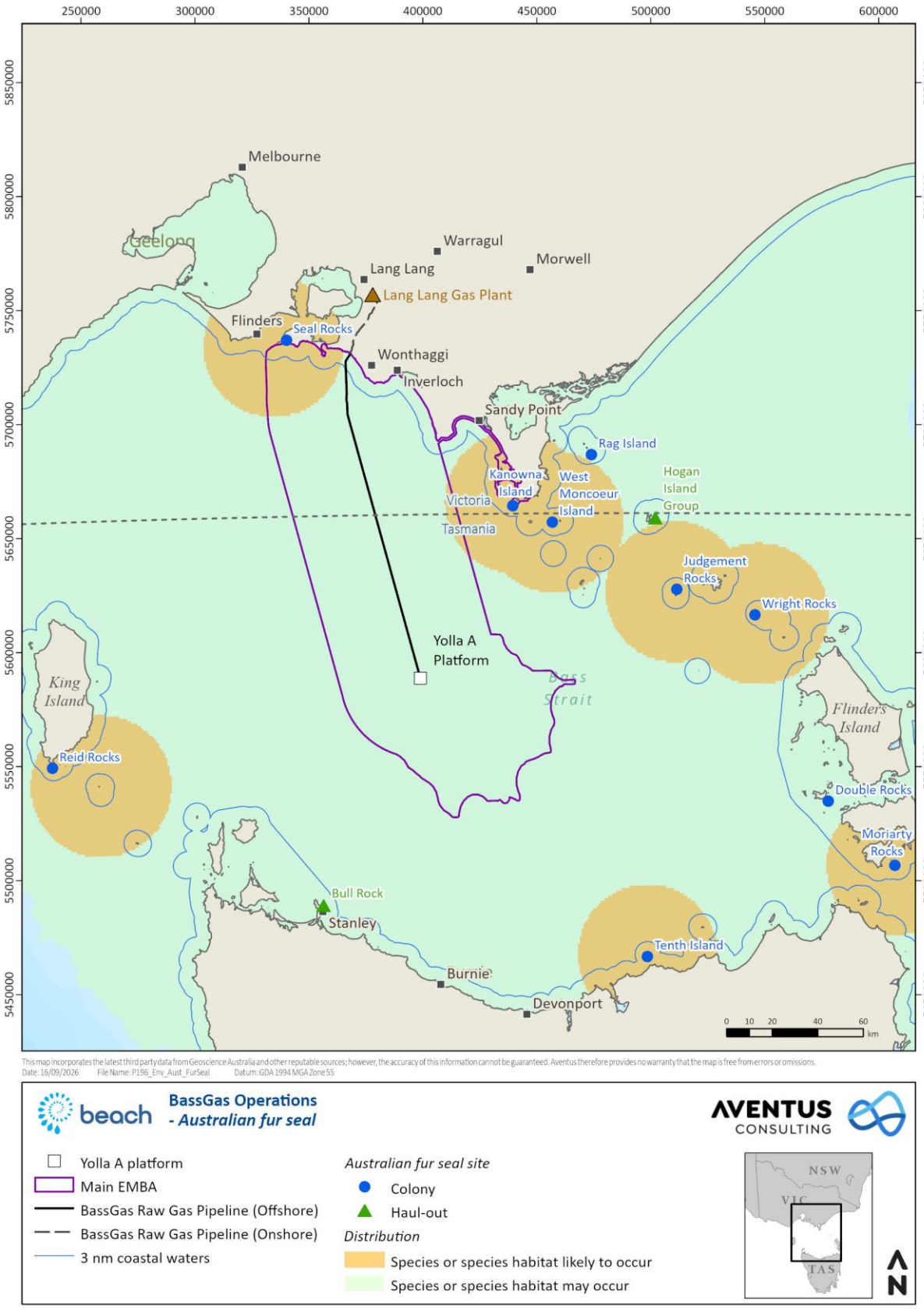


Figure 5.27 Australian Fur-Seal Colonies and Haul Out Sites

During the summer months Australian fur-seals are observed repeatedly travelling between northern Bass Strait islands and southern Tasmania waters following the Tasmanian east coast. Lactating female fur-seals and some territorial males are restricted to foraging ranges within Bass Strait waters. Lactating female Australian fur-seals forage primarily within the shallow continental shelf of Bass Strait, including off Cape Otway in western Victoria. They forage on benthos at depths of between 60 m and 80 m (Hume et al., 2004; Arnoud and Kirkwood, 2007; Robinson et al., 2008) generally within 100 km to 200 km of the breeding colony for up to five days at a time (Hume et al., 2004). The lactation period lasts for between 10 and 11 months and some females may nurse pups for up to three years (Arnoud and Hindell, 2001).

Male Australian fur-seals are bound to colonies during the breeding season from late October to late December. Outside the breeding season they forage up to several hundred kilometres (Hume et al., 2004) and are away for long periods even up to nine days (Kirkwood et al., 2005). The sexes generally forage in the same environment (Kirkwood et al., 2005); this suggests that males target different prey than females as observed in similar New Zealand fur-seals where males prey on larger fish and seabird species compared to females. The operational area or EMBA is likely to represent foraging grounds for some Australian fur-seals.

New Zealand fur-seal

New Zealand fur-seals, also sometimes referred to as long-nosed fur-seals) are mostly found in central South Australian waters (Kangaroo Island to South Eyre Peninsula); 77% of their population is found here (Shaughnessy, 1999).

There are 51 known breeding sites for New Zealand fur-seals in Australia, with most of these are outside of Victoria (47 in South Australia and Western Australia) (Kirkwood et al., 2009). Lower density breeding areas occur in Victoria (Shaughnessy 1999). Breeding locations in Victoria occur predominantly at Cape Bridgewater and a small number of individuals at Kanowna Island, off Wilson's Promontory (located 85 km northeast of Yolla-A) and the Skerries (located approximately 394 km northeast of Yolla-A) (Kirkwood et al., 2009) – both area located outside of the EMBA (see Figure 5.28. During the non-breeding season (February to October) the breeding sites are occupied by pups/young juveniles, whilst adult females alternate between the breeding sites and foraging at sea (Shaughnessy, 1999).

New Zealand fur-seals feed on small pelagic fish, squid and seabirds, including little penguins (Shaughnessy, 1999). Juvenile seals feed primarily in oceanic waters beyond the continental shelf, lactating females feed in mid-outer shelf waters (50-100 km from the colony) and adult males forage in deeper waters.

The total Australian population of New Zealand fur seals is 58,000. The population has been slow to recover from the previous intense sealing operations from 1798 to 1820, partially as the species are slow reproducers, producing one pup per year when they reach sexual maturity at four years. Up to 15% of pups die before they reach two months of age, primarily as a result of fishing net and other marine debris entanglements.

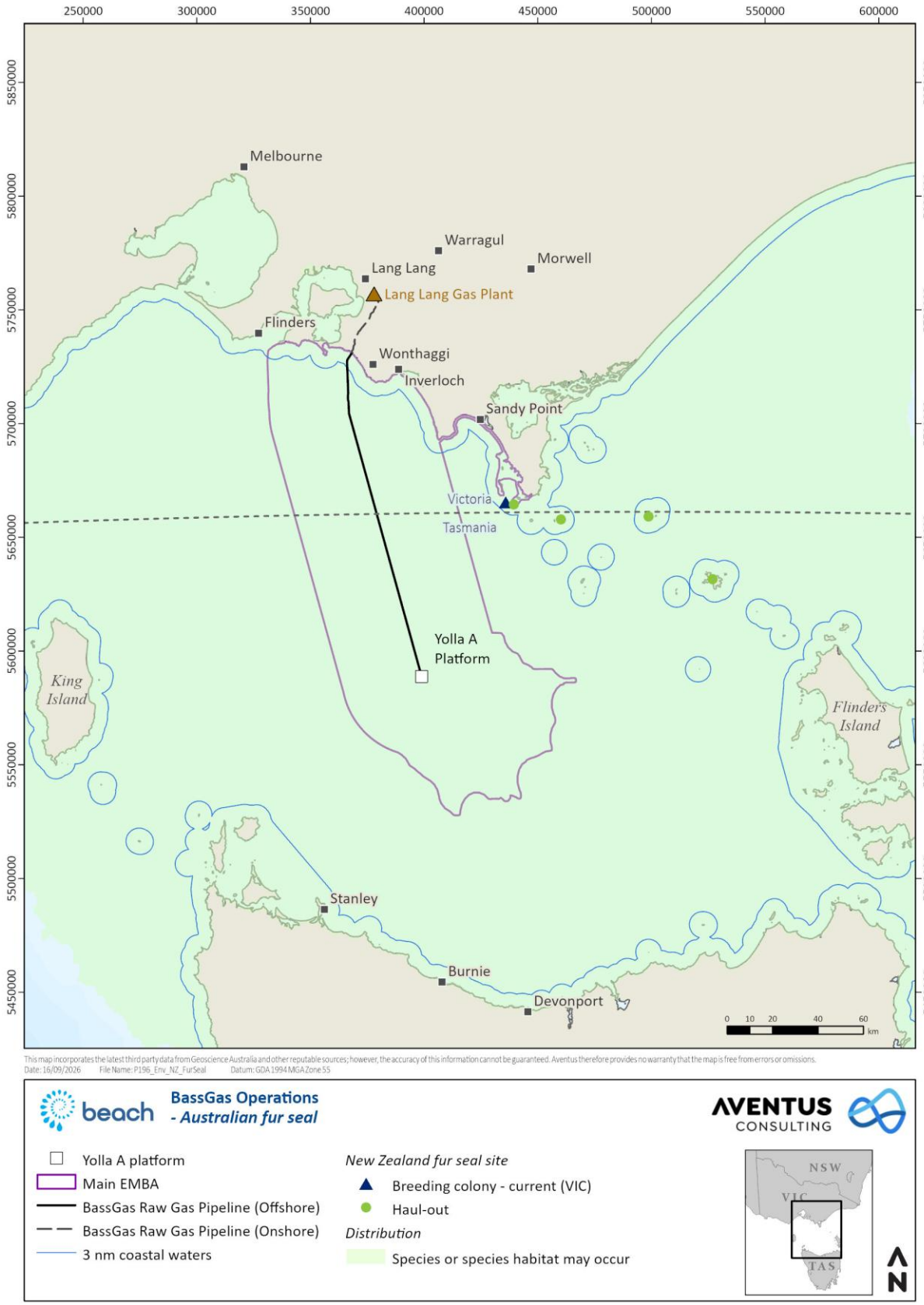


Figure 5.28. New Zealand Fur-Seal Colonies and Haul Out Sites

Haul-out sites in Bass Strait, as reported by Barton et al (2012) and OSRA mapping, are listed below:

- Beware Reef (341 km northeast of Yolla-A);
- Kanowna Island (85 km northeast of Yolla-A); and
- The Hogan Islands Group (120 km northeast of Yolla-A).
- West Moncoeur Island (south of Wilson's Promontory, 88 km northeast of Yolla-A).

The species prefers the rocky parts of islands with jumbled terrain and boulders and prefers smoother igneous rocks to rough limestone. The breeding coloniy in Bass Strait recorded by Shaughnessy (1999) and OSRA mapping that is within the EMBA is Kanowna Island located 85 km northeast of Yolla-A.

Breeding colonies in Bass Strait recorded by Shaughnessy (1999) and OSRA mapping that are not within the EMBA are listed below:

- Rag Island (122 km northeast of Yolla-A).
- The Skerries (394 km northeast of Yolla-A) – 300 individuals and 78 pups (in 2002).
- Judgment Rock in the Kent Island Group (about 2,500 pups per year, 135 km east of Yolla-A) (Kirkwood et al., 2009).

There is no BIA for the New Zealand fur-seal in Bass Strait. Given the close proximity of the BassGas Development to breeding colonies and haul-out sites, it is likely that the species feeds in the operational area, and certainly within the EMBA.

5.6.7 Fish

It is estimated that there are over 500 species of fish found in the waters of Bass Strait, including species of importance to commercial and recreational fisheries (LCC, 1993). Fish species commercially fished in the EMBA are listed in Section 5.9.5.

The PMST Report identifies 39 fish species (31 of which are seahorses and pipefish) that may occur within the operational area and EMBA (Table 5.15). The operational an and EMBA overlaps a foraging BIA for the white shark. An additional three species have been included from the FFG threatened species list that were not recorded in the EPBC Act PMST. These are the Flatback mangrove goby (*Mugilogobius platynotus*), scalloped hammerhead (*Sphyrna lewini*) and Australian whitebait (*Lovettia sealii*). The threatened and migratory species are described in this section.

Table 5.15: EPBC Act-listed and FFG Act-listed fish that may occur in the operational area and EMBA

Scientific name	Common name	Listed threatened species	Listed migratory species	Presence in EMBA	BIA within the EMBA	FFG Act status
EPBC Act-listed freshwater species						
Galaxiella pusilla	Eastern dwarf galaxia	Endangered	-	Likely	-	Endangered
Prototroctes maraena	Australian grayling	Vulnerable	-	Likely	-	Vulnerable
EPBC Act-listed oceanic species						
Carcharodon carcharias	Great white shark	Vulnerable	Yes	Likely	Foraging (known to occur)	Endangered
Galeorhinus galeus	School shark	Conservation dependent	-	Likely	-	-
Carcharius taurus	Grey nurse shark	-	Yes	May	-	Critically endangered
Isurus oxyrinchus	Shortfin mako	-	Yes	Likely	-	-
Lamna nasus	Porbeagle	-	Yes	Likely	-	-
Seriolella brama	Blue warehou	Conservation dependent	-	Likely	-	Conservation dependent
EPBC Act-listed pipefish, pipe horse, seahorse and sea dragons						
Heraldia nocturna	Eastern upside-down pipefish	-	-	May	-	-
Hippocampus abdominalis	Big-belly seahorse	-	-	May	-	-
Hippocampus breviceps	Short-head seahorse	-	-	May	-	-
Hippocampus minotaur	Bullneck seahorse	-	-	May	-	-
Histiogamphelus briggsii	Brigg's crested pipefish	-	-	May	-	-

Scientific name	Common name	Listed threatened species	Listed migratory species	Presence in EMBA	BIA within the EMBA	FFG Act status
Histiogamphelus cristatus	Rhino pipefish	-	-	May	-	-
Hypselognathus rostratus	Knifesnout pipefish	-	-	May	-	-
Kaupus costatus	Deepbody pipefish	-	-	May	-	-
Kimblaeus bassensis	Trawl pipefish	-	-	May	-	-
Leptoichthys fistularius	Brushtail pipefish	-	-	May	-	-
Lissocampus caudalis	Australian smooth pipefish	-	-	May	-	-
Lissocampus runa	Javelin pipefish	-	-	May	-	-
Maroubra perserrata	Sawtooth pipefish	-	-	May	-	-
Mitotichthys mollisoni	Mollison's Pipefish	-	-	May	-	-
Mitotichthys semistriatus	Halfbanded Pipefish	-	-	May	-	-
Mitotichthys tuckeri	Tucker's Pipefish	-	-	May	-	-
Notiocampus ruber	Red Pipefish	-	-	May	-	-
Phycodurus eques	Leafy Seadragon	-	-	May	-	-
Phyllopteryx taeniolatus	Common Seadragon	-	-	May	-	-
Pugnaso curtirostris	Pugnose Pipefish	-	-	May	-	-
Solegnathus robustus	Robust pipehorse	-	-	May	-	-
Solegnathus spinosissimus	Spiny pipehorse	-	-	May	-	-
Stigmatopora argus	Spotted pipefish	-	-	May	-	-
Stigmatopora nigra	Widebody pipefish	-	-	May	-	-

Scientific name	Common name	Listed threatened species	Listed migratory species	Presence in EMBA	BIA within the EMBA	FFG Act status
Stipecampus cristatus	Ringback pipefish	-	-	May	-	-
MayUrocampus carinirostris	Hairy pipefish	-	-	May	-	-
Vanacampus margaritifer	Mother-of-pearl pipefish	-	-	May	-	-
Vanacampus poecilolaemus	Longsnout pipefish	-	-	May	-	-
Vanacampus phillipi	Port phillip pipefish	-	-	May	-	-

Definitions and key as per Table 5.9.

5.6.7.1 Eastern dwarf galaxias (EPBC Act: Vulnerable, FFG Act: Endangered)

Habitat suitable to the eastern dwarf galaxias (*Galaxiella pusilla*) is slow flowing and still, shallow, permanent and temporary freshwater habitats such as swamps, drains and the backwaters of streams and creeks, often containing dense aquatic macrophytes and emergent plants (Saddlier et al., 2010).

Given the EMBA is within marine waters and coastlines, it is not likely that eastern dwarf galaxias' will be encountered in the operational area or EMBA due to its preference for freshwater habitats.

5.6.7.2 Australian grayling (EPBC Act: Vulnerable, FFG Act: Endangered)

The Australian grayling (*Prototroctes maraena*) is a dark brown to olive-green fish attaining 19 cm in length. The species typically inhabits the coastal streams of New South Wales, Victoria and Tasmania migrating between streams and the ocean (Backhouse et al., 2008; DELWP, 2015). The species spends most of its life in freshwater (DEECA, 2015) and migrates to lower reaches of rivers to spawn in autumn (Museums Victoria, 2019), though timing is dependent on many variables including latitude and varying temperature regimes (Backhouse et al., 2008), with increased stream flows also thought to initiate migration (Backhouse et al., 2008).

The Australian Grayling Action Statement (DEEECA, 2015) lists Victorian rivers that flow into Bass Strait that are known habitat for this species. The Tarwin river mouth is intersected by the EMBA. The National Recovery Plan for the Australian Grayling (Backhouse et al., 2008) lists the Pieman, Arthur and Detention rivers in Tasmania as important rivers for the species, which are not intersected by the EMBA. The Australian Grayling Action Statement (DELWP, 2015) list the threatening processes to this species as barriers to movement, river regulation, poor water quality, siltation, introduced fish, climate change, diseases and fishing. It is unlikely that the Australian grayling is present in the operational area or EMBA due to its preference for freshwater stream and river habitats.

5.6.7.3 Grey nurse shark (east coast population) (EPBC Act: Critically endangered, FFG Act: Critically endangered)

The grey nurse shark (*Carcharius Taurus*) (eastern population) is a large robust species that has become critically endangered due to commercial fishing, spearfishing and protective beach meshing (TSSC, 2001). It was historically widespread in sub-tropical and warm temperate seas and previously recorded from all Australian states except Tasmania and have all but disappeared from Victorian waters (TSSC, 2001). Only one record of the species occurs from Gippsland, at Mallacoota Inlet in the early 1970s.

The species currently has a broad inshore distribution throughout sub-tropical to cool temperate waters on the continental shelf, with separate east coast and west coast populations (DCCEEW, 2014b). The east coast population extends from central Queensland to southern NSW, occasionally as far south as the NSW/Victoria border (DCCEEW, 2014b), which coincides with the BIA for their distribution and breeding (October to November). Preferred habitat for grey nurse sharks is inshore rocky reefs or islands, generally aggregating near the seabed in water depths of 10-40 m in deep sandy or gravel filled gutters, or in rocky caves (DCCEEW, 2014b). There are no aggregation sites located off the Victorian coast (DCCEEW 2014b).

Given the current distribution of the grey nurse shark, it is unlikely to occur within the operational area or EMBA in significant numbers.

5.6.7.4 Syngnathids (EPBC Act: Listed marine species, FFG Act: Not listed)

There are 31 species of syngnathids (pipefish, seahorse and pipehorse) recorded in the EPBC Act PMST as potentially occurring in the operational area and EMBA (see Table 5.15). The majority of these fish species are associated with seagrass meadows, macroalgal seabed habitats, rocky reefs and sponge gardens located in shallow, inshore waters (e.g., protected coastal bays, harbours and jetties) less than 50 m deep (Museums Victoria, 2019). They are sometimes recorded in deeper offshore waters, where they depend on the protection of sponges and rafts of floating seaweed such as Sargassum.

The PMST species profile and threats profiles indicate that the sygnathids listed for the EMBA are widely distributed throughout southern, south-eastern and south-western Australian waters (DAFF, 2020b). The diverse range of ecological niches afforded by the shallow waters of the operational area and EMBA would be expected to provide suitable habitat for these species, possibly including the RGP itself. Considering the preferred depth range for these species, it is unlikely that there will be any suitable habitat in the area for these species around Yolla-A, but they are likely to be present within the shallow nearshore waters of the operational area and EMBA at all times of the year.

5.6.7.5 Great white shark (EPBC Act: Vulnerable, FFG Act: Endangered)

The great white shark (*Carcharodon carcharias*) is widely distributed and located throughout temperate and sub- tropical waters. The known range in Australian waters includes all coastal areas except the Northern Territory (DSEWPC, 2013b) (Figure 5.29).

Studies indicate that the great white shark is usually a solitary animal, largely transient in areas it inhabits for days to weeks (DSEWPC, 2013b). Individuals are known to return to feeding grounds on a seasonal basis (Klimley and Anderson, 1996). The species moves seasonally along the south and east Australian coasts, moving northerly along the coast during autumn and winter and returning to southern Australian waters by early summer.

Observations of adult great white sharks in or near the EMBA area are more frequent around Australian fur-seal colonies (see Figure 5.29) including Wilsons Promontory and Seal Rocks, Phillip Island.

Juveniles are known to congregate along Ninety Mile Beach from Corner Inlet to Lakes Entrance. Museums Victoria (2019) indicates that Corner Inlet may be an important nursery area for the eastern population of great white sharks mostly from mid-summer through to autumn (DSEWPC, 2013b).

Key threats to the species as listed in the White Shark Recovery Plan (DSEWPC, 2013b) are mortality from targeted fishing, accidental fishing bycatch and illegal fishing and mortality from shark control activities such as beach meshing and drum-lining.

It is likely that great white sharks transit through the operational area and EMBA throughout the year, with a presence in the breeding area between Wilsons Promontory and Lakes Entrance from mid-summer through to autumn.

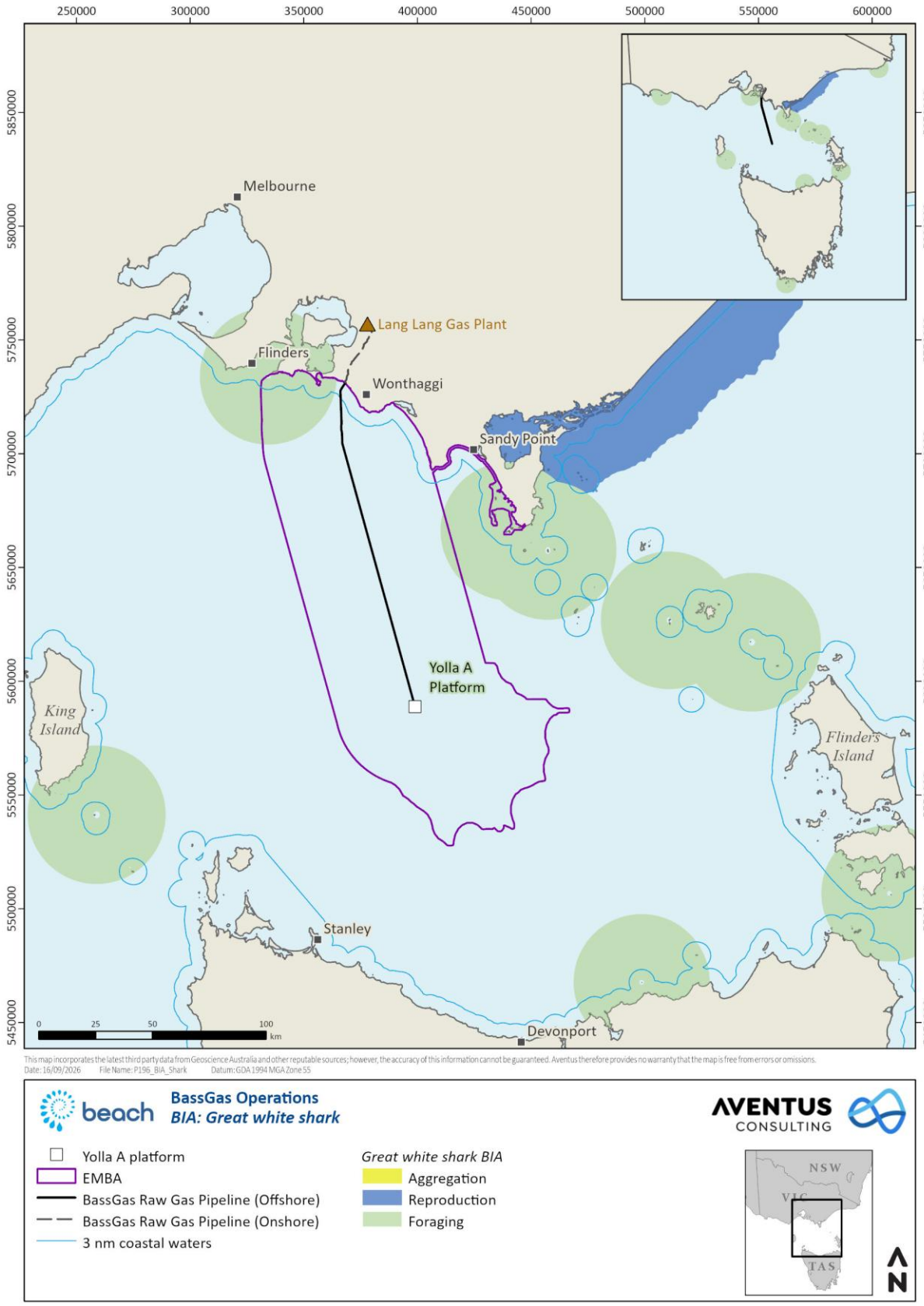


Figure 5.29: Great white shark BIA

5.6.7.6 Shortfin mako shark (EPBC Act: Listed migratory, FFG Act: Not listed)

The shortfin mako shark (*Isurus oxyrinchus*) is a pelagic species with a circum-global wide-ranging oceanic distribution in tropical and temperate seas (Mollet et al., 2000). It is widespread in Australian waters, commonly found in water with temperatures greater than 16°C (Museums Victoria, 2019). Populations of the shortfin mako shark are considered to have undergone a substantial decline globally. These sharks are common by-catch species of commercial fisheries (Mollet et al., 2000).

Due to their widespread distribution in Australian waters, shortfin mako sharks may migrate through the operational area and the EMBA throughout the year.

5.6.7.7 Porbeagle shark (EPBC Act: Listed migratory, FFG Act: not listed)

The porbeagle shark (*Lamna nasus*) is widespread in the southern waters of Australia (Museums Victoria, 2019). The species preys on bony fishes and cephalopods and is an opportunistic hunter that regularly moves up and down in the water column, catching prey in mid-water as well as at the seafloor. It is most commonly found over food-rich banks on the outer continental shelf and makes occasional forays close to shore or into the open ocean down to depths of approximately 1,300 m. It also conducts long distance seasonal migrations generally shifting between shallower and deeper water (Pade et al., 2009).

Due to their widespread distribution in Australian waters, porbeagle sharks may migrate through the operational area and the EMBA throughout the year.

5.6.8 Reptiles

Three species of marine turtle are listed under the EPBC Act as potentially occurring through the operational area and EMBA, as listed in Table 5.16. No BIAs for turtles occur within Bass Strait. EA (2003) reports that the turtles known to occur in Victorian waters are considered to be rare vagrants outside their usual range.

There is currently one national recovery plan in place for marine turtles; 'Recovery Plan for Marine Turtles in Australia, 2017-2027' (DoEE, 2017).

Table 5.16: EPBC Act-listed reptiles that may occur in the operational area and EMBA

Scientific name	Common name	Listed migratory species	Presence within EMBA	BIA within the EMBA	FFG Act status
EPBC Act-listed endangered species					
Dermochelys coriacea	Leatherback turtle	Yes	Likely	-	Critically endangered
Caretta caretta	Loggerhead turtle	Yes	Likely	-	-
EPBC Act-listed vulnerable species					
Chelonia mydas	Green turtle	Yes	May	-	-

Definitions and key as per Table 5.9.

5.6.8.1 Leatherback turtle (EPBC Act: Endangered, listed migratory, FFG Act: Critically endangered)

The leatherback turtle (*Dermochelys coriacea*) is widely distributed throughout tropical, sub-tropical and temperate waters of Australia (DCCEEW, 2017) including oceanic waters and continental shelf waters along the coast of southern Australia (Limpus, 2009). Unlike other marine turtles, the leatherback turtle utilises cold water foraging areas with reported foraging along the coastal waters of central Australia (southern Queensland to central New South Wales), southeast Australia (Tasmania, Victoria and eastern South Australia) and southern Western Australia (Limpus, 2009). This species feeds on soft-bodied invertebrates including jellyfish (Limpus, 2009).

No major nesting has been recorded in Australia, with isolated nesting recorded in the Northern Territory, Queensland and northern New South Wales (DCCEEW, 2017). This species nests only in the tropics. The DCCEEW (2017) maps the leatherback turtles as having a known or likely range within Bass Strait and a may occur in southern waters.

The operational area and EMBA area do not represent critical habitat for the species. As such, this species is only likely to occur within the operational area or EMBA as vagrant individuals.

5.6.8.2 Loggerhead turtle (EPBC Act: Endangered, listed migratory, FFG Act: Not listed)

The loggerhead turtle (*Caretta caretta*) is globally distributed in sub-tropical waters (Limpus, 2008a) including eastern, northern and western Australia (DCCEEW, 2017), and is rarely sighted off the Victorian coast.

The main Australian breeding areas for loggerhead turtles are generally confined to southern Queensland and Western Australia (Cogger et al., 1993). Loggerhead turtles will migrate over distances in excess of 1,000 km, and show a strong fidelity to their feeding and breeding areas (Limpus, 2008a). Loggerhead turtles are carnivorous, feeding primarily on benthic invertebrates such as molluscs and crabs in depths ranging from nearshore to 55 m (DCCEEW, 2017) in tidal and sub-tidal habitats, reefs, seagrass beds and bays (DCCEEW, 2017).

No known loggerhead foraging areas have been identified in Victorian waters (DCCEEW, 2017). As such, this species is only likely to occur within the operational area or EMBA as vagrant individuals.

5.6.8.3 Green turtle (EPBC Act: Vulnerable, listed migratory, FFG Act: Not listed)

The green turtle (*Chelonia mydas*) is distributed in sub-tropical and tropical waters around the world (Limpus, 2008b; DCCEEW, 2017). In Australia, they nest, forage and migrate across tropical northern Australia. Mature turtles settle in tidal and sub-tidal habitat such as reefs, bays and seagrass beds where they feed on seagrass and algae (Limpus, 2008b; DCCEEW, 2017).

There are no known nesting or foraging grounds for green turtles in Victoria and they occur only as rare vagrants (DCCEEW, 2017). The DCCEEW (2017) maps the green turtle as having a ‘known’ or ‘likely’ range within Bass Strait and as such, there is a low probability that this species occurs within the operational area or EMBA.

5.6.9 Marine Pests

It is widely recognised that marine pests cause significant impacts on economic, ecological, social and cultural values of marine environments. Impacts can include the introduction of new diseases, altering ecosystem processes and reducing biodiversity, causing major economic loss and disrupting human activities (Brusati and Grosholz, 2007).

In the South-east Marine Region, 115 marine pest species have been introduced and an additional 84 have been identified as possible introductions, or 'cryptogenic' species (NOO, 2002). Several introduced species have become pests either by displacing native species, dominating habitats or causing algal blooms.

Marine pests known to occur in Bass Strait, according to Parks Victoria (2015) and Butler et al (2012) include:

- Pacific oyster (*Crassostrea gigas*) – small number of this oyster species are reported to occur in Western Port Bay and at Tidal River in the Wilsons Promontory National Park.
- Northern pacific seastar (*Asterias amurensis*) – prefer soft sediment habitat, but also use artificial structures and rocky reefs, living in water depths usually less than 25 m (but up to 200 m water depths). It is thought to have been introduced in 1995 through ballast water from Japan. In the VFA's recent scallop abundance survey (see Section 5.9.5), it is noted that no northern pacific seastars were observed.
- New Zealand screw shell (*Maoricolpus roseus*) – lies on or partially buried in sand, mud or gravel in waters up to 130 m deep. It can densely blanket the sea floor with live and dead shells and compete with native scallops and other shellfish for food. This species is known to be present in the Port Phillip and the Western Port region.
- European shore crab (*Carcinus maenas*) – prefers intertidal areas, bays, estuaries, mudflats and subtidal seagrass beds, but occurs in waters up to 60 m deep. It is widespread across Victorian intertidal reef and common in Western Port.
- Dead man's fingers (*Codium fragile* sp. fragile) – Widespread in Port Phillip and known to inhabit San Remo and Newhaven in Western Port. It grows rapidly to shade out native vegetation and can regenerate from a broken fragment enabling easy transfer from one area to another. Attaches to subtidal rocky reed and other hard surfaces.
- Asian date mussel (*Musculista senhousia*) – prefers soft sediments in waters up to 20 m deep, forming mats and altering food availability for marine fauna.
- Cord grass (*Spartina anglica* and *Spartina x townsendii* sp) – found at the mouth of Bass River and in drain outlets near Tooradin in Western Port. Widespread in South Gippsland including Anderson's Inlet and Corner Inlet. Invades native saltmarsh, mangroves and mudflats, altering the mud habitat and excluding other species.

5.7 First Nations

5.7.1 Methodology to Identify Cultural Values and Sensitivities

The definition of environment in the OPGGS(E)R includes the people and communities, heritage value of places, and their social, economic, and cultural features. Specifically for First Nations peoples, this includes cultural heritage and sea country values which, in accordance with Indigenous tradition, may be a spiritual and cultural connection that may be affected by the operations.

Beach recognises First Nations Groups and their deep spiritual and cultural connection to the environment. The cultural values and features within the Operational and Planning Area are addressed in this section. The description of the environment for cultural features and values was developed through:

- Consultation with First Nations Groups with connection to Sea Country in the Operational and Planning Area.
- Review of available publications by First Nations Groups relating to Sea Country.
- Engagement of Extent Heritage Pty Ltd (Extent), a specialist archaeological consulting firm, to undertake a literature review to support the development of a comprehensive description of Sea Country, including cultural values and sensitivities.
- Cultural values assessment with Bunurong Land Council Aboriginal Land Corporation.

Through these processes, and in particular, consultation with First Nations Groups, Beach is confident that the cultural heritage values, and cultural features and sensitivities of First Nations groups within the Operational and Planning Area have been identified.

5.7.2 Recognition of First Nations Groups

First Nation Groups and Traditional Owners and connection to Country is recognised through contemporary laws such as the Commonwealth Native Title Act (1993), as well as various State laws and agreement making (e.g. Traditional Owner Settlement Act 2010 (Vic) and Aboriginal Heritage Acts).

While connection to Country for some First Nations Groups has been formally recognised through native title, other First Nations Groups and their connection and rights to land and sea is recognised through relevant State legislation.

A review of the statutory laws, rights and recognition conferred to First Nations Peoples within the Planning Area is summarised in the below sections

5.7.2.1 Native Title

The Commonwealth Native Title Act 1993 is an Australia-wide native title scheme with the following key objectives:

- Providing for the recognition and protection of native title.

- Establishing a mechanism for determining claims to native title.
- Establishing ways in which future dealings affecting native title (future acts) may proceed.

Native title is the formal recognition that Aboriginal and Torres Strait Islander people have rights and interests to land and waters according to their traditional law and customs.

A key principle for native title determination is for First Nation's people to establish and prove that Indigenous people have an unbroken and current connection to their lands and waters and in practicing their culture from the time of European settlement.

Native title can be granted with non-exclusive or exclusive rights to lands and waters. Non-exclusive native title can include, for example, the right to live and camp on an area, and hunt and fish, and can co-exist with the rights of other land users. In sea areas, only non-exclusive native title can be recognised as exclusive native title is considered inconsistent with other common law rights regarding marine access and navigation (NNTT 2010).

The Federal Court of Australia first recognised native title over the sea for the Traditional Owners of Croker Island in Arnhem Land in 1998 (Tribunal File No. DCD 1998/001). Since the Croker Islands Seas native title determination, (non-exclusive) native title in sea country has been recognised along Australia's coastline through numerous claims and determinations under the Native Title Act 1993.

A search of the National Native Title Tribunal (the Tribunal) database identified the following native title claims and consent determinations within or adjacent to the Planning Area (Figure 5.30).

5.7.2.2 Victoria

Gunaikurnai People A determination by the Federal Court of Australia recognising the native title rights of the Gunaikurnai People over parts of the determination area was registered on 22 October 2010 (Tribunal File No. VCD2010/001).

This determination area exists outside but adjacent to the Planning Area. The area covers the land and waters, including sea country, from Wilsons Promontory to Newmerella, and includes the culturally significant Nooramunga Marine & Coastal Park and Lakes Entrance and connected wetlands (Figure 5.30). The Gunaikurnai Land & Waters Aboriginal Corporation is the registered native title body corporate under the Corporations (Aboriginal and Torres Strait Islander) Act 2006 and manages the native title rights for the Gunaikurnai People.

5.7.2.3 Tasmania

There are no native title areas in Tasmania.

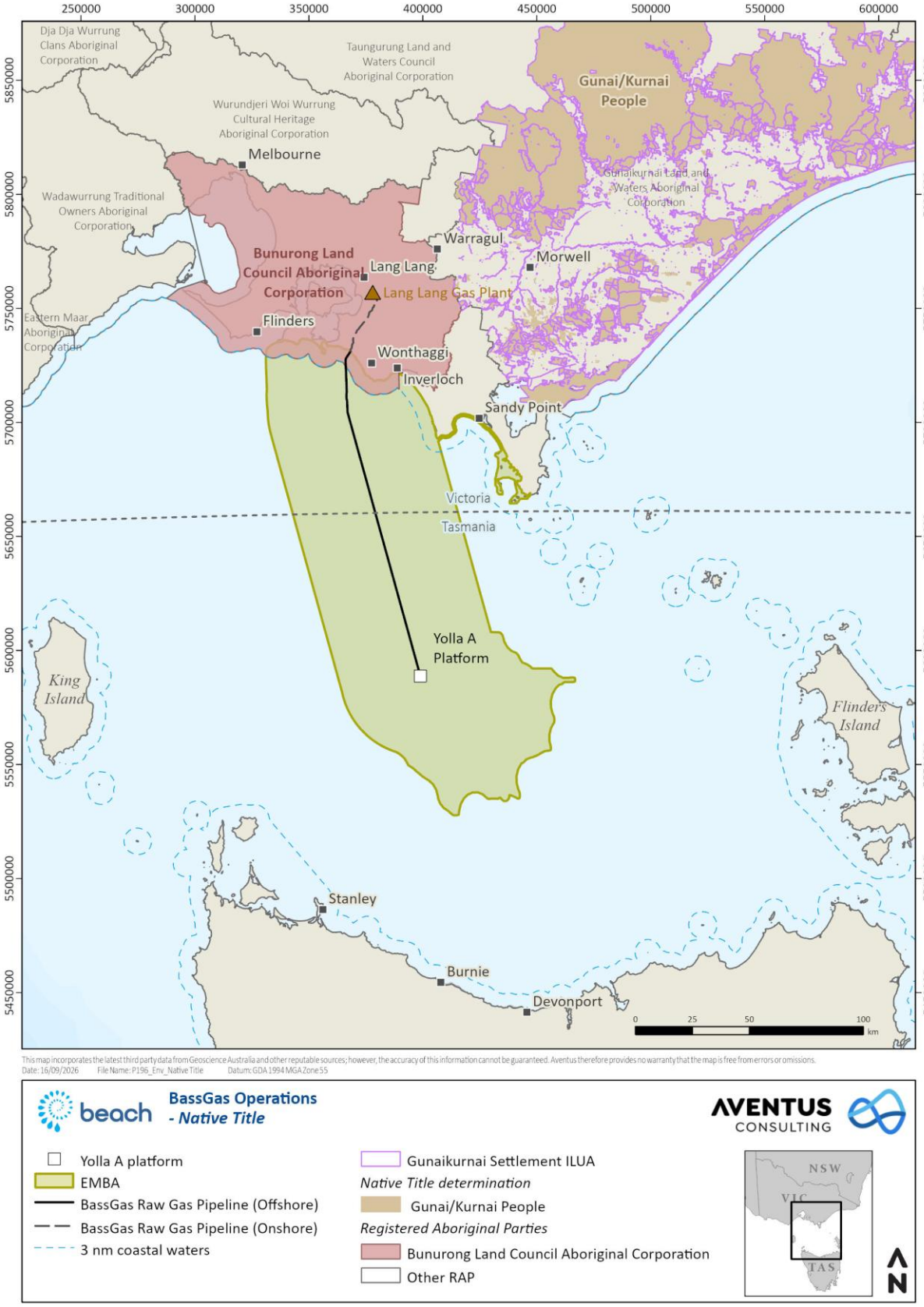


Figure 5.30: Native Title and RAPs within and adjacent to the operational area and the EMBA

5.7.2.4 Registered Aboriginal Parties

As an operator in Victoria, Beach is also cognisant of the Aboriginal Heritage Act 2006 (Vic) (AHA 2006 VIC) that recognises a Registered Aboriginal Party (RAP) as the Traditional Owner Corporation to manage and protect First Nations cultural heritage over their Country including coastal and onshore waters. The AHA 2006 VIC recognises RAPs as the primary guardians, keepers and knowledge holders of First Nations cultural heritage and the primary source of advice and knowledge on matters relating to First Nations places or objects in the appointed RAP region (Figure 5.30).

The following groups are recognised RAPs within or adjacent the Planning Area described in this EP:

- Bunurong Land Council Aboriginal Corporation
- Gunaikurnai Land and Waters Aboriginal Corporation

5.7.2.5 Indigenous Land Use Agreements

An Indigenous land use agreement (ILUAs) is a voluntary agreement between a native title group and other parties on the use and management of land and waters. ILUAs are established by the Native Title Act 1993. No registered ILUAs were identified within the Operational Area or Planning Areas (NTV Victoria & Tasmania).

5.7.2.6 Land Rights

Most states and territories have legislation which sets out land rights arrangements with First Nations peoples within their jurisdiction. In most cases the statutory land rights legislation does not extend to marine areas. An exception is under the Traditional Owner Settlement Act 2010 (Vic) which provides the possibility of agreements to extend to marine areas.

Victoria

In Victoria, the Traditional Owner Settlement Act 2010 (Vic) was developed as an alternative approach to the native title process that recognises traditional owners' relationship to land and provides certain rights on Crown land. The Gunaikurnai People entered into an agreement with the State of Victoria under the Traditional Owner Settlement Act 2010 (Vic). In Victoria, the Aboriginal Nations Heritage Act 2006 (Vic) recognises a Registered Aboriginal Party as the Traditional Owner to manage and protect First Nations cultural heritage over their Country including coastal and onshore waters.

Tasmania

Tasmania does not have a First Nations land rights legislative regime. Rather, under the Aboriginal Lands Act 1995 (Tas), grants of land parcels of historic or cultural significance ‘to promote reconciliation with the Tasmanian Aboriginal community’ may be made and vested in the Aboriginal Land Council of Tasmania. Some islands in the Bass Strait and adjacent to the Planning Area, such as Badger Island and Clarke Island, were returned to the Tasmanian First Nations community under the Aboriginal Lands Act 1995.

5.7.2.7 Indigenous Protected Areas

Indigenous Protected Areas (IPAs) are areas of land and sea managed by First Nations groups through their custodianship and stewardship obligations for Country. IPAs deliver biodiversity conservation

outcomes for the benefit of all Australians, through voluntary agreements the Traditional Owners of land or sea and the Australian Government. The IPA program has a dual purpose of achieving conservation obligations and providing sustainable uses to deliver social, cultural, and economic benefits for local Indigenous communities. Indigenous People are active participants in the management of IPAs through land and sea ranger programs and other custodian and management activities.

No IPAs were identified in the Operational Area or Planning Area.

5.7.3 Cultural Values and Sensitivities

5.7.3.1 Country and Sea Country Overview

Country is a cultural landscape and includes the tangible (cultural heritage) and intangible (songlines, creation stories and cultural practices). First Nations cultural concepts are firmly intertwined with the nature of the environment, of Country. Country describes all aspects of place, environment, spirituality, law, and identity. Part of Country that extends into the oceans is known as Sea Country. Values of Country differ between First Nations groups, and not all First Nations groups and communities in Australia hold the same belief systems as formational pillars of their community or spirituality. Differences can be due to aspects of post-colonialism, such as dispossession, genocide, and cultural practice restrictions.

Due to the varied culture and history of First Nations groups, and in particular owing to various degrees of dispossession and removal from country, loss of connection, and continuation of culture, the responses of First Nations communities to caring for and talking about Country are different throughout Australia. These individualised but community-based beliefs and values contribute to the need for a varied and responsive approach to managing cultural (tangible and intangible) values.

A cultural landscape is about both pre-colonial and contemporary interactions between humans and the physical environment including non-human animals, plants, physical structures, ancestors, songlines, trade routes and other significant cultural connections to Country. Cultural landscapes are reflections of how First Nations people engaged with Country, as they see that landscape features are not just physical features, their understanding is that the landscape intrinsically connects the past and the present to people, stories, and history.

Smyth and Isherwood (2016) describe Sea Country as all estuaries, beaches, bays, and marine areas collectively, within a traditional estate. Sea Country contains evidence of the ancient mystical events by which all geographic features, animals, plants, and people were created. Sea Country contains sacred sites and contains tracks (or songlines) along which mythological beings travelled during the creation period (Smyth and Isherwood 2016). The sea, like the land, is integral to the identity of First Nations groups. Formal recognition of Sea Country rights lags considerably compared to land rights; this could be for a range of reasons including conflicting perspectives and opinions on traditional custodianship of land and how far it extends (Smyth and Isherwood 2016).

Coastal areas were amongst the most densely populated areas, due to abundance of resources. Sea Country, as it does on land, has been found to contain evidence of the ancient Dreamtime events by which all geographic features, animals, plants, and people were created. Sea Country may contain sacred sites, which may be related to these creation events, and it contains tracks (or songlines) along which ancestral beings travelled during the creation period. Sea Country has a continuing cultural

value because of the connection to creation and dreaming stories, ceremonial sites, and places of occupation.

Country is the term often used by First Nations people to describe the lands, waterways, and seas to which they are connected. The term contains complex ideas about law, place, custom, language, spiritual belief, cultural practice, material sustenance, family, and identity (AIATSIS 2022). Sea Country, also known as Saltwater Country, extends into the Operational Area and Planning Area.

5.7.3.2 First Nations Groups Sea Country within the Operational and Planning Areas

There are First Nations groups with Native Title recognition in areas adjacent to the Operational Area and Planning Area. However, it is important to also acknowledge and respect the intangible cultural values and sensitivities that exist for other First Nations groups described in this section that are not directly adjacent to the Operational Area, due to the interconnectedness of marine ecosystems and existence of various marine fauna and flora and intangible cultural values. Table 5.17 summarises the First Nations groups in relation to the Operational Area and Planning Area.

Table 5.17: First Nations groups adjacent Operational and Planning area

First Nations Group	Operational Area	Planning Area
Bunurong	√	√
Gunaikurnai	-	√
Palawa (Tasmania)	-	√

The land adjacent to the Operational and Planning area is the Traditional lands of the Bunurong (Boonwurrung) people, Bunurong are legally represented by the Bunurong Land Council Aboriginal Corporation (BLALC). Bunurong Country extends from the Werribee river to Wilsons Promontory includes some of the submerged land bridge to Tasmania. Through consultation for previous EP's with Beach, BLCAC advised that Sea Country is very significant for cultural practices and ceremony. Eels and kelp hold special cultural significance for the Bunurong people.

Also adjacent to the planning area is Lutruwita (palawa kani name for Tasmania). The Palawa (Tasmanian First Nations) are the Traditional Owners of Lutruwita (Tasmania). The Palawa people have inhabited Tasmania for at least 35,000 years. At the end of the last ice age the sea level rose, and Tasmania became isolated from the mainland of Australia. They survived in the changing landscape partly due to their ability to harvest aquatic resources, such as seals and shellfish. Following conflict between the European colonists and the Tasmanian First Nation peoples, many were relocated to missions on Bruny Island, Flinders Island, and other sites, and finally to Oyster Cove. Through consultation with representatives from Circular Head Aboriginal Corporation, who a body who speaks for the Palawa of North West Tasmania, Beach understands that kelp, whales, and mutton birds hold special cultural significance for First Nations peoples on mainland Tasmania, King Island and Flinders Island.

5.7.3.3 Sea Country Values

The Planning Area overlaps the South-east Marine Region. Indigenous uses and values within the South-east Marine Region are described in Sea Country - an Indigenous Perspective (NOO 2002). Specifically, Indigenous activities described in the South-east Marine Region Profile (CoA 2015) state:

> *Most parts of coastal Australia are of continuing cultural and spiritual significance to Indigenous people, many of whom engage in subsistence hunting, fishing and gathering and depend directly on marine resources for food. Through their involvement in commercial activities, many Indigenous people also depend on marine resources for their income.*

Fishing is an important part of Indigenous culture, and a variety of methods and equipment are used, including hand gathering, lines, rods and reels, nets, traps and spears. Indigenous fishing targets a range of species of fish, shellfish, crabs and worms that are used for food, medicine or bait. Abalone, crab and lobster harvesting are important Indigenous fisheries. Indigenous people in south-eastern Australia engage in fishing and shellfish collecting on a regular basis and are involved in commercial fishing activities.

First Nations people in the South-east Marine Region have articulated particular aspirations in terms of access rights and traditional use of marine resources, participation in management processes, and participation in the fishing sector. First Nations people's interests in the South-east Marine Region, are diverse and complex. Indigenous people live around the region in major cities, regional centres, small towns and on First Nations land. Coastal areas of southeast Australia were amongst the most densely populated regions of pre-colonial Australia. These highly populated areas provided an abundance of marine and other resources. However, we know that many have been displaced from the coastal areas (NOO 2002).

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, and that songlines pass through marine parks.

5.7.3.4 Sea Country Values – Resources

Adornment and Function

Frequently, tangible resources, such as food items, animal and plant species, and other resources, such as stone, bone and wood, are also tied strongly to intangible elements of First Nations culture. First Nations people of Tasmania, the palawa, were noted for creating durable and waterproof containers of sea-kelp threaded and dried to shape on wooden handles. In addition, shells were collected and worn as adornment. Throughout south-eastern Australia, reports of seaweed use include for cultural and ceremonial activity, medicine, clothing, food, fishing, and domestic/shelter uses (Thurstan et. al 2017). The Wadawurrung, for example, used "pink seaweed" as a poultice for jellyfish stings (Lane 1980).

Other fish and shellfish species have been noted by community during consultation, including abalone, cockles, and rock lobster (crayfish). The Eastern Maar have noted the migration routes of crustaceans as of notable significance. The Wadawurrung mention that crayfish, mussels, oysters, pipis, and fish provided important bush tucker, medicines, and other resources. Fish were caught using hooks, nets, and traps (WTOAC 2020). Other species were specifically not eaten or associated with other custom, for example, the Stingray (Baalangurk) was not eaten by the Kurnai (Howitt 1996 n.d.). Swans were hunted with boomerangs and spears, whilst other birds were caught in nets woven from plant fibres (WTOAC 2020).

Eels

Eels and their migration are held in social and cultural significance by the Bunurong. Other coastal and river groups, including the Wadawurrung (buniya), also utilised eels as an important resource and seek to protect their migration along rivers, creeks, and into the oceans. Section 5 provides more details on eels.

The Kulin and Kurnai Dreaming Story of Lo-an includes Lo-an and his wife Lo-an-tuka surviving mostly on eels cooked in a marin-a-thung (earth oven) on the Yarra flats. After finding a feather on his chest, Lo-an with Lo-an-tuka proceeded to follow the breeze to find the swans that the feather had come from and walked to the shores of Western Port. They camped for a long time feeding on swans and continued following the coastline to Corner Inlet. The Kulin believe they became the stars Sirius and Canopis. The Kurnai believe Lo-an is upon his mountain and looks out towards to sea, watching over the people (Massola 1968).

Whales

Through consultation, whales, including southern right and blue whales and their migration routes have been noted as of social and cultural significance by coastal First Nations groups in Victoria.

First Nations communities in the south-east of Australia often saw whales as spirits that transformed when they entered the water, creating a respectful relationship between whales and First Nations communities.

For Bunurong, the great mother whales or, Parbayin Betayil, are a significant part of women's lore and according to creation stories songs guided mother whales and their babies to the safe resting place, it is there that Bunurong women learned of the sacred ways of womanhood. (Walton, 2021).

Whales have featured in dreaming stories, ceremony, song and dance of First Nations people for millennia. Gunditjmara maintain a strong spiritual connection to all species of whales that travel through Gunditjmara country (GMTOAC RNTBC 2023). Karntabul yarkeen (whale dreaming) stories connect Aboriginal groups all along the coasts of Australia, neighbouring groups in Victoria, still gather today to strengthen the connection of groups to whales and their stories. The arrival of whales in waters also signifies the beginning of the 'big wet season (May-Oct), 1 of 6 Gunditjmara seasons. Whales are also a food source, in traditional times, tribes would send up smoke signals and gather when whales got beached. Protection of whales is paramount to Gunditjmara spiritual, physical wellbeing (GMTOAC RNTBC 2023).

Whale hunts took place from small, shore-based vessels, and targeted smaller animals (Eldridge 2015). First Nations methods of hunting may have included using fire and smoke to lure the whales to the coast and bays (Eldridge 2015), and the opportunistic utilisation of beached whales also occurred, which may have prompted periods of intense gathering of people and ceremony like those observed by early settlers such as Henty (Eldridge 2015). In Howitt's notes on the Kurnai, whales are called Ganda - 'Dead whales thrown up by the sea were supposed to have been killed by the Mrarts [ghost or spirit] and birds called Yauruk [or Yara-wuk] and sent ashore. The Mrarts then communicated to the Biraaks who told the Kurnai where to go and find the Ganda (Howitt 1996 n.d.).

The Gunaikurnai have noted bottlenose dolphin at Lakes Entrance, and the significance of dolphins is echoed by the Wadawurrung. Wesson (2001) notes that 'the souls of prominent community leaders [were] reincarnated as dolphins and orcas'.

5.7.3.5 Sea Country Intangible Values

Landforms and landscape features in and surrounding watery places are known to hold particular significance for First Nations coastal communities. Islands off the Southern Ocean coastline have cultural importance to First Nations people as Islands of the Dead and are frequently connected to the shore by journey-after-death stories (Draper 2015).

For example, the Gunditjmara of Western Victoria seasonally occupied the caves and escarpments in the coastal limestone karst formation. These caves at Cape Bridgewater are associated with Bunjil who descended from the caves where he resided to walk along the shoreline (Bonwick 1858). The Gunditjmara believe that 'Bunjil, their creator and eagle and his brother Pallian ascended to the sky from Deen Maar in a sheet of flame after creating the land and sea and all living things' (Draper 2015). Mathews (1904) noted that the Gunditjmara buried their dead on the mainland with their heads pointed to Deen Maar island where their souls would be transported to await reincarnation. Dawson (1881) records that a haunted cave, Tarn wirring 'road of the spirits', is believed to form a passage between the mainland and the island, and the good spirit 'Put put cheptech' conveys the spirit from the island to the clouds. Other Islands in south-eastern Australia, such as Kangaroo Island (Karta), hold similar stories.

Contact and post-contact places are also noted to be in or adjacent to Sea Country in Victoria and Tasmania, and these include sites of massacre and dispossession. The site of the Convincing Ground massacre (1833/34), where a group of whalers murdered Gunditjmara over ownership of a stranded whale, is located north of Allestree on the Portland coast. This place continues to be a place of great sorrow for the community. Other coastal massacre sites include on the Aire River Estuary at Cape Otway (1846), Eurmerella (1842), Freshwater Creek (1843) Twofold Bay (1806), and Cape Grimm (1828) (Newcastle University 2024). Missionary activity and forced removal of First Nations people in Tasmania resulted in detainment of First Nations people on Flinders Island (at Wybalenna). Other First Nations groups were taken to Swan Island and Gun Carriage Island. This detainment resulted in significant loss of life, and a loss of culture, language, and connection.

Law, Spirituality and Songlines

Intangible heritage refers to the cultural assets, cultural knowledge and intellectual property collectively held by First Nations and may involve practices, oral traditions, ancestral narratives, performing arts, local knowledges and practices concerning nature, the environment, and the universe. Intangible cultural heritage performs an important function of safeguarding to recognise and protect knowledge and skills that are transmitted through it from one generation to the next.

Songlines are described as short songs pertaining to the travels and exploits of ancestral beings during the Dreamtime. These songs are usually sung in association with a ritual activity, particularly dancing (Tonkinson 1972). Songlines are stories ancestral beings which includes creation stories, they are multipurpose the stories educate and uphold traditional lore, they are also communication and trade routes. (Fuller & Busill 2021).

Understanding First Nations songlines and stories also means understanding the Dreaming. Often described as the 'Dreamtime', or 'deep time', recognising the existence of Dreamtime beyond the Western concept of past, present, and future.

First Nation's people around Australia have long had a strong connection to whales, which has significance as totemic ancestors to some groups. The arrival of whales along Australia's coastline marked the arrival of the "elders of the sea", which follows a songline or ancient memory code, that traces the journeys of ancestral spirits as they created the land, animals, and lore.

In Victoria, Koontapool (southern right whales) occur along the coastlines of south-west Victoria in Gunditjmara Sea Country to feed and birth. These Koontapool Woorrkngan Yakeen (Whale Birthing Dreaming Sites), are in coastal bay areas from Port Campbell to Portland, including Warrnambool. These places on Gunditjmara Country are known resting and feeding sites for mothers and calves and are directly related to Gunditjmara Neeyn (midwives), explaining why Gunditjmara is a Matrilineal Nation (DCCEEW 2024k).

A Kulin Dreaming story includes Angel Cave (between Port Philip and Western Port) where "One Day Bunjil, the All Father, was walking upon the sea, when suddenly there rose a great storm. Bunjil walked to the rocky shore and spoke to it, and immediately the shore rose up into a cliff and the cave was made before his eyes. Bunjil stepped into it and sheltered there till the storm was over' (Massola 1968).

A Kurnai Dreaming story of Port Albert includes the sick frog, Tide-lek, who drank all the water from the land. He didn't feel sick anymore, but he felt bad for leaving the people with nothing to drink. He walked across Port Albert one day and everyone tried to make him laugh to regurgitate the water, but they all failed until No-yang (the eel) danced on his tail and Tide-lek laughed and the land flooded. Many people died or were marooned, forming the islands. The pelican saved people with a large canoe. As part of this Dreaming Story, the pelican also formed the white pipe-clay used for ceremony at White Rock, the southernmost Island of the Seal Group east of Wilsons Promontory (Massola 1968).

As part of the Kurnai creation stories the first man and woman were Borun the pelican, and Tuk the musk duck (VACL 2014). Totemic Species are spiritually important and can be bestowed in a number of ways – through family relations or through ceremony. Randall Mumbler, from the Eurobodalla region, for example, discusses that '… Fish are more likely to be ceremonial totems; it is not common to have a fish as a totem… I have certain species that I can't fish for or eat. These rules have been placed upon me through ceremony and so I stay away from them. There are certain fish that my brother and I never eat. That is also like a conservation thing…it keeps that species alive…" Randal Mumbler (in Donaldson 2012).

The Eastern Maar discuss their connection to Sea Country noting that the sea was 'central to our culture, economy, and survival. The coastline is home to sites that are important for our Dreaming - Three Sisters Rocks and Deen Maar (Lady Julia Percy Island) where our Ancestors leave the earth. Our connection with our Sea Country extends well beyond the current shoreline to the edge of the continental shelf. While this area is under the sea today, we occupied it for thousands of years and rising sea levels have not washed away the history, physical evidence or our connection (EMAC 2015)

5.7.3.6 Submerged Cultural Heritage and Landscapes

First Nations peoples in Victoria and Tasmania have occupied, used, and managed sea country for thousands of years, including areas now submerged by sea level rise since time immemorial. An understanding of submerged landscapes and sea level changes may be evident from stories from First Nations groups, "Indigenous peoples still relate to land that was inundated by sea during the last ice age and regard it as their own" (NOO 2002).

The lava flows of the World Heritage listed Budj Bim Cultural Landscape (which is outside of the Operational Area and Planning Area) have recently, through ocean scanning methods, been revealed to extend into the sea. The mapping of this geological formation allows the Gunditjmara to connect to Sea Country in new ways assisted by modern technology, as a supplement to their traditional knowledge and ancient connection to the sea

5.7.3.7 Conservation and Contemporary Cultural Values

It is frequently raised by First Nations communities that ecological protection and sustainability is integral to First Nations cultural and contemporary values. Sea Country Plans, such as those completed by the Wadawurrung (WTOAC 2020), and Eastern Maar (EMAC 2015), highlight the importance of approaches that protect and enhance the environment, including biodiversity, coastal erosion, management of sea level rise and addressing climate change impacts. Goals include managing impacts to whale migration, bird and bat nesting and migration (such as the microbat, bent-wing bat, and orange-bellied parrot), protection of environmentally fragile resources such as seagrass and kelp fields, as well as securing habitat for threatened species such as the leafy seadragon.

'Increased pollution from coastal communities, agricultural and industrial run off is changing the sea hydrology and choking our sea life with plastics. Our Warre is being overused and heating up with climate changes. We are seeing the loss of our kelp forests and dramatic changes in sea life which we all depend upon' (WTOAC 2020). 'Our coastal dunes are layered with living places and hearths from the many generations of our ancestors living, harvesting, sharing meals, trading in these living places, and practicing ceremony here. We have the largest stretch of registered cultural sites in Australia along our coastline.

Our fish traps, which were used to catch the abundant fish, have survived the storms and sea level changes. Ochre pits of different colours are dotted along our sandstone and limestone cliffs and headlands. Our sandy beaches, rock pools, rocky platforms and reefs were and continue to be places of abundance for harvesting food and resources like crustaceans, shellfish, and kelp' (WTOAC 2020).

Seals, or Bithaui or Gurnun in Kurnai (Howitt n.d.), are noted by the Gunaikurnai as a significant species, and habitat for fur seals at Wilsons Promontory Marine National Park is identified as an important resource to be protected, particularly due to the reliance of species on both the land and sea for different life cycle stages. It is therefore considered important that programs for environmental management consider both land and marine environments, as they are interconnected and must be managed as a whole to ensure success (GLAWAC 2015). Through the processes identified above, and in particular, consultation with First Nations Groups, Beach is confident we have identified the cultural heritage values, and cultural features and sensitivities of First Nations groups identified within the Operational Area and Planning Area.

5.7.4 Assessment of Potential Impacts and Risks to Cultural Values and Sensitivities

Section 0 evaluates the environmental impacts and risks and identifies where First Nations cultural values and sensitivities may be potentially affected. Where a potential impact to First Nations cultural values and sensitivities has been identified, details of the control measures, if required, to reduce impacts and risks from the Program are of an acceptable level and as low as reasonably practicable are provided.

5.8 Maritime Archaeological Heritage

5.8.1 Shipwrecks

Shipwrecks over 75 years old are protected within Commonwealth waters under the Historic Shipwrecks Act 1976 (Cth), in Victorian waters under the Victorian Heritage Act 1995 (Vic), and in Tasmanian waters under the Historic Cultural Heritage Act 1995 (Tas).

There are 255 shipwrecks mapped within the EMBA using a search of the Australian National Shipwreck Database (DAFF, 2020g) (Figure 5.31).

The nearest shipwreck to Yolla-A is the Victoria (shipwreck ID 6769), located 49 km east-northeast of Yolla-A. There is little information about this shipwreck other than the fact it was wrecked in 1908.

The nearest shipwrecks to the offshore RGP are the:

- Agnes – shipwreck ID 5931, located 2 km west of the pipeline and 12 km from the nearest shoreline.
- Maori – shipwreck ID 6393, located 1.5 km west of the pipeline and 4 km from the nearest shoreline.
- Eli Lafond – shipwreck ID 6145, located 100 m east of the pipeline and 900 m from the nearest shoreline.

5.8.1.1 Shipwreck Protection Zones

Of the 650 shipwrecks in Victoria, nine have been placed within protected zones (a no-entry zone of 500-m radius [78.5 ha] around a particularly significant and/or fragile shipwreck) (DAFF, 2020g). Five of these are located within Port Phillip Bay, and two along the west Gippsland coast, these being the PS Clonmel (just outside Corner Inlet) and the SS Glenelg (187 km northeast of Yolla-A). The SS Glenelg is intersected by the EMBA and is described below.

SS Glenelg (1900) is one of the worst maritime disasters in Victorian history with the deaths of 38 people and only three survivors. After the wreck was discovered, it was subject to heavy looting and was placed in a protected zone to help prevent further theft. Maritime archaeologists also want to study the remains of the hull as they may provide unknown technical details of iron ship building, details of the refit the vessel underwent in 1898 and information pertaining to life on board a typical cargo/passenger vessel at the turn of the century (DAFF, 2020g).

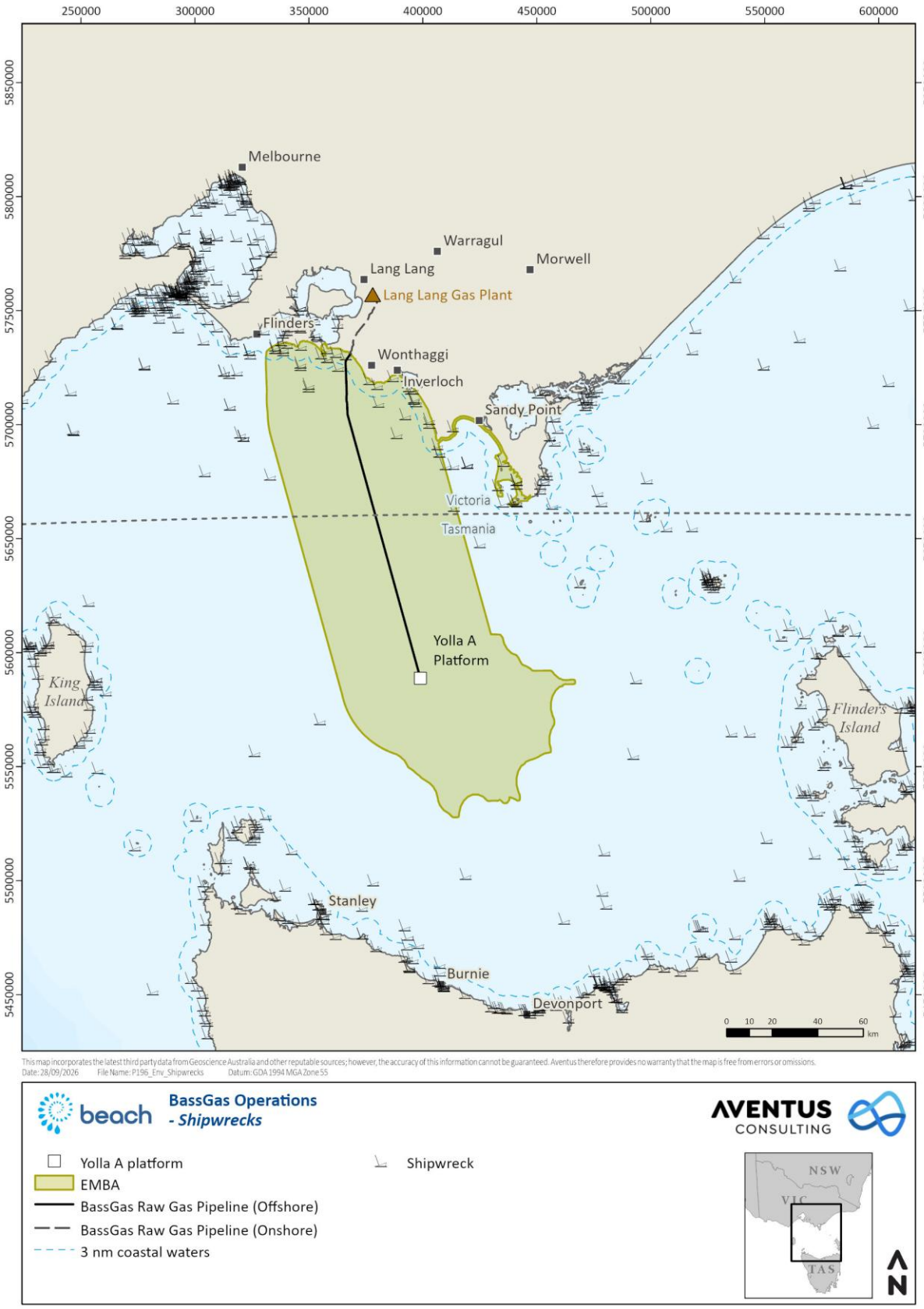


Figure 5.31: Known shipwrecks and lighthouses in Bass Strait and the EMBA

5.9 Socio-economic Environment

This section describes the social and economic environment of the operational area and EMBA. Note, only coastal settlements that are modelled to be potentially exposed to shoreline loading of hydrocarbons under the spill scenarios are described here.

Victoria

The pipeline shore crossing is located in the Bass Coast Shire. The Bass Coast Shire is located in south-eastern Victoria, about 130 kilometres south-east of the Melbourne CBD and is a popular holiday destination. Bass Coast Shire is bounded by Western Port Bay in the north and west, Cardinia Shire in the north-east, South Gippsland Shire in the east, and Bass Strait in the south.

Australian Bureau of Statistics (ABS) data from the 2021 census for the Bass Coast Shire indicates that it has a population of 40,675 with a median age of 51 and with Aboriginal people making up 1.1% of the population. The Shire covers an area of 864 km2, 88% of which is used for primary production.

The nearest towns to the RGP shore crossing and along the coast of the EMBA are briefly described below based on ABS (2021) census data:

- Kilcunda has a population of 578 people and a median age of 55. Of those in the labour force, 45.2% worked full-time and 41.7% worked part-time. Professionals, managers and community and personal service workers made up 50% of the population's occupations.
- Wonthaggi has a population of 8,430 people and a median age of 51, occupying 4,290 dwellings. The greatest proportion of the population are employed as hospital, supermarket and aged care residential services.
- Cape Paterson has a population of 960 people and a median age of 54. There are 1,081 private dwellings and the median weekly household income is $1,253. Managers and Clerical and administrative workers were the two most common occupations at 22.1% and 15.5%, respectively.
- Cape Woolamai (Phillip Island) has a population of 2,301 and a median age of 43. It has 1,851 private dwellings, of which 47.6% are permanently occupied, reflecting its popularity as a holiday home destination.
- Inverloch, with a population of 6,046, had 41.7% of its 4,278 dwellings permanently unoccupied. The area is a popular tourist destination, particularly for swimming, kitesurfing and windsurfing in the calm waters of Anderson Inlet. Fishing and surfing are also popular.

Tasmania

There are no Tasmanian coastal settlements along shorelines modelled to be potentially exposed to shoreline loading of hydrocarbons in the event of a spill.

5.9.1 Offshore energy exploration and production

In 2018, Victoria accounted for 11% of Australia's crude oil production, 11% of Australia's condensate production, 49% of Australia's LPG production and 10% of Australia's conventional gas production (AEMO, 2025). Production has been trending down since it peaked in 2000.

The EMBA overlaps with the Gippsland oil and gas production province, which is home to numerous offshore platforms, subsea wells, and pipelines. Major producers in the Gippsland region include Woodside Energy Group and ExxonMobil, which jointly operate the Bass Strait fields through the Gippsland Basin Joint Venture. Other companies involved in oil and gas activities in the area include Carnarvon Hibiscus Pty Ltd and Amplitude Energy (Cooper Energy), which engage in various operations such as pipeline management, non-production activities, and decommissioning projects.

The EMBA overlaps the Tasmanian Gas Pipeline, which connects the Victorian and Tasmanian gas networks. The pipeline is 740 km in length, including approximately 300 km of sub-sea pipeline and has a capacity to transport 129 terajoules (TJ) per day of natural gas to Tasmania (AEMC, 2025).

5.9.2 Other Infrastructure

The Victorian Desalination Plant, located at Wonthaggi, is located 140 km north of Yolla-A. The Victorian Desalination Project (Project), located in the Wonthaggi region, achieved final commissioning completion on 17 December 2012 and is fully operational. The plant is capable of supplying up to 150 billion litres of water a year to Melbourne, Geelong and via other connections, South Gippsland and Western Port towns. The seawater intake and outlet structures are connected to the onshore plant via a 1.2 km and 1.5 km underground tunnel, respectively. The BassGas RGP is located approximately 3 km west of the intake and outlet structures (Figure 5.32). The two intake structures are 8 m high, 13 m in diameter, situated 50 m apart and located in a water depth of 20 m. They draw in water at very low speeds (the suction effect is not strong enough to draw fish in).

There are two Telstra telecommunications cables located 5 km and 6.5 km east of Yolla-A, with another telecommunications cable located 29 km to the west of Yolla-A. This western telecommunication cable intersects the offshore RGP at a point 33 km off the Victorian coast.

5.9.3 Tourism

Marine-based tourism and recreation in Bass Strait is primarily associated with recreational fishing, boating and ecotourism.

Seaside towns are the primary destinations that attract tourists and holidaymakers to the south coast of Victoria and northwest coast of Tasmania. These coastal communities are popular tourist towns for their boating and fishing activities, along with bushwalking, bird watching and other nature-focused activities. Towns including Inverloch, Venus Bay, Cape Paterson and Cape Woolamai in Victoria are especially popular in summer as well. The George Bass Coastal Walk is one such nature-focused activity that stretches from the outskirts of San Remo to Kilcunda and features a cliff-top trail that follows the route of explorer George Bass and offers spectacular views of the coastline.

The Bass Coast tourism industry is significant, with recent estimates showing it generates approximately $202.3 million in direct visitor expenditure and accounts for 1,255 direct and full-time equivalent jobs. It is the most tourism-reliant region in Victoria, contributing 11.2% to the region's Gross Regional Product, according to the Bass Coast Annual Report (2023-24) (BCSC, 2024)

At Stanley on the northwest coast of Tasmania, The Nut provides a range of tourism and recreational opportunities including scenic viewing, walking tracks and a chair lift, and areas for nature study, which are enjoyed by interstate and overseas visitors. This area is managed by the Tasmanian Parks and Wildlife Service (TPWS).

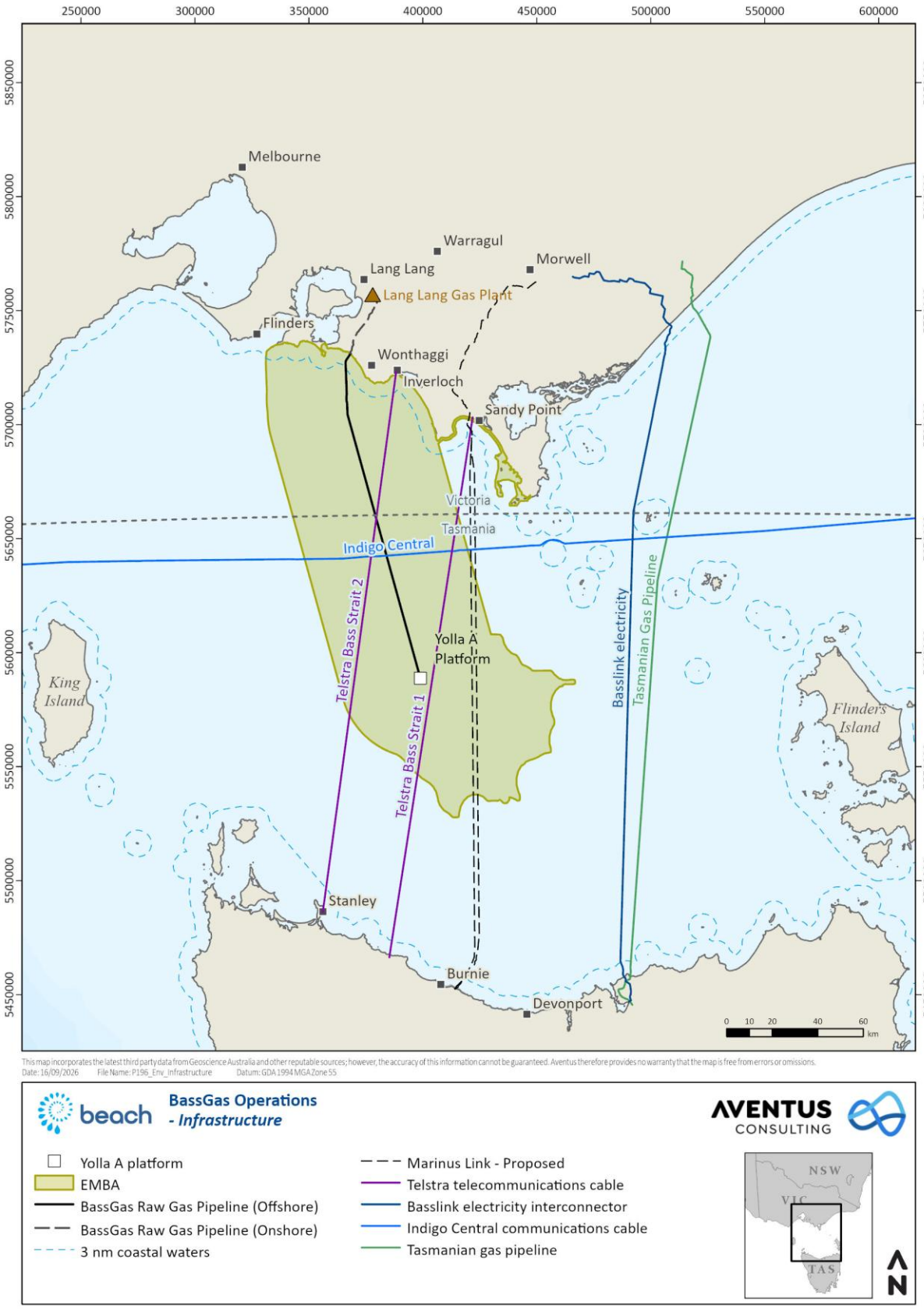


Figure 5.32: Bass Strait subsea infrastructure in the EMBA

5.9.4 Recreation

Recreational fishing along the Bass, Gippsland typically targets snapper, King George whiting, flathead, bream, sharks, tuna, calamari, and Australian salmon. Along the Tasmanian north coast, a range of recreational species are targeted including salmon, bream, tuna and rock lobster using gear including rods, nets and pots.

The Kilcunda Lobster Festival is held annually in late January in the town of Kilcunda (where the pipeline comes ashore) as a fundraising event. The festival draws nearly 5,000 people each year and celebrates all things lobster. The Sam Remo fishing festival (located 11 km from the RGP shore crossing) is held in September each year, with the main event being the 'blessing of the fleet' (to ensure safe journeys and a bountiful season).

As Bass Strait is relatively shallow, the water currents through the Bass Strait can create unpredictable seas, reducing the numbers of small recreational boats from venturing long distances from shore. Larger game fishing boats are likely to fish further out to sea and use boat ramps and marinas along the Victorian coast of the EMBA.

Businesses provide for the equipment needs of fishermen and fishing tours along the Bass Coast. Competitions such as the San Remo Easter Fishing Good Friday Appeal Competition, held annually over the Easter long weekend, and community groups such as the Anderson Inlet Angling Club are examples of recreational fishing's popularity in the region.

Recreational diving and snorkelling are popular activities with a diverse range of sites in around the Victorian and Tasmanian coast. Open water dives to shipwrecks off the coast of Wilsons Promontory, such as the wreck of the SS Cambridge and the SS Gulf of Carpentaria are also common spots for recreational divers.

5.9.5 Commercial Fisheries

The operational area and EMBA intersect several Commonwealth, Victorian and Tasmanian managed commercial fisheries. These are the described below.

5.9.5.1 Commonwealth-managed Fisheries

Commonwealth fisheries are managed by the Australian Fisheries Management Authority (AFMA) under the *Fisheries Management Act 1991* (Cth). AFMA jurisdiction covers the area of ocean from three nautical miles from the coast out to the 200 nautical miles limit (the Australian Fishing Zone (AFZ)). Commonwealth commercial fisheries with jurisdictions to fish within the EMBA are the:

- Bass Strait Central Zone Scallop Fishery (BSCZSF) (6.73% overlap with the planning area);
- Eastern Tuna and Billfish Fishery (0.43% overlap);
- Small Pelagic Fishery (0.45% overlap);
- Southern Bluefin Tuna Fishery (0.21% overlap);
- Southern Squid Jig Fishery (SSJF) (0.55% overlap); and

- Southern and Eastern Scalefish and Shark Fishery (SESSF), incorporating.
    - Commonwealth Broad Trawl sector (1.19% overlap).
    - Danish Seine (1.19% overlap).
    - Scalefish Hook sector (0.59% overlap).
    - Gillnet and Shark Hook sector (1% overlap).

Though certain fisheries possess jurisdiction to actively fish within the operational area and EMBA, analysis of publicly available catch data indicates that not all fisheries have been active within the operational area and/or planning areas. Table 5.18 summarises the jurisdiction and fishing catch volumes and values for commonwealth fisheries that have been active in the operational area and EMBA.

As detailed in Section 4.7 Beach's consultation with Commonwealth fishery industry representatives indicates they have no material concerns about potential conflicts between their operations and the ongoing BassGas operations. The small area of overlap between the EMBA and Commonwealth fisheries, together with the fact that many of the Commonwealth fisheries listed above do not actively fish around the BassGas development or in the EMBA, is likely to be the key reason for the lack of concern expressed to Beach.

Table 5.18: Commonwealth-managed commercial fisheries in the operational area and EMBA

Fishery	Target species	Geographic extent of fishery	Does fishing occur in the operational area or EMBA?	Fishing season	Fishing methods, vessels and licences	Catch data and other information
Southern Squid Jig Fishery (Figure 5.33)	Arrow squid (*Nototodarus gouldi*)	The fishery extends from the SA/WA border east to southern Queensland.	**Operational area?** No. There is no overlap between the operational area and low, medium or high intensity fishing grounds. The operational area intersects 0.006% of the fishery. **EMBA?** Yes. Based on 2020 - 2024 fishing intensity data, the EMBA overlaps a small area of low intensity fishing. The EMBA intersects 0.55% of the fishery.	12-month season begins 1st January and ends 31 December.	Squid jigging is the fishing method used, mainly at night-time and in water depths of 60 to 120 m. High-powered lamps are used to attract squid. Portland, Apollo Bay, Port Fairy, Geelong and Queenscliff are the primary landing ports. • 2023 – 8 active vessels. • 2022 – 6 active vessels. • 2021 – 8 permits and 29 active vessels. • 2020 – 5 active vessels. • 2019 – 8 permits and 35 active vessels.	Catch data and economic value available for the last five years with totals including hook, gillnet and trap sectors: • 2023 – 963 tonnes worth $4 million • 2022 – 394 tonnes worth $1.86 million. • 2021 – 982 tonnes worth $3.3 million. • 2020 – 480 tonnes worth $2.4 million. • 2019 – 722 tonnes worth $2.89 million.
Southern and Eastern Scalefish and Shark Fishery (SESSF)						
Shark Gillnet Sector (Figure 5.34)	Gummy shark (*Mustelus antarcticus*) is the key target species, with bycatch of elephant fish	Waters from the NSW/Victorian border westward to the SA/WA border, including the waters around Tasmania, from the low water	**Operational area?** Yes. Based on 2019 - 2023 fishing intensity data, the operational area overlaps areas of	12-month season begins 1st May.	Demersal gillnet and a variety of line methods. • 2023-24 – 60 permits and 31 active vessels. • 2022-23 – 60 permits and 30 active vessels.	Catch data and economic value available for the last five years with totals including hook, gillnet and trap sectors: • 2023-24 – 2,116 tonnes with no value assigned.

	(*Callorhinchus milii*), sawshark (*Pristiophorus cirratus, P. nudipinnis*), and school shark (*Galeorhinus galeus*).	mark to the extent of the AFZ. Most fishing occurs in waters adjacent to the coastline in Bass Strait.	low and medium intensity fishing. The operational area intersects 0.01% of the fishery. **EMBA?** Yes. Based on 2019 - 2023 fishing intensity data, the EMBA overlaps areas of low and medium intensity fishing. The EMBA intersects 1% of the shark gillnet and shark hook sector.		• 2021-22 – 60 permits and 29 active vessels. • 2020-21 – 61 permits and 31 active vessels. • 2019-20 – 61 permits and 35 active vessels.	• 2022-23 – 2,086 tonnes worth $23.92 million • 2021-22 – 2,150 tonnes worth $21.1 million. • 2020-21 – 2,268 tonnes worth $24.84 million. • 2019-20 – 2,201 tonnes worth $19.7 million.
Commonwealth Trawl Sector (CTS) danish seine fishery (Figure 5.35)	Tiger flathead (*Neoplatycephalus richardsoni)* and the eastern school whiting (*Sillago flindersi)* are the key species.	The fishery extends from north of Sydney/NSW westward to Cape Jervis in SA, including the waters around Tasmania.	**Operational area?** Yes. Based on 2019 - 2023 fishing intensity data, the operational area overlaps an area of low intensity fishing. The operational area intersects 0.01% of the fishery. **EMBA?** Yes. Based on 2019 - 2023 fishing intensity data, the EMBA overlaps an area of low and	12-month season begins 1st May.	A vessel will set out long ropes and a net on the seabed. It will haul the ropes together to herd fish into the net for capture. • 2023-24 – 37 permits and 18 active vessels. • 2022-23 – 37 permits and 18 active vessels. • 2021-22 – 19 active vessels. • 2020-21 – 20 active vessels. • 2019-20 – 19 active vessels.	Catch data and economic value available for the last five years with totals including otter trawl, Danish seine and scalefish hook sectors: • 2023-24 – 12,919 tonnes with no value assigned. • 2022-23 – 13,393 tonnes worth $65.88 million • 2021-22 – 19,501 tonnes worth $80 million.

		medium intensity fishing. The EMBA intersects 1.19% of the fishery.	• 2020-21 – 20,883 tonnes worth $64 million. • 2019-20 – 13,072 tonnes worth $51.34 million.

Sources: CoA (2025, 2024, 2023; 2022; 2021).

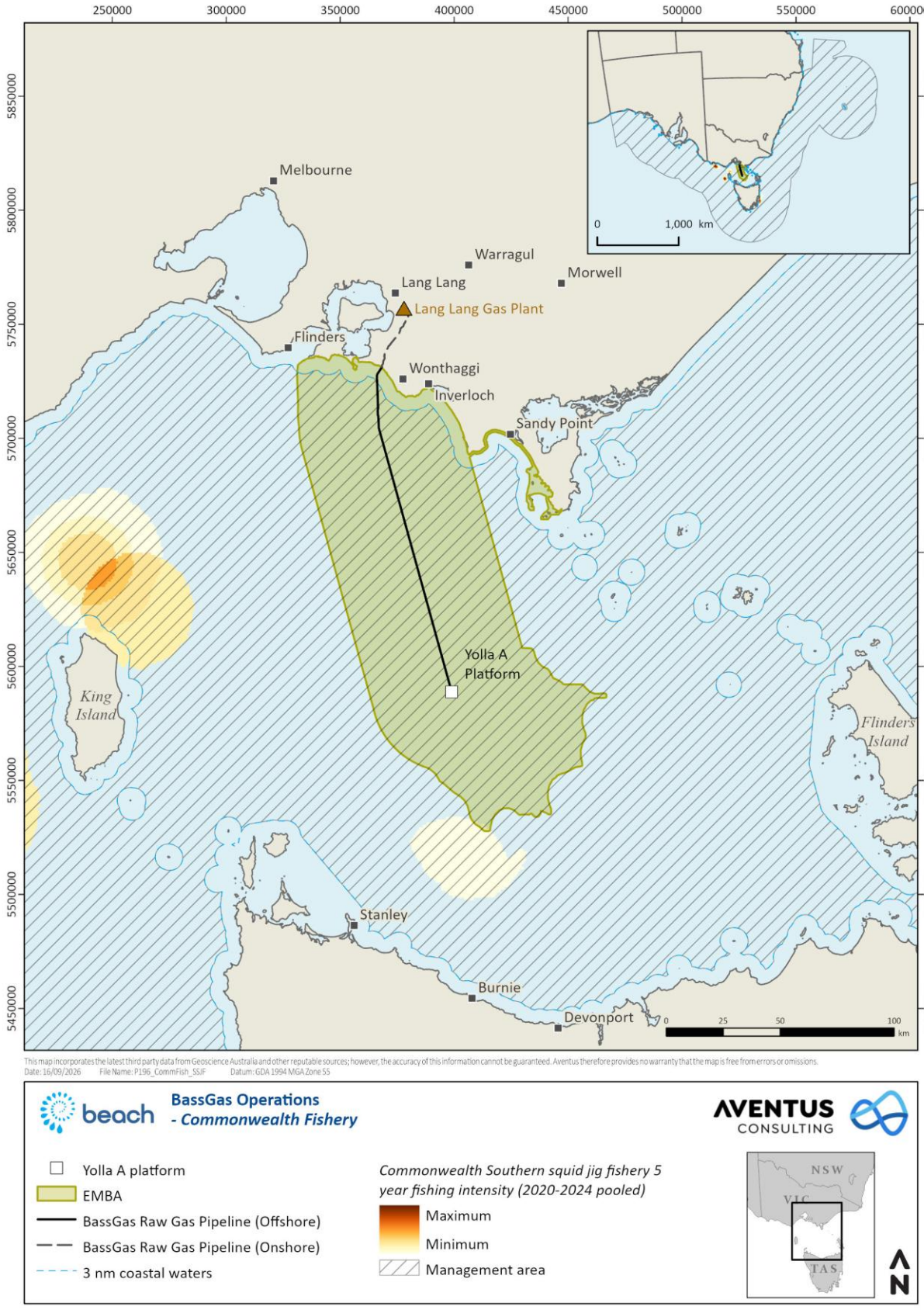


Figure 5.33: Area and fishing intensity between 2020 – 2024 of Southern Squid Jig Fishery.

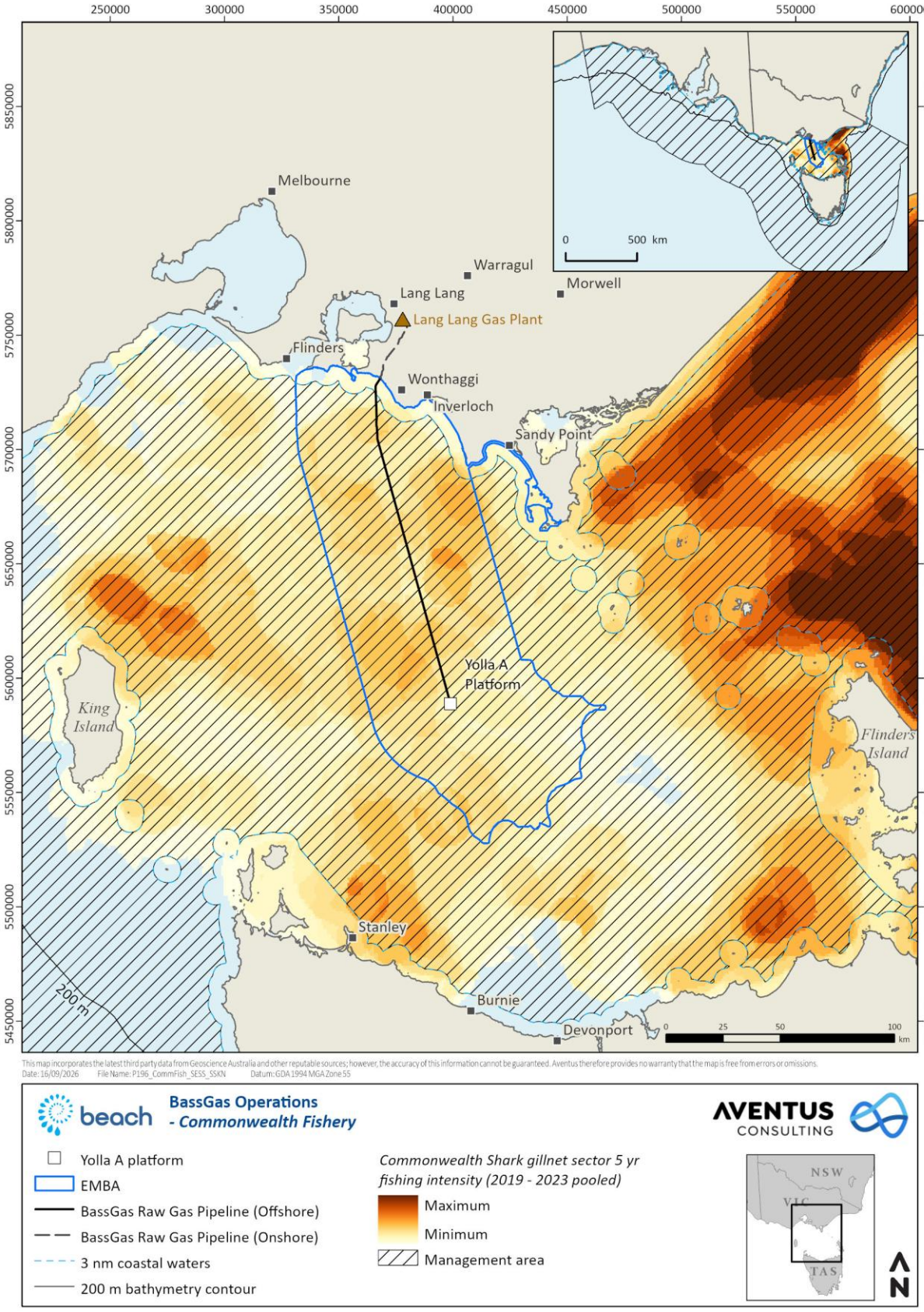


Figure 5.34: Area and fishing intensity between 2019 – 2023 of the shark gillnet fishery.

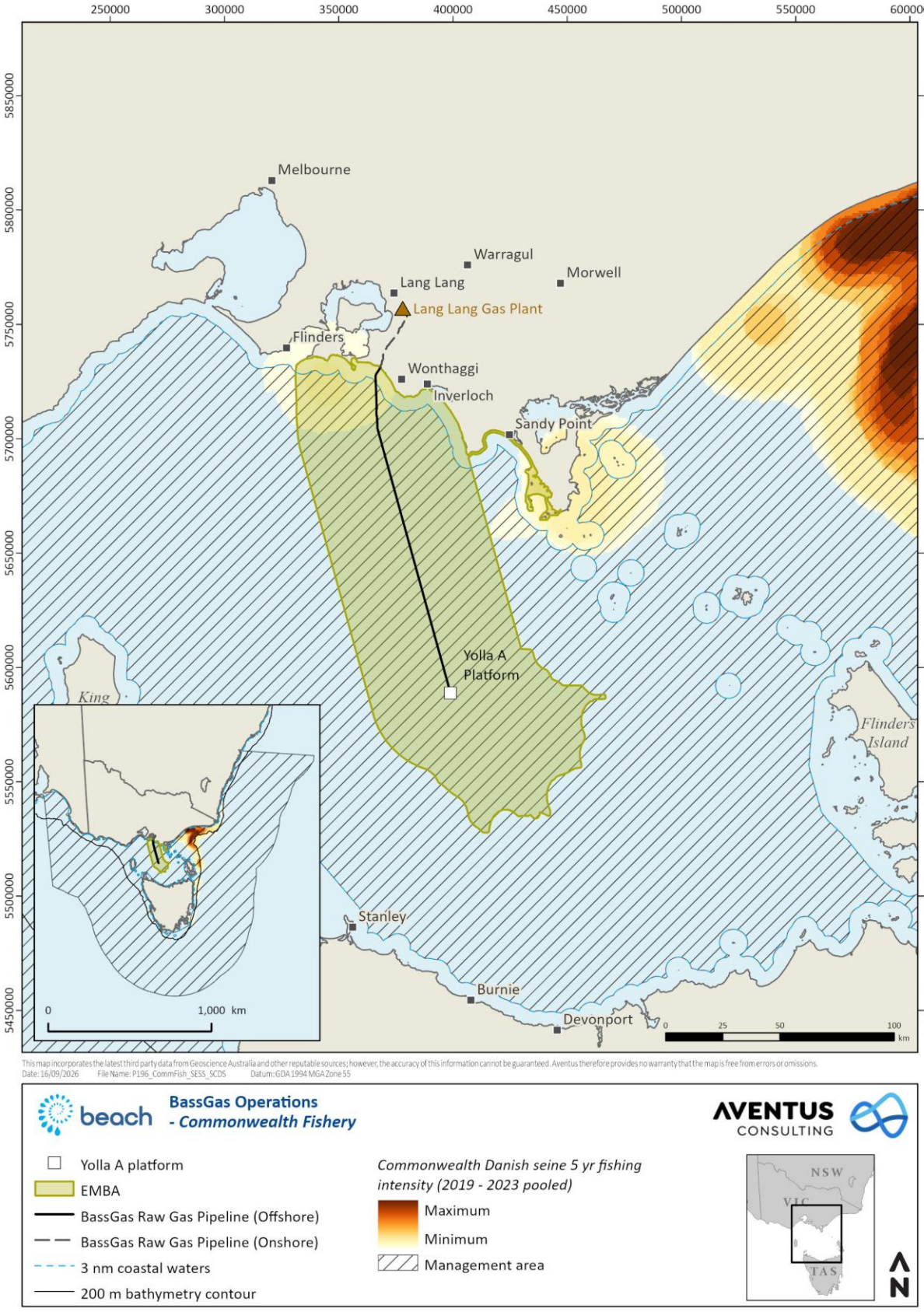


Figure 5.35: Fishing intensity in the Commonwealth Trawl Sector for Danish-seine, 2019 – 23 fishing seasons.

5.9.5.2 Victorian-managed Fisheries

Table 5.19 provides the Victorian-managed commercial fisheries in the operational area and EMBA and summarises the key information for each of these fisheries and indicates that the Victorian-managed commercial fisheries with jurisdiction within the EMBA include:

- Abalone Fishery Zone (4.42% overlap);
- Giant Crab Fishery Zone (4.38% overlap);
- Pipi Fishery Zone (6.18% overlap);
- Rock Lobster Fishery Zone (4.38% overlap);
- Scallop Fishery Zone (10.71% overlap);
- Wrasse Fishery Zone - assessment zone (8.13% overlap);
- Sea Urchin Fishery Zone (5.6% overlap);
- Octopus Fishery (4.59% overlap);
- Ocean trawl fishery (7.86% overlap); and
- Inshore trawl fishery (4.85% overlap).

Table 5.19. Victorian-managed commercial fisheries in the operational area and EMBA

Fishery	Target species	Geographic extent of fishery	Does fishing occur in the operational area or EMBA?	Fishing season	Fishing methods, vessels and licences	Catch data and other information
Abalone Fishery (Figure 5.36)	Blacklip (*Haliotis rubra*) and greenlip abalone (*H. laevigata*) are targeted species.	Victorian Central Abalone Zone is located between Lakes Entrance and the mouth of the Hopkins River. Most abalone live on rocky reefs from the shore out to depths of 30 m.	**Operational area?** Yes. The operational area intersects 0.07% of the Victorian Central Abalone Zone. There is no fishing data available for the abalone fishery. **EMBA?** Yes. The EMBA intersects 4.42% of the Victorian Central Abalone Zone. Waters around Yolla-A are too deep for this fishery.	1 July - 30 June (Central zone)	Abalone diving activity occurs close to shoreline using hookah gear (breathing air supplied via hose connected to an air compressor on the vessel). Commercial divers do not use SCUBA gear. Divers use an iron bar to prise abalone from rocks. The fishery consists of 71 fishery access licences, of which 34 operate in the central zone.	In the central zone, catches for the last five seasons were: 2023/24 – 222 tonnes 2022/23 – 252 tonnes 2021/22 – 260 tonnes 2020/21 – 240 tonnes 2019/20 – 233 tonnes Across all Victorian zones, the catches for the seasons with available data were: 2023/24 – 497 tonnes valued at 16.5 million 2022/23 – 647 tonnes valued at 18.4 million 2021/22 – 636 tonnes valued at 17.3 million 2020/21 – 610 tonnes valued at 16.8 million 2019/20 – 621 tonnes valued at 27.6 million
Giant crab (Western Zone) Fishery (Figure 5.37)	Giant crab (*Pseudocarcinus gigas*)	The boundaries of the fishery mimic those of the Rock Lobster Fishery, however the fishery is based in the Western Zone.	**Operational area?** Yes. The operational area intersects 0.07% of the eastern zone of the fishery.	Closed season from: Female lobsters – 1 June to 15 November to protect females in berry during spawning period.	Fishers target giant crabs using baited rock lobster pots. A pot can have only one entrance and one chamber. Each pot must have at least one escape gap to allow undersize rock	Catches of giant crab for the last five seasons were: 2023/24 – 7.5 tonnes 2022/23 – 7.5 tonnes 2021/22 – 7.5 tonnes 2020/21 – 12 tonnes

Fishery	Target species	Geographic extent of fishery	Does fishing occur in the operational area or EMBA?	Fishing season	Fishing methods, vessels and licences	Catch data and other information
			Fishing intensity between 2021 – 2025 is on the western side of Victoria with no overlap with the operational area. **EMBA?** Yes. The EMBA intersects 4.38% of the fishery. Fishing intensity between 2021 – 2025 is on the western side of Victoria with no overlap with the EMBA	Male lobsters – 15 September to 15 November to protect males during their moulting period when soft shells increase their vulnerability.	lobster and giant crabs to escape. The maximum number of licences is 30 and a maximum of 140 pots across the fishery.	2019/20 – 11 tonnes
Pipi fishery (Eastern Zone) (Figure 5.38)	Pipi (*Donax deltoids*)	Covers the entire Victorian coastline, with pipis found in the surf zone of high-energy sandy beaches. The EMBA intersects the eastern zones (being the Victorian shoreline).	**Operational area?** Yes. The operational area intersects 0.1% of the fishery. Fishing intensity between 2021 – 2025 is close to the border of Victoria and SA. **EMBA?** Yes.	Year-round.	Pipi Fishery Access Licences have been issued for the Discovery Bay and Venus Bay commercial management zones.	Pipis are sold for bait and for human consumption. There is no publicly available information regarding catch data and associated value.

Fishery	Target species	Geographic extent of fishery	Does fishing occur in the operational area or EMBA?	Fishing season	Fishing methods, vessels and licences	Catch data and other information
			The EMBA intersects 6.18% of the fishery.			
Rock Lobster Fishery (Figure 5.39)	Southern rock lobster (*Jasus edwardsii*). Very small bycatch of species including southern rock cod (*Lotella* and *Pseudophycis* spp), hermit crab (family Paguroidea), leatherjacket (*Monacanthidae* spp) and octopus (*Octopus* spp).	The eastern zone stretches from Apollo Bay in southwest Victoria to the Victorian/NSW border. Rock lobster abundance decreases moving from western Victoria to eastern Victoria. Larval release occurs across the southern continental shelf, which is a high-current area, facilitating dispersal.	**Operational area?** Yes. There were 10 – 284 days fished along the Victorian coastline within the operational area between 2021 – 2025. The operational area intersects 0.07% of the fishery. **EMBA?** Yes. There were 10 – 853 days fished along the Victorian coastline within the EMBA between 2021 – 2025. The EMBA intersects 4.38% of the fishery.	Closed season for: Female lobsters – 1 June to 15 November to protect females in berry during spawning period. Male lobsters – 15 September to 15 November to protect males during their moulting period when soft shells increase their vulnerability. Catches generally highest from August to January.	Fished from coastal rocky reefs in waters up to 150 m depth, with most of the catch coming from inshore waters less than 100 m deep. Baited pots are generally set and retrieved each day, marked with a surface buoy. The maximum number of licences is 47 for the eastern zone. Across the Victorian fishery there is a total of 118 licences.	The Rock Lobster Fishery is Victoria's most valuable fishery. In the eastern zone, catches for the last five seasons with available data were: 2022/23 – 17.3 tonnes 2021/22 – 20.7 tonnes 2020/21 – 31.7 tonnes 2019/20 – 37.1 tonnes 2018/19 – 44.7 tonnes

Fishery	Target species	Geographic extent of fishery	Does fishing occur in the operational area or EMBA?	Fishing season	Fishing methods, vessels and licences	Catch data and other information
Bass Strait Scallop Fishery (Victorian zone) (Figure 5.40)	Commercial scallop (*Pecten fumatus*).	Extends 20 nm from the high tide water mark of the entire Victorian coastline (excluding bays and inlets where commercial scallop fishing is prohibited). Management of the Bass Strait Scallop fishery was split between the Commonwealth, Victoria and Tasmania in 1986 under an Offshore Constitutional Settlement, whereby Commonwealth central, Victorian and Tasmanian zones were created.	**Operational area?** No. There is no overlap between the operational area and days fished. The operational area intersects 0.19% of the fishery. **EMBA?** No. There is no overlap between the EMBA and days fished. Fishing effort is east of Wilsons Promontory. The EMBA intersects 10.71% of the fishery.	12-month season, beginning 1st April. Fishing usually occurs during the winter months but can occur from May to the end of November. While scallops are still present in the region, they are believed to be present in much lower numbers than historically. Scallops have highly variable levels of natural mortality, with an historical 'boom' or 'bust' nature. Fishing activity in the area is low, although the VFA is implementing management arrangements designed to increase fishing activity in the area.	Towed scallop dredges (typically 4.5 m wide) that target dense aggregations ('beds') of scallop. A tooth-bar on the bottom of the mouth of the dredge lifts scallops from the seabed and into the dredge basket. There is a maximum of 91 licences available with 89 currently assigned. Only a few vessels fishing these licenses operate in any one year (generally between 12 and 20). Vessels are typically based out of Lakes Entrance or Port Welshpool, although licence holders may fish the entire coastline. Some licence holders also have entitlements to fish the Commonwealth scallop fishery, inshore trawl, Commonwealth SESS fishery and the southern squid jig fishery (see Table 5.15).	Zero quotas were in place for the 2010/11, 2011/12 and 2012/13 seasons due to a lack of commercial scallop quantities. The TACC was set at 136.5 tonnes in the 2014/15 seasons and slightly reduced to 135 tonnes from 2015/16 to 2020/21. In the 2022/23 season, TACC was increased to 979 tonnes due to an increase in viable scallop beds however was reduced to 132 t in the 2023/24 season after a reduction in scallop beds was identified. Scallop spawning normally occurs from late winter to early spring, with larvae drifting as plankton for up to six weeks before first settlement. Juvenile scallops reach marketable size within 18 months.

Fishery	Target species	Geographic extent of fishery	Does fishing occur in the operational area or EMBA?	Fishing season	Fishing methods, vessels and licences	Catch data and other information
Octopus Fishery (Figure 5.41)	Pale octopus (*Octopus pallidus*), Maori octopus (*Macroctopus maorum*) and gloomy octopus (*Octopus tetricus*).	The fishery is divided into the central, eastern and western octopus zones spanning the Victorian coast. The operational area and EMBA overlap the central octopus zone.	**Operational area?** Yes. There were 1 – 49 days fished along the Victorian coastline within the operational area between 2021 – 2025. The operational area intersects 0.07% of the fishery. **EMBA?** Yes. There were 1 – 49 days fished along the Victorian coastline within the EMBA between 2021 – 2025. The EMBA intersects 4.59% of the fishery.	Open year-round from July 1 to June 30.	There are 11 licences within the fishery. Fisheries target octopus by using traps, pots and unbaited dens.	Catches of octopus for the last five seasons were: 2023/24 – 106 tonnes 2022/23 – 132 tonnes 2021/22 – 133 tonnes 2020/21 – 163 tonnes 2019/20 – 136 tonnes
Wrasse Fishery (Figure 5.42)	Blue-throat wrasse (*Notolabrus tetricus*), saddled wrasse (*N. fucicola*), orange-spotted	The central zone stretches from east of Apollo Bay in southwest Victoria to Corner Inlet eastern Victorian. The fishery extends along the entire length of the	**Operational area?** Yes. There were up to 84 days fished along the Victorian coastline within the	Year-round.	Handline fishing (excluding longline), rock lobster pots (if in possession of a rock lobster access fishing licence). Wrasse inhabit depths up to 160 metres. Preferred water	Catches of all wrasse species for the last five seasons were: 2023/24 – 20 tonnes 2022/23 – 18 tonnes 2021/22 – 20 tonnes 2020/21 – 20 tonnes

Fishery	Target species	Geographic extent of fishery	Does fishing occur in the operational area or EMBA?	Fishing season	Fishing methods, vessels and licences	Catch data and other information
	wrasse (*N. parilus*).	Victorian coastline and out to 20 nautical miles offshore, (excluding marine reserves, bays and inlets).The fishery is divided into three commercial management zones; licence holders can fish in any of these zones	operational area between 2021 – 2025. The operational area intersects 0.10% of the fishery. **EMBA?** Yes. There were up to 177 days fished along the Victorian coastline within the EMBA between 2021 – 2025. The EMBA intersects 8.13% of the fishery.		depths for blue- throat wrasse is 20-40 m, while saddled wrasse prefer depths of 10-30 m. There are 22 Wrasse (Ocean) Fishery Access Licences (OWFAL) issued under the Fisheries Act 1995.	2019/20 – 22 tonnes
Sea Urchin Fishery Zone (Figure 5.43)	White sea urchin (*Tripneustes ventricosus*), long-spined sea urchin (*Centrostephanus rodgersii*) and short-spined sea urchin	The sea urchin fishery comprises of four individual management zones. The central zone covers Victorian waters from Hopkins River to Lakes Entrance. The eastern zone extends from Lakes Entrance to the NSW border.	**Operational area?** Yes. The operational area intersects 0.87% of the fishery. There is no fishing data available for the fishery. **EMBA?** Yes. The EMBA intersects 5.6% of the fishery.	Year-round	The sea urchin is usually collected by hand by divers. The number of licences for this fishery is 9	Catches of sea urchin for the last five seasons were: 2023/24 – 139 tonnes 2022/23 – 123 tonnes 2021/22 – 81 tonnes 2020/21 – 104 tonnes 2019/20 – 112 tonnes

Fishery	Target species	Geographic extent of fishery	Does fishing occur in the operational area or EMBA?	Fishing season	Fishing methods, vessels and licences	Catch data and other information
			There is no fishing data available for the fishery.			
Ocean trawl fishery (Figure 5.44)	A range of fish including salmon, snapper, whiting, trevally, mackerel and gummy shark. As well as calamari and rays.	The fishery covers the marine waters of Victoria excluding ports, lakes and sea inlets.	**Operational area?** Yes. There was up to 12 days fished along the Victorian coastline within the operational area between 2021 – 2025. The operational area intersects 0.097% of the fishery. **EMBA?** Yes. There was up to 61 days fished along the Victorian coastline within the EMBA between 2021 – 2025. The EMBA intersects 7.9% of the fishery.	Year-round.	The number of licenses is capped at 74. Fishing methods used include: • Drop lines, Longlines, Handlines • Fishing lines and hooks • Dip nets, Landing nets, Gaffs • Bait traps, Bait pumps	There is no publicly available information regarding catch data and associated value.

Fishery	Target species	Geographic extent of fishery	Does fishing occur in the operational area or EMBA?	Fishing season	Fishing methods, vessels and licences	Catch data and other information
Inshore trawl fishery (Figure 5.45)	A range of fish species including flathead, whiting and mackerel as well as eastern king prawns (*Melicertus plebejus*), eastern school pawns, bug, sand crab and octopus.		**Operational area?** Yes. There was up to 15 days fished along the Victorian coastline within the operational area between 2021 – 2025. The operational area intersects 0.07% of the fishery. **EMBA?** Yes. There was up to 15 days fished along the Victorian coastline within the EMBA between 2021 – 20245 The EMBA intersects 4.86% of the fishery.	Year-round	There is a total of 54 license holders within the fishery. Equipment that can be used are specified on the license including: • trawl nets with a headline length not exceeding 33 metres • combination of trawl nets with a combined head line length not exceeding 66 metres	There is no publicly available information regarding catch data and associated value.

As of the commencement of the 2025/26 season, a new Victorian Giant Crab Fishery Harvest Strategy was formalised. Developed by a sub-committee of the Victorian Rock Lobster and Giant Crab Resource Assessment Group (RLRAG) (VFA, 2025)

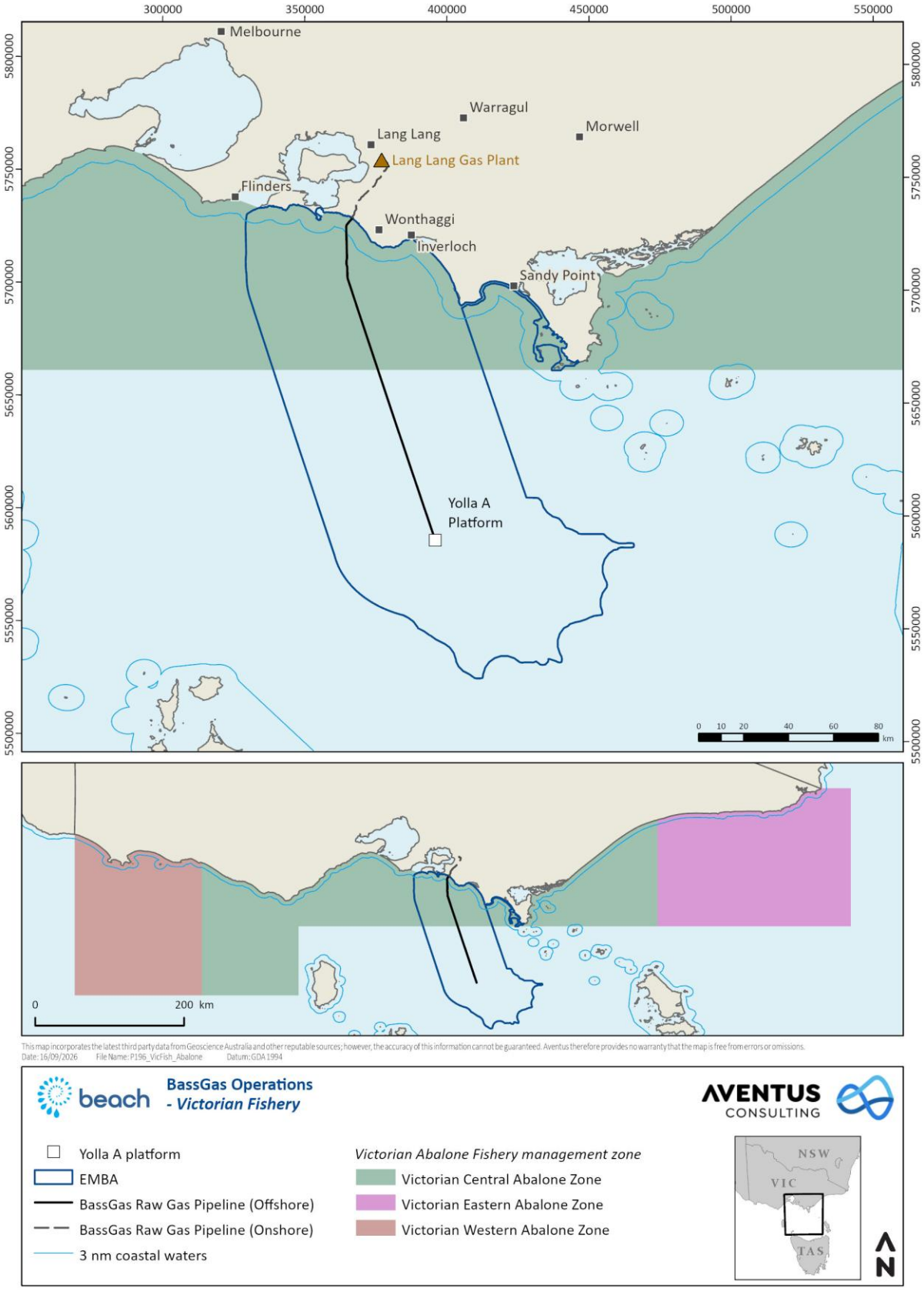


Figure 5.36. Victorian abalone fishery jurisdiction intersected by the EMBA

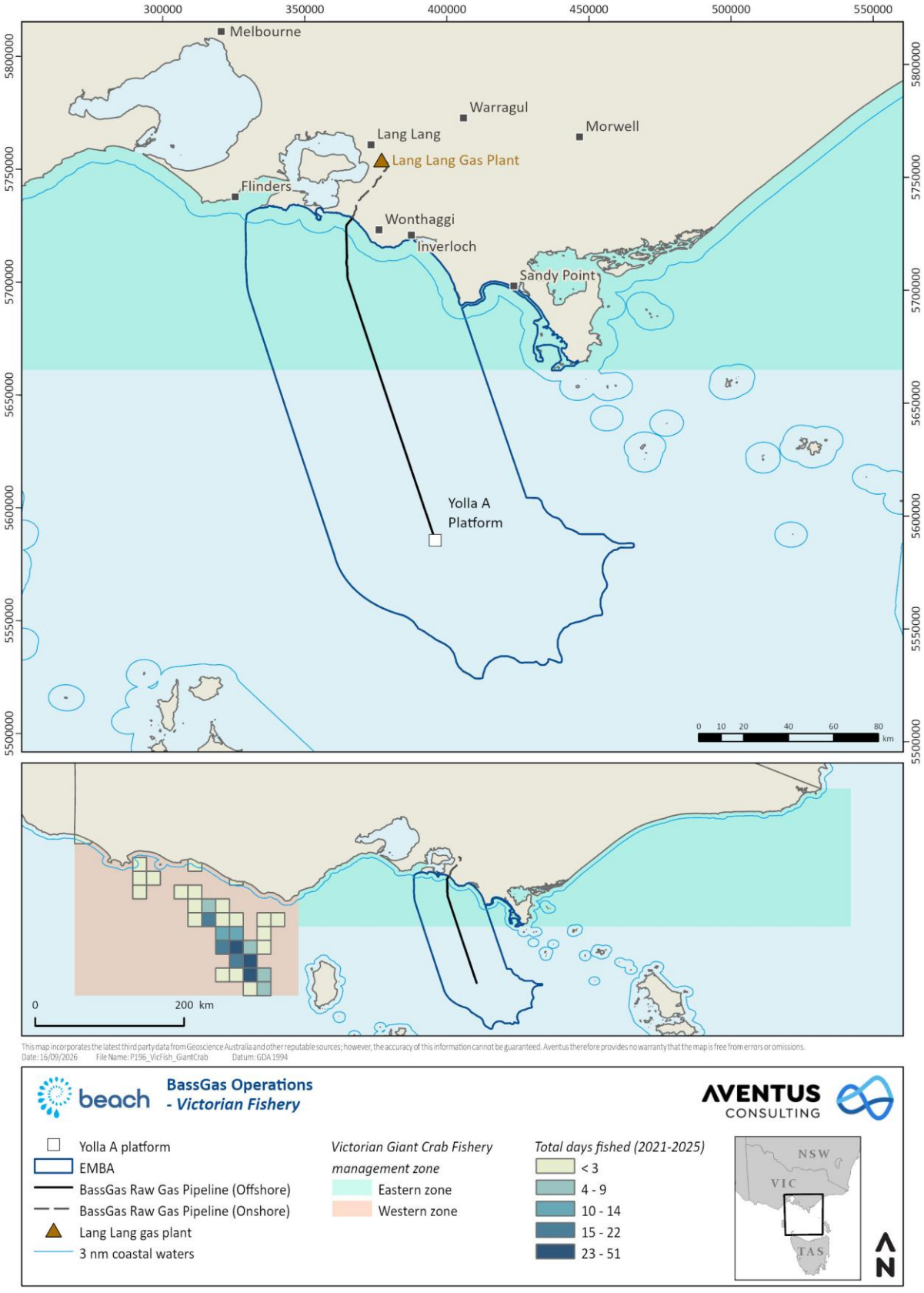


Figure 5.37. Victorian giant crab fishery jurisdiction and 2021 - 2025 fishing intensity intersected by the EMBA.

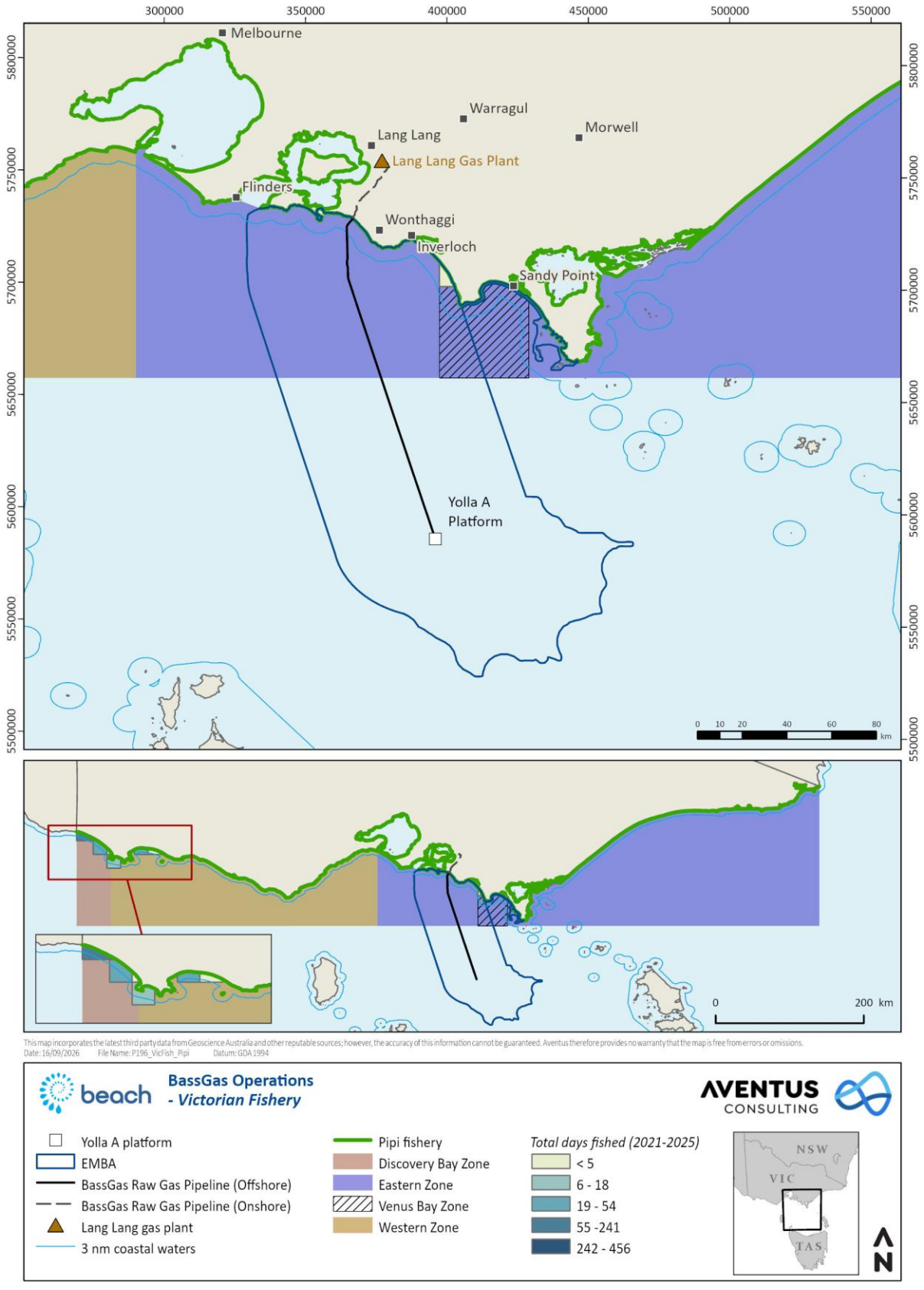


Figure 5.38. Victorian pipi fishery jurisdiction and 2021 - 2025 fishing intensity intersected by the EMBA.

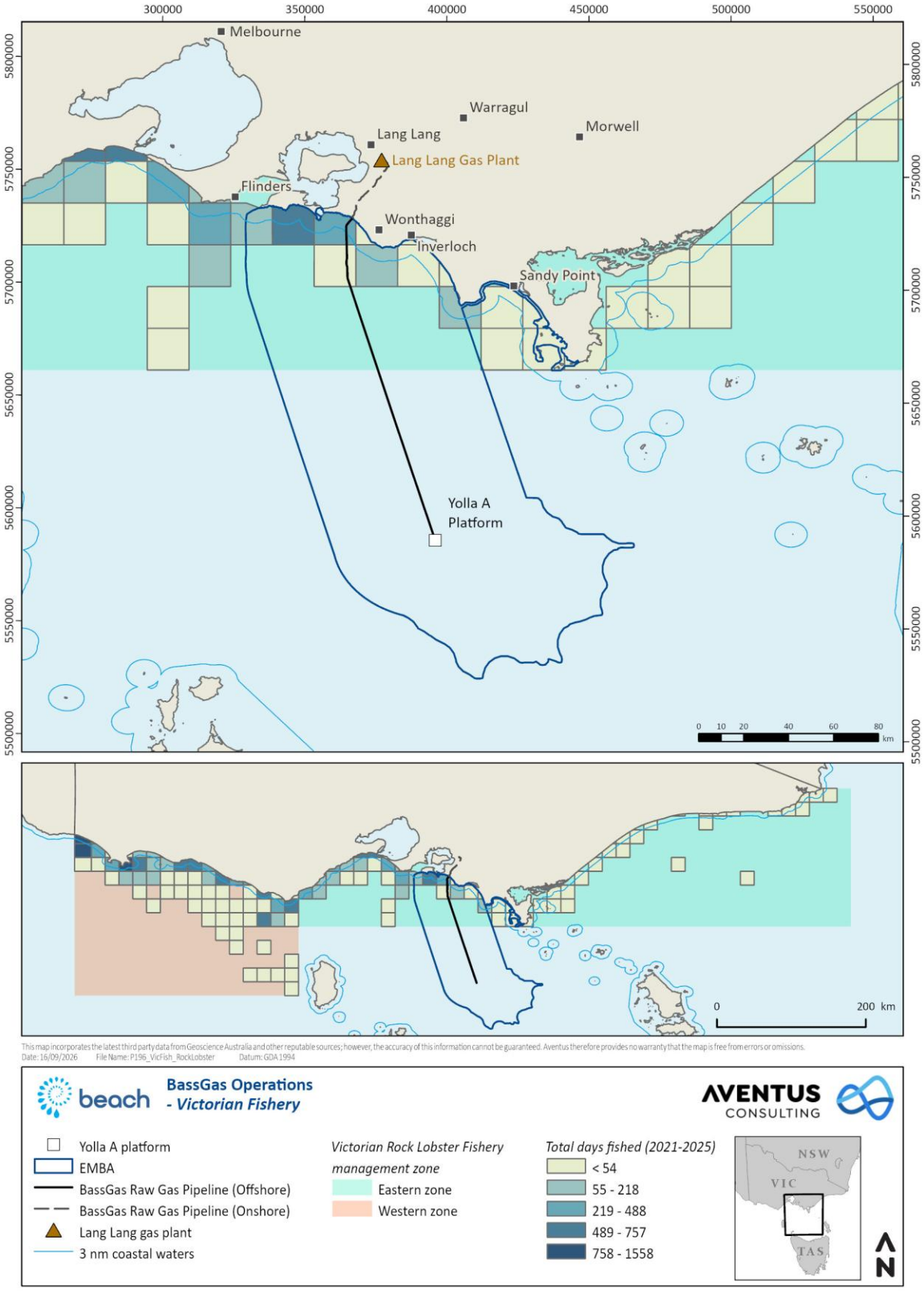


Figure 5.39. Victorian rock lobster fishery jurisdiction and 2021 - 2025 fishing intensity intersected by the EMBA.

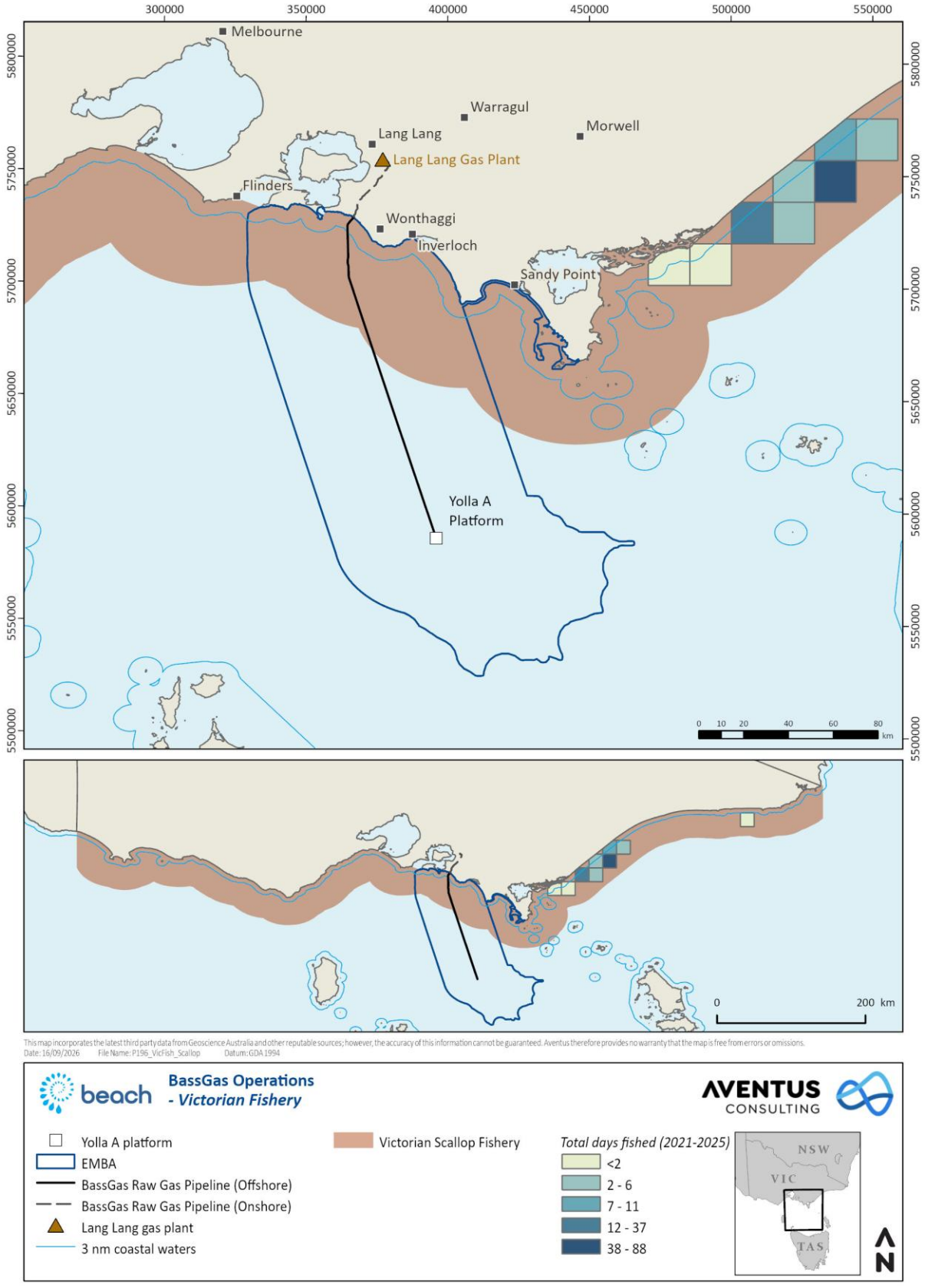


Figure 5.40. Victorian scallop fishery jurisdiction and 2021 - 2025 fishing intensity intersected by the EMBA

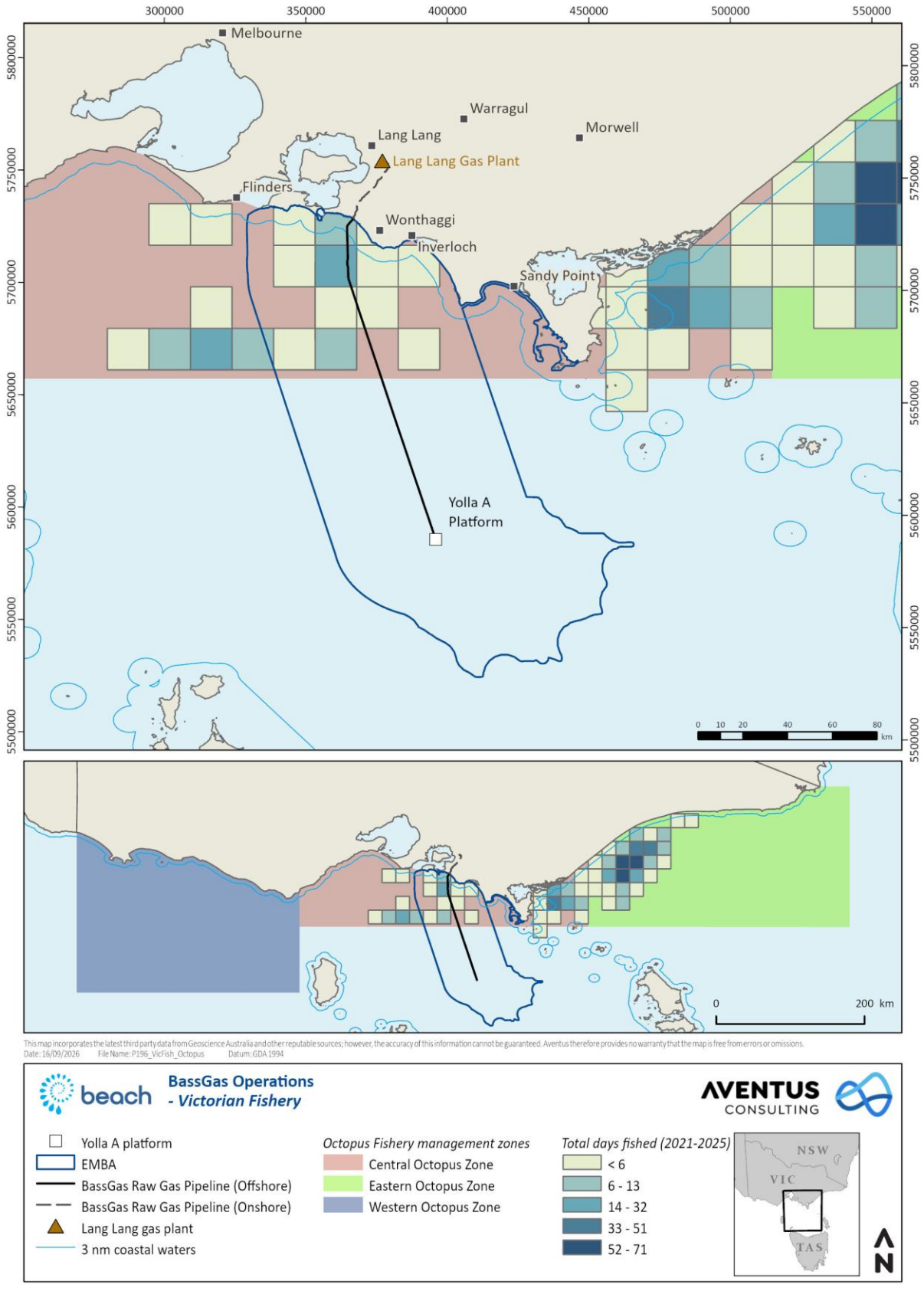


Figure 5.41. Victorian octopus fishery jurisdiction and 2021 - 2025 fishing intensity intersected by the EMBA

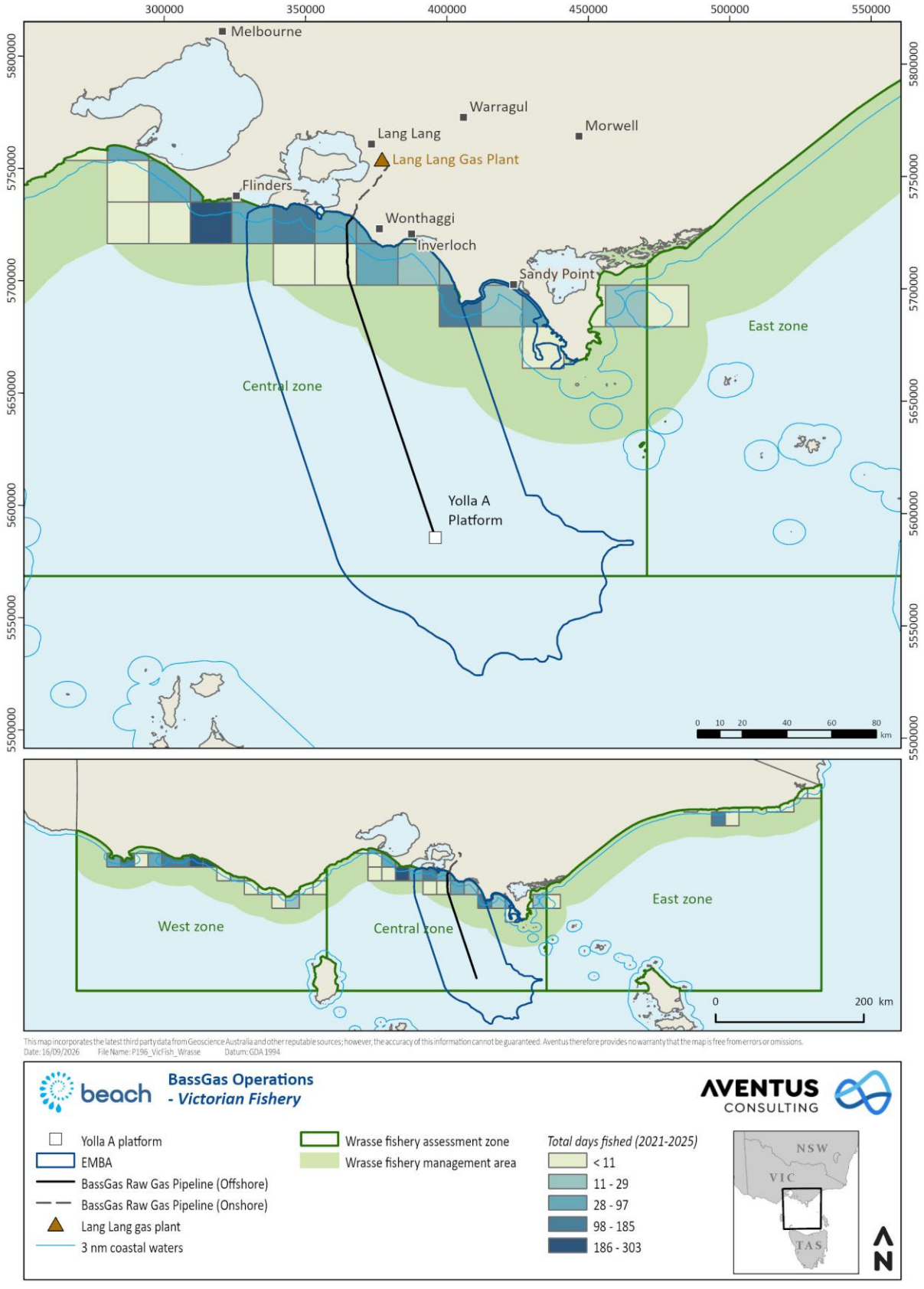


Figure 5.42. Victorian wrasse fishery jurisdiction and 2021 - 2025 fishing intensity intersected by the EMBA

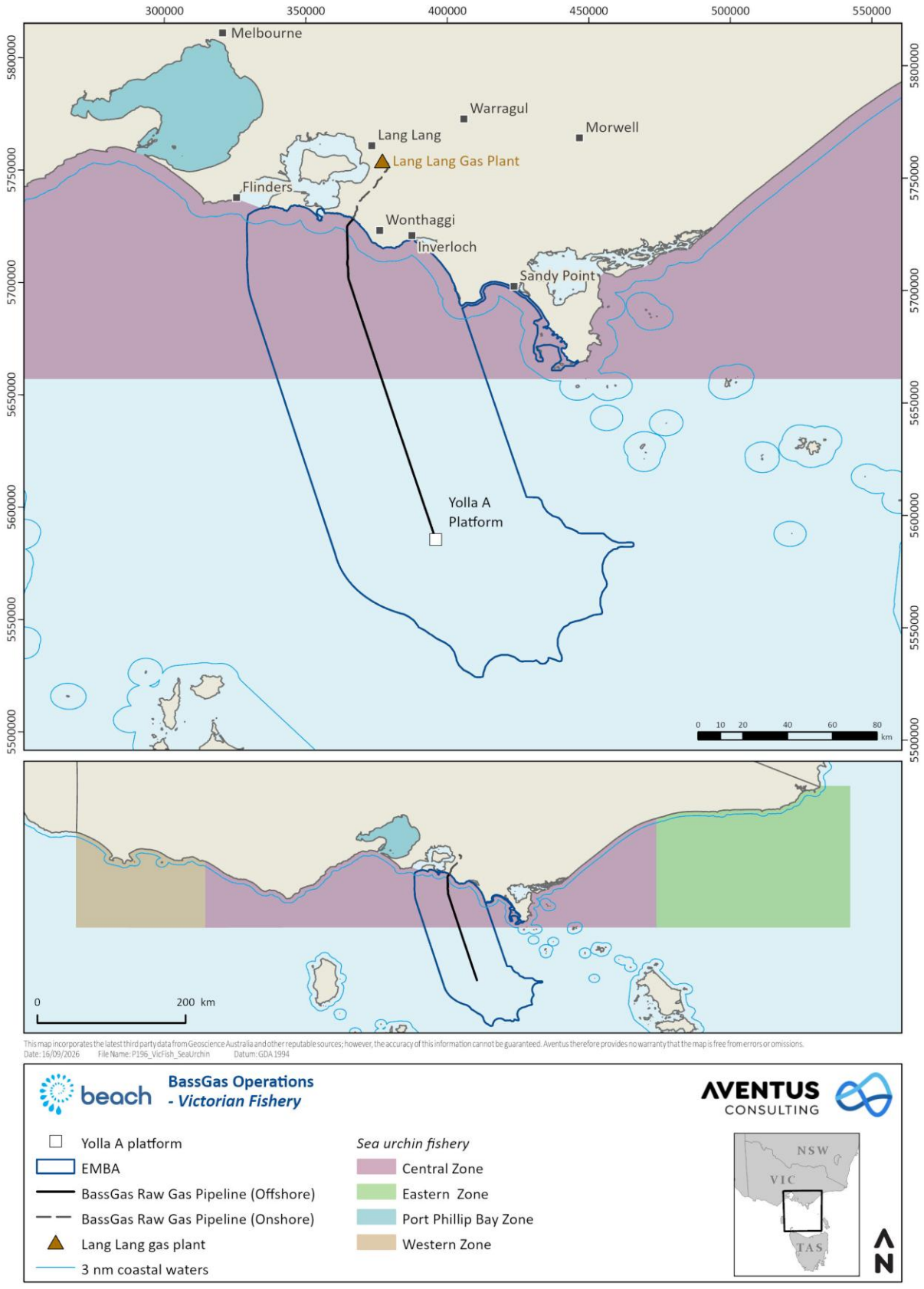


Figure 5.43. Victorian sea urchin fishery jurisdiction intersected by the EMBA

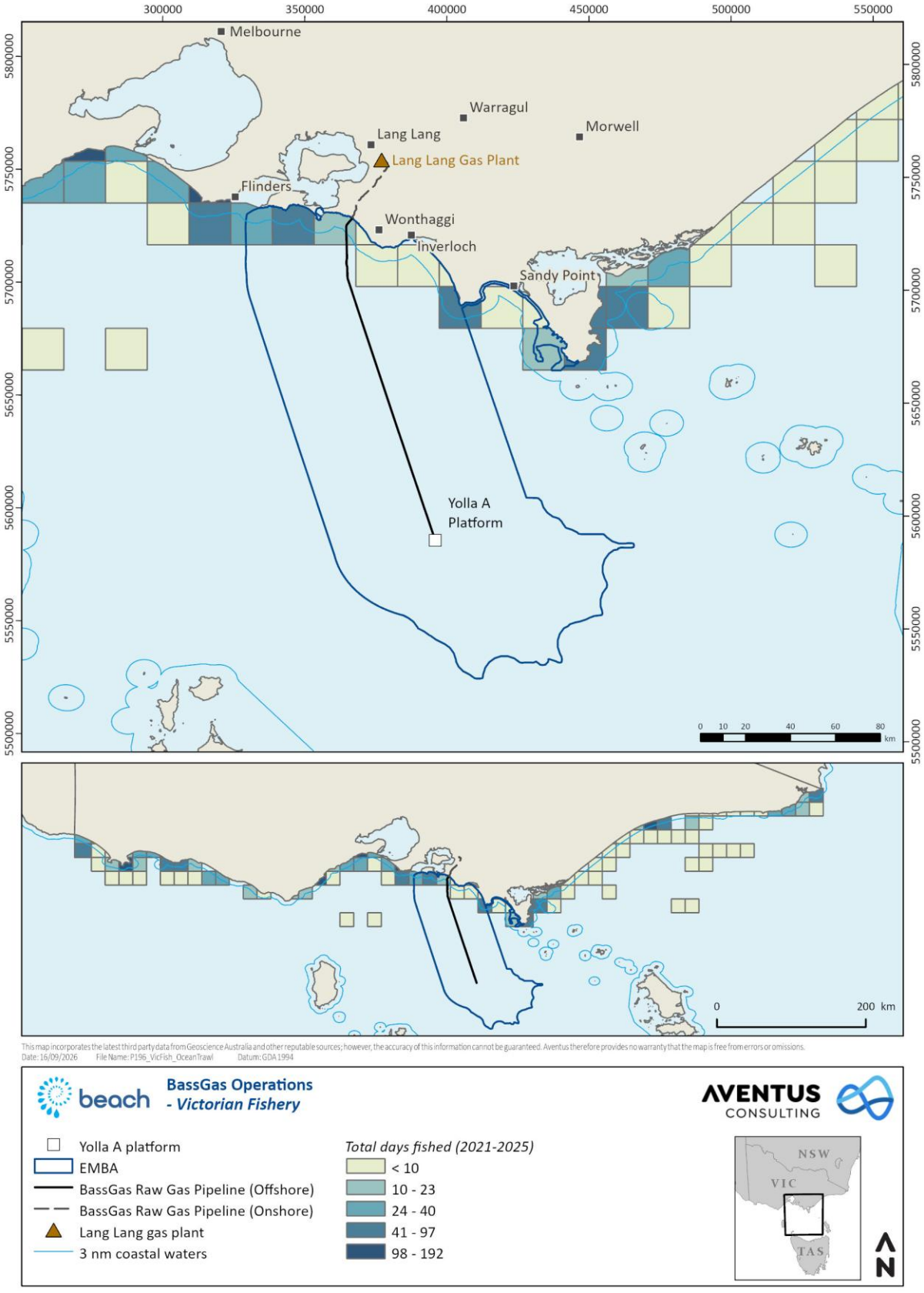


Figure 5.44. Victorian ocean trawl fishery jurisdiction and 2021 - 2025 fishing intensity intersected by the EMBA

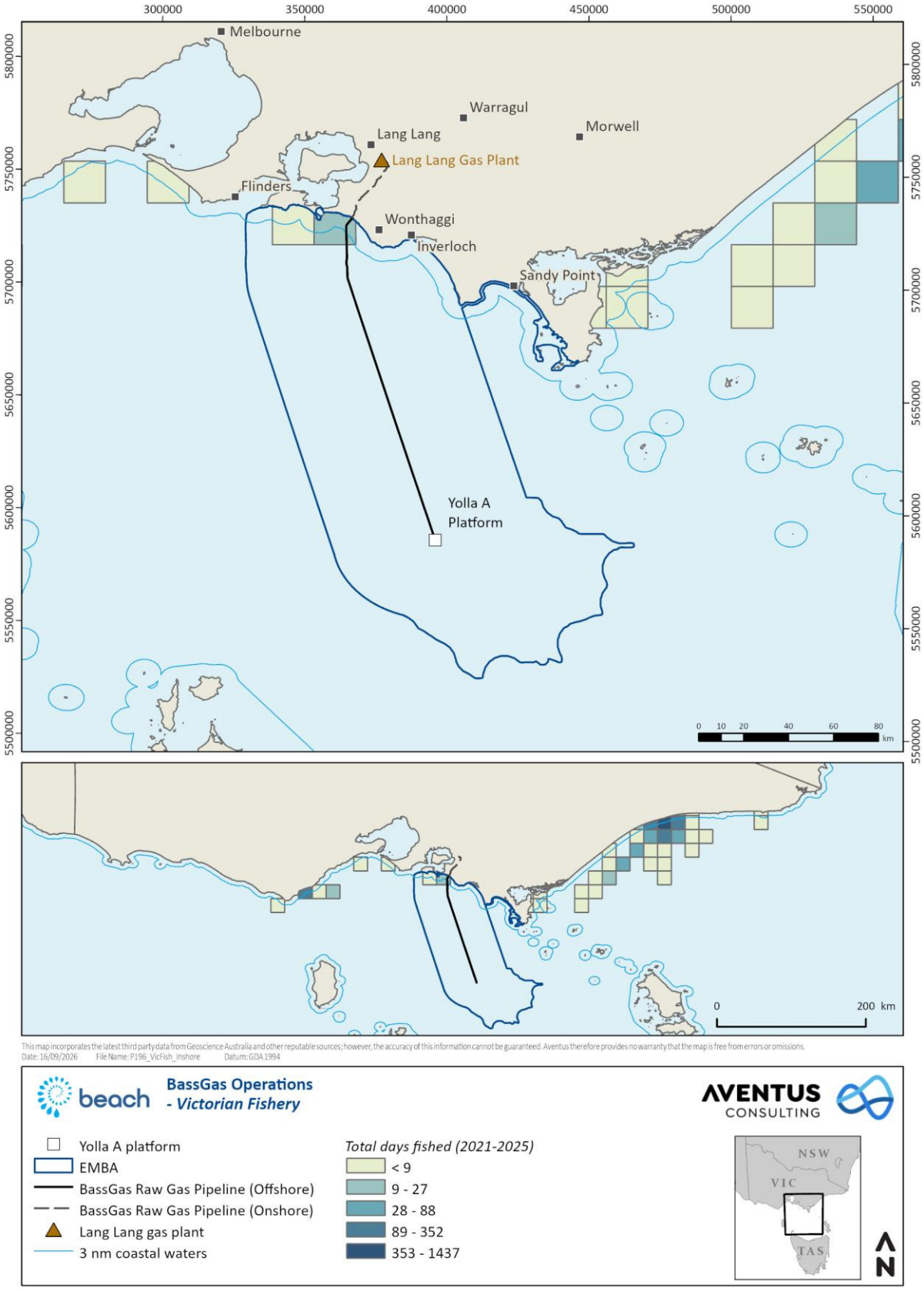


Figure 5.45. Victorian inshore trawl fishery jurisdiction and 2021 - 2025 fishing intensity intersected by the EMBA

5.9.5.3 Tasmanian Fisheries

Table 5.20 provides the Tasmanian-managed commercial fisheries in the operational area and EMBA and summarises the key information for each of these fisheries and indicates that the Tasmanian-managed commercial fisheries with jurisdiction within the EMBA include:

- Scalefish fishery (0.04% overlap with the operational area and 5.28% with the EMBA);
- Lobster fishery (0.04% overlap with the operational area and 4.23% with the EMBA);
- Giant crab fishery (0.04% overlap with the operational area and 4.23% with the EMBA);
- Scallop fishery (0.04% overlap with the operational area and 4.23% with the EMBA); and
- Shellfish fishery (0.01% overlap with the operational area and 1.38% with the EMBA);

Table 5.20: Tasmanian-managed commercial fisheries in the operational area and EMBA

Fishery	Target species	Geographic extent of fishery	Does fishing occur in the operational area or EMBA?	Fishing season	Fishing methods, vessels and licences	Catch data and other information
Scalefish Fishery (Figure 5.46)	Multi-species fishery including banded morwong (*Cheilodactylus spectabilis*), tiger flathead (*Neoplatycephalus richardsoni*), southern school whiting (*Sillago flindersi*) Australian salmon (*Arripis trutta),* barracouta (*Thyrsites atun*), bastard trumpeter (*Latridopsis forsteri*) and blue warehou (*Seriolella brama*).	Entire Tasmanian coastline.	**Operational area?** Yes. There is overlap between the operational area and the fishery. The operational area intersects 0.04% of the fishery. **EMBA?** Yes. The EMBA intersects the fishery area. The EMBA intersects 5.28% of the fishery.	Year-round. Some seasonal closures depending on the target species.	The fishery targets multiple species and therefore uses multiple gear-types including drop-line, Danish seine, fish trap, hand-line and spear. There is no data on the amount of vessels licences in place for this fishery since the previous EP was submitted. There were 259 vessels operating in 2017/18 across the fishery.	Catches of key scalefish species for the last five seasons were: • 20123/124 – 309 t. • 2022/23 – 625 t. • 2021/22 – 567 t. • 2020/21 – 1,063 t. • 2019/20 – 20 t.
Rock lobster fishery (Figure 5.47)	Southern rock lobster (*Jasus edwardsii*).	Entire Tasmanian coastline, the fishery shares the same reporting grid as the giant crab and scallop fisheries	**Operational area?** Yes. There is overlap between the operational area and the fishery.	Open to males only until October 2026.	The fishery uses baited pots to harvest lobster all around Tasmania including islands. Most of the commercial catch comes from the western half of the state, with fishers frequently	Catches of key rock lobster species for the last five seasons were: • 2025/2026 – 1,031 t. • 2024/2025 – 1,030 t. • 2023/2024 – 1,038 t.

Fishery	Target species	Geographic extent of fishery	Does fishing occur in the operational area or EMBA?	Fishing season	Fishing methods, vessels and licences	Catch data and other information
			The operational area intersects 0.04% of the fishery **EMBA?** Yes. The EMBA intersects the fishery area. The EMBA intersects 4.23% of the fishery.		facing rough weather and poor conditions to land their catch. The commercial fleet also harvest rock lobster from the East Coast, which is also an important area for the recreational fishery. There is no data on the amount of vessels licences in place for this fishery.	• 2022/2023 – 1,031 t. • 2021/2022 – 1,038 t.
Giant crab fishery (Figure 5.47)	Giant crabs (*pseudocarcinus gigas*).	Entire Tasmanian coastline, the fishery shares the same reporting grid as the rock lobster and scallop fisheries	**Operational area?** Yes. There is overlap between the operational area and the fishery. The operational area intersects 0.04% of the fishery **EMBA?** Yes. The EMBA intersects the fishery area. The EMBA intersects 4.23% of the fishery.	The fishery is broken into males and females. Male fishery is between 1 August to 30 June. Female fishery is between 15 November to 31 May.	The fishery harvests giant crabs using baited heavy steel traps which are similar to rock lobster pots that are lowered to the seabed. There is no data on the amount of vessels licences in place for this fishery.	The total catch data is unavailable however, the maximum amount per year is 20.7 tonnes.
Scallop fishery (Figure 5.47)	Commercial scallop	Entire Tasmanian coastline, the fishery shares the same reporting grid as the giant crab and rock lobster fisheries	**Operational area?** Yes. There is overlap between the operational area and the fishery.	Scallop fishery is closed as of January 2026.	The fishery is only allowed to harvet scallops by hand with set limits per bag. There is no data on the amount of vessels licences in place for this fishery.	Catches of key scallop species for the last three available seasons were: • 2023 – 1,203 t. • 2022 – 3,397 t. • 2021 – 44 t.

Fishery	Target species	Geographic extent of fishery	Does fishing occur in the operational area or EMBA?	Fishing season	Fishing methods, vessels and licences	Catch data and other information
			The operational area intersects 0.04% of the fishery **EMBA?** Yes. The EMBA intersects the fishery area. The EMBA intersects 4.23% of the fishery.			
Shellfish fishery (Figure 5.48)	Pacific Oyster (*Crassostrea gigas*), Native Oyster (*Ostrea angasi*) and Venerupis Clam (*Venerupis largillierti*)	Entire Tasmanian coastline.	**Operational area?** Yes. There is overlap between the operational area and the fishery. The operational area intersects 0.00018% of the fishery. **EMBA?** Yes. The EMBA intersects the fishery area. The EMBA intersects 1.13% of the fishery.	Year-round. Some seasonal closures depending on the target species.	Shellfish in Tasmania is primarily picked by hand. There is no data on the amount of vessels licences in place for this fishery.	Shellfish catch data is not available.

Source: DPIPWE (2020a-h), Moore & Hartmann (2019), Emery et al (2015), Hill et al (2020), Semmns et al (2024), Sharples et al (2025), Twigme et al (2025), McAllister et al (2025), Day et al (2024), Fishing Tasmania (2026).

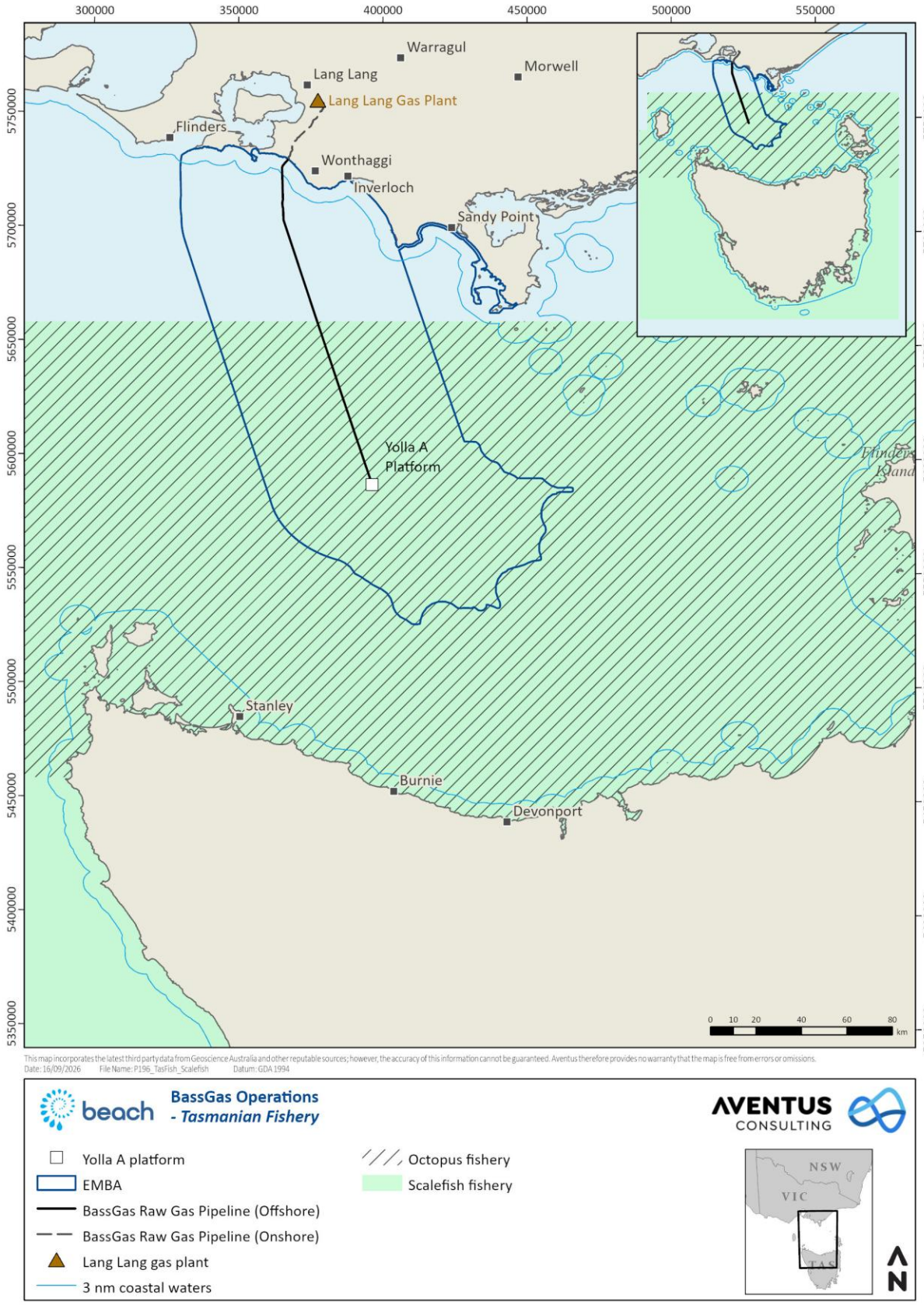


Figure 5.46. Tasmanian scalefish fishery jurisdiction intersected by the EMBA.

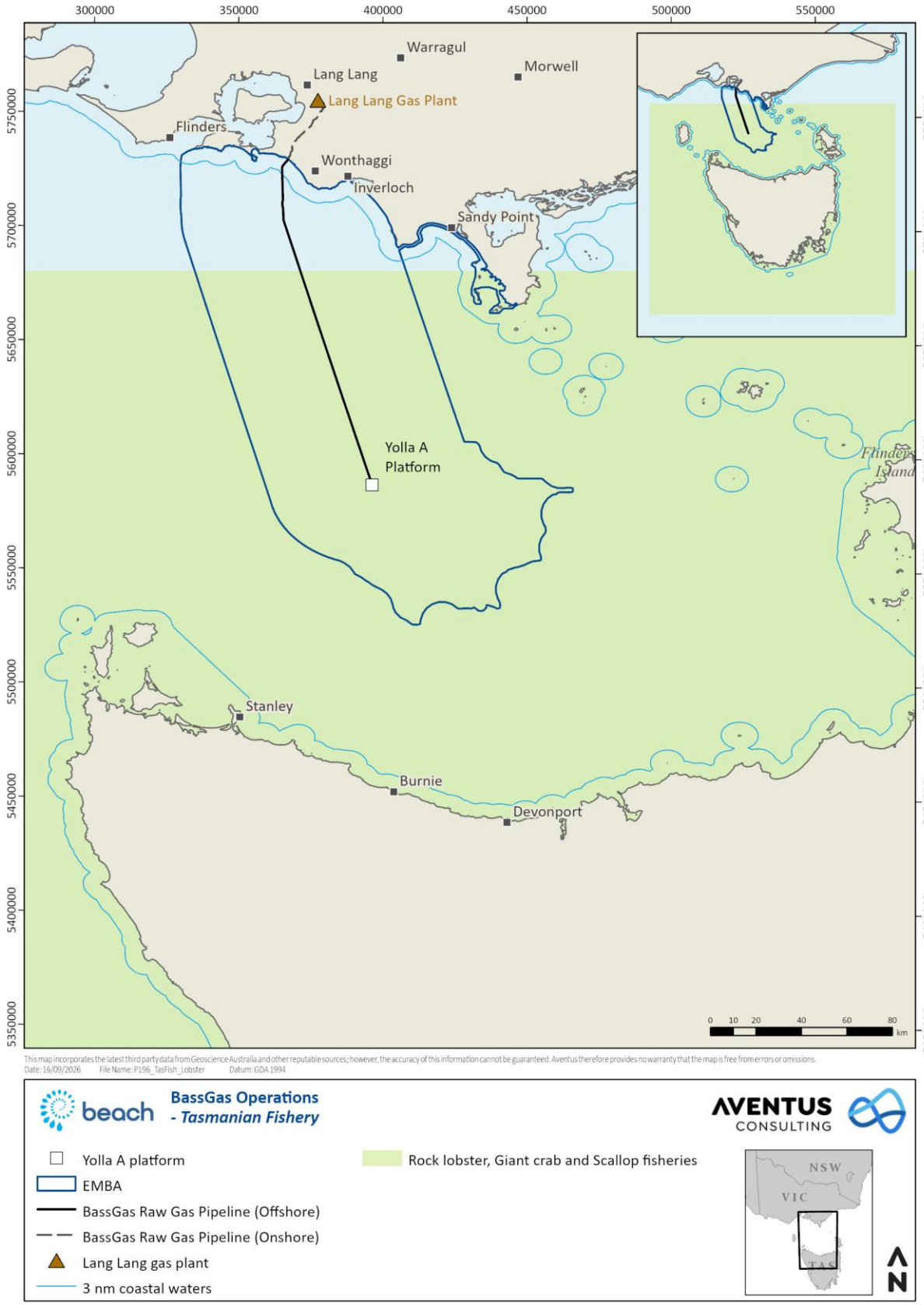


Figure 5.47. Tasmanian rock lobster, giant crab and scallop fishery jurisdiction intersected by the EMBA.

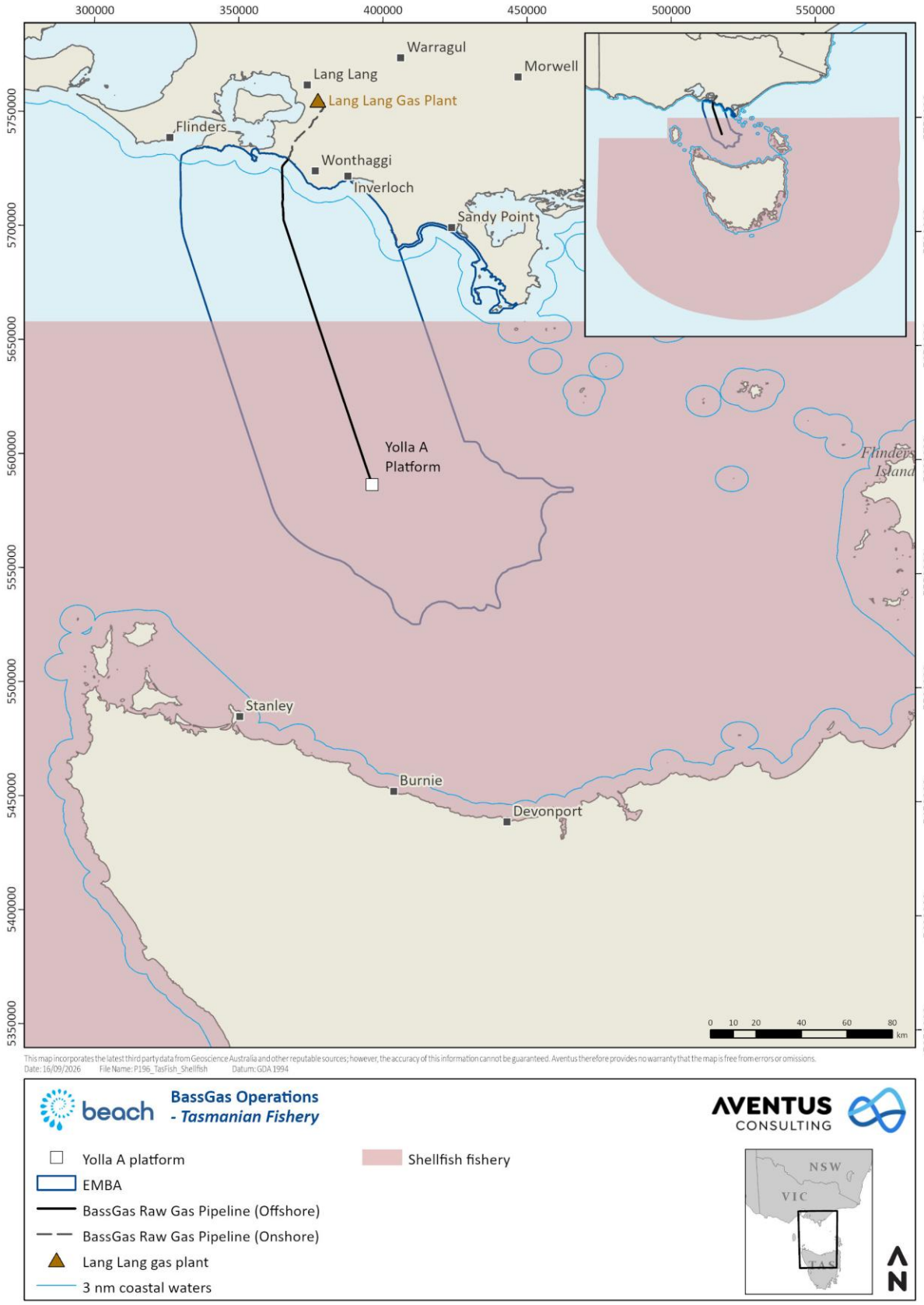


Figure 5.48. Tasmanian shellfish fishery jurisdiction intersected by the EMBA.

5.9.6 Commercial Shipping

The South-east Marine Region, including Bass Strait, is among Australia's busiest shipping areas. It handles international and coastal cargo trade, as well as passenger and vehicular ferry services.

The 'Spirit of Tasmania' ferry operates daily between Melbourne and Devonport in northern Tasmania, with traffic data clearly illustrating this well-travelled route, located about 40 km southwest of Yolla-A. Other maritime traffic between Melbourne and the Australian east coast passes near Wilsons Promontory and crosses the BassGas pipeline (see Figure 5.49).

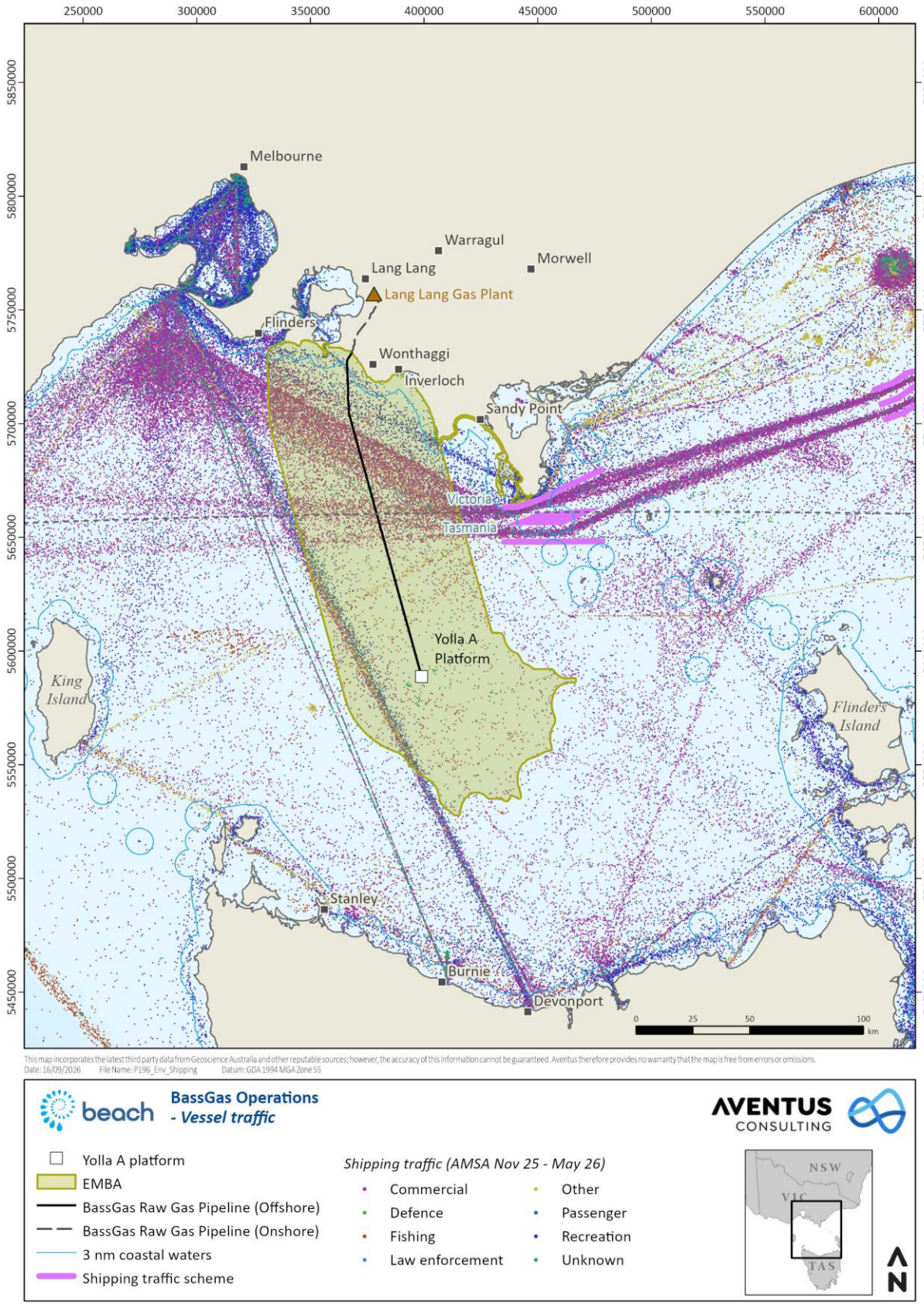


Figure 5.49: Commercial shipping traffic in the EMBA between November 2025 and May 2026.

6 Environmental Impact and Risk Assessment Methodology

6.1 Overview

This section outlines the environmental impact and risk assessment methodology used for the assessment of the BassGas Operations. The methodology is consistent with the Australian and New Zealand Standard for Risk Management (AS/NZS ISO 31000:2018, Risk Management – Principles and Guidelines). Figure 6.1 outlines the Beach risk assessment management process, with each step of this process described in this chapter.

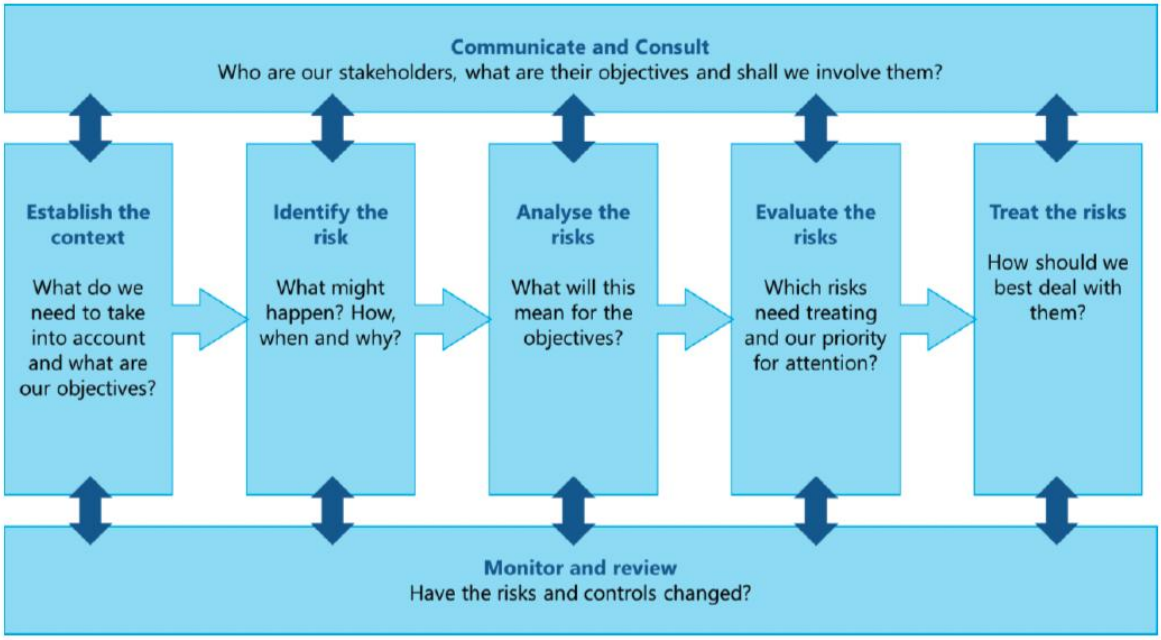


Figure 6.1: Beach risk assessment process

6.1.1 Risk Assessment Process Definitions

Definitions of the term used in the risk assessment process are detailed in Table 6.1.

Table 6.1: Risk Assessment Process Definitions

Term	Definition
Activity	Refers to a 'petroleum activity' as defined under the OPGGS(E)R as: *petroleum activity means operations or works in an offshore area undertaken for the purpose of:* *exercising a right conferred on a petroleum titleholder under the Act* by a petroleum title; or* *discharging an obligation imposed on a petroleum titleholder by the Act or a legislative instrument under the Act*.* *Act is this context is the OPGGS Act.
Consequence	The consequence of an environmental impact or risk is the potential outcome of the event on affected receptors (particular values and sensitivities). Consequence can be positive or negative.
Control Measure	Defined under the OPGGS(E)R as *a system, an item of equipment, a person or a procedure, that is used as a basis for managing environmental impacts and risks*

Term	Definition
Emergency condition	An unplanned event that has the potential to cause significant environmental damage or harm to a Matter of National Environmental Significance (MNES). An environmental emergency condition may, or may not, correspond with a safety incident considered to be a Major Accident Event.
Environment	Under the OPGGS(E)R as means: *(a) ecosystems and their constituent parts, including people and communities; and* *(b) natural and physical resources; and* *(c) the qualities and characteristics of locations, places and areas; and* *(d) the heritage value of place.* *and includes* *(e) the social, economic and cultural features of the matters mentioned in paragraphs (a), (b), (c) and (d).*
Environmental aspect	An element or characteristic of an operation, product, or service that interacts or can interact with the environment. Environmental aspects can cause environmental impacts.
Environmental impact	Defined under the OPGGS(E)R as *any change to the environment, whether adverse or beneficial, that wholly or partially results from an activity.*
Environmental performance outcome (EPO)	Defined under the OPGGS(E)R as *a measurable level of performance required for the management of environmental aspects of an activity to ensure that environmental impacts and risks will be of an acceptable level.*
Environmental performance standard (EPS)	Defined under the OPGGS(E)R as *a statement of the performance required of a control measure.*
Environment receptors (or receptors)	Features of the environment that may be affected by impacts and risks
Environmental risk	An unplanned environmental impact has the potential to occur, due either directly or indirectly from undertaking the activity.
Likelihood	The is the chance of the impact occurring
Measurement criteria	Is a verifiable mechanism for determining control measures are performing as required.
Receptor	A receptor is a component of the environment that may be affected by the activity
Residual risks	The risk remaining after control measures have been applied (i.e. after risk treatment).

6.2 Step 1 – Communicate and Consult

In accordance with the requirements of the OPGGS(E)R, during the development of this EP, Beach has consulted with relevant persons to obtain information in relation to their functions, interests and activities associated with the activity and potential impacts and risks. This information has been used to inform the EP and the impact and risk assessment undertaken for the activity. The stakeholder consultation process is described in detail in **Chapter 4**.

6.3 Step 2 – Establish the Content

Context for the risk assessment process is established by:

- Identifying the environmental aspects of the activity that will or may cause environmental impacts or may present risks to the environment based on the 'Activity Description' in **Chapter 3**.

- Understanding the objections or claims of relevant persons and incorporating their feedback and any information provided into the design of the activity where appropriate as outlined in **Chapter 4**, 'Stakeholder Consultation'.

- Understanding the regulatory framework in which the activity takes place as described in **Chapter 2**, 'Applicable Requirements'.

- Identifying the environment that may be affected (EMBA), either directly or indirectly, by the activity, as described in the 'Existing Environment' in **Chapter 5**).

Once the context has been established, the hazards of the activity can be identified, along with the impacts and risks of these hazards. This process is described in the following sections.

6.4 Step 3 – Identify the Potential Impacts and Risks

Potential impacts (planned) and risks (unplanned) associated with the environmental aspects of the activity are identified in relation to the receptors that may be affected, either directly or indirectly, by one or multiple aspects of the activity i.e., identifying the cause-effect pathway by which environmental and social receptors may be impacted. Table 6.1 details the aspects identified for the activity.

6.5 Step 4 – Analyse the Potential Impact and Risks

Once impacts and risks have been identified, an analysis of the nature and scale of the impact or risk is undertaken. This involves determining the possible contributing factors associated with the impact or risk. Each possible cause should be identified separately, particularly where controls to manage the impact or risk differ. In this way, the controls can be directly linked to the impact or risk.

6.5.1 Establish Environmental Performance Outcomes

Environmental performance outcomes (EPOs) are developed to provide a measurable level of performance for the management of environmental aspects of an activity to ensure that environmental impacts and risks will be of an acceptable level. The process of defining an appropriate EPO, has relied on the required levels of performance set either in legislation (such as the OPGGS Act), Government guidance notes such as the *Matters of National Environmental Significance–Significant Impact Guidelines* (CoA 2013), *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) recovery/management plans or may be the result of consultation with relevant persons and/ or organisations (e.g. fishers, marine users, First Nations).

6.6 Step 5 – Evaluate and Treat the Potential Impacts and Risks

The following steps are undertaken using the Beach Risk Matrix (Table 6.2) to evaluate the potential impacts and risks:

- Identify the consequences of each potential environmental impact, corresponding to the maximum credible impact.

- For unplanned events (risks), identify the likelihood (probability) of unplanned environmental impacts occurring.

- For unplanned events (risks), assign a level of risk to each potential environmental impact using the risk matrix.

- Identify control measures to manage potential impacts and risks to as low as reasonably practicable (ALARP) (Section 6.7) and an acceptable level (Section 6.8).
- Establish EPS for each of the identified control measures.

Table 6.2 Beach risk assessment matrix

Risk	PEOPLE	ENVIRONMENT	REPUTATION	FINANCIAL	LEGAL	A Remote	B Highly Unlikely	C Unlikely	D Possible	E Likely	F Almost Certain	Risk
	Impact to Beach or contracting personnel	**Natural environment**	**Community safety, reputation/social licence. media, items of cultural significance.**	**Financial impact (e.g. due to loss of revenue, business interruption, asset loss etc.)**	**E.G. Breach of law, prosecution, civil action**	<1% chance of occurring within the next year. Requires exceptional circumstances, unlikely event in the long-term future. Only occur as a 100-year event	>1% chance of occurring within the next year. May occur but not anticipated. Could occur years to decades	>5% chance of occurring within the next year. May occur but not for a while. Could occur within a few years	>10% chance of occurring within the next year. May occur shortly but a distinct probability it won't. Could occur within months to years	>50% chance of occurring within the next year. Balance of probability will occur. Could occur within weeks to months	99% chance of occurring within the next year. Impact is occurring now. Could occur within days to weeks	
CONSE	6 Catastrophic	Multiple fatalities >4 or severe irreversible disability to large group of people (>10)	Catastrophic offsite or onsite release or spill; long-term destruction of highly significant ecosystems; significant effects on endangered species or habitats; irreversible or very long-term impact	Multiple community fatalities; complete loss of social licence; prolonged negative national media; complete loss of items of cultural significance	> AUD$500m	Prolonged and complex civil and/or regulatory litigation; potential jail terms and/or very high fines and/or damages claim	HIGH	HIGH	SEVERE	SEVERE	EXTREME	EXTREME	6 Catastrophic
	5 Critical	1-3 fatalities or serious irreversible disability (>30%) to multiple persons (<10)	Significant offsite or onsite release or spill; eradication or impairment of the ecosystem; significant impact on highly valued species or habitats; widespread long-term impact	Community fatality; significant loss of social licence; negative national media for 2 or more days; significant damage to items of cultural significance	>AUD$100m & ≤ $500m	Civil and/or regulatory litigation; potential significant fines and/or damages claim	MEDIUM	MEDIUM	HIGH	SEVERE	SEVERE	EXTREME	5 Critical
	4 Major	Serious permanent injury/ illness or moderate irreversible disability (<30%) to one or more persons	Major Offsite or onsite release or spill; very serious environmental effects, such as displacement of species and partial impairment of ecosystem; major impact on highly valued species or habitats; widespread medium and some long-term impact	Serious permanent injury to community member; major damage to social licence; negative national media; major damage to items of cultural significance	>AUD$10m & ≤ $100m	Civil and/or regulatory litigation; potential major fine and damages claim	MEDIUM	MEDIUM	MEDIUM	HIGH	SEVERE	SEVERE	4 Major
	3 Serious	Serious reversible/ temporary injury/illness; Lost Time Injury >5 days or Alternate/Restricted Duties > 1 month	Minor offsite or onsite release or spill; serious short-term effect to ecosystem functions; serious impact on valued species or habitats; moderate effects on biological or physical environment	Serious reversible injury to community member; serious damage to social licence; negative state media; serious damage to items of cultural significance	>AUD$1m & ≤$10m	Serious potential breach of law; report and investigation by regulator; possible prosecution or regulatory notice (e.g. improvement notice or equivalent), or possible civil litigation and serious damages claim	LOW	MEDIUM	MEDIUM	MEDIUM	HIGH	SEVERE	3 Serious
	2 Moderate	Reversible temporary injury/ illness requiring Medical Treatment; Lost Time Injury ≤5 days or Alternate/Restricted Duties for ≤ 1 month	Event contained within site; short-term effects but not affecting ecosystem functions; some impact on valued species or habitats; minor short-term damage to biological and/or physical environment	Moderate injury to community member; moderate impact to social licence; negative local media; moderate damage to items of cultural significance	>AUD$100,000 & ≤ $1m	Potential Breach of law or non-compliance; inquiry by a regulator leading to Low-level legal issues; possible civil litigation and moderate damages claim	LOW	LOW	MEDIUM	MEDIUM	MEDIUM	HIGH	2 Moderate
	1 Minor	First Aid Injury/illness	Spill limited to release location; minor effects but not affecting ecosystem functions; no impact on valued species or habitats; low-level impacts on biological and physical environment	Minor injury to community member, public concern restricted to local complaints, minor damage to items of cultural significance	≤AUD$100,000	Minor potential breach of law; not reportable to a regulator; on the spot fine or technical non-compliance	LOW	LOW	LOW	MEDIUM	MEDIUM	MEDIUM	1 Minor

6.7 Demonstration of ALARP

Beach's approach to demonstration of ALARP includes:

- Systematically identify and assess all potential environmental impacts and risks associated with the activity.
- Where relevant, apply industry 'good practice' controls to manage impacts and risks.
- Assess the effectiveness of the controls in place and determine whether the controls are adequate according to the 'hierarchy of control' principle.
- For higher order impacts and risks undertake a layer of protection analysis and implement further controls if both feasible and reasonably practicable to do so.

NOPSEMA's EP decision making guideline (NOPSEMA 2024) states that in order to demonstrate ALARP, a titleholder must be able to implement all available control measures where the cost is not grossly disproportionate to the environmental benefit gained from implementing the control measure.

For this EP, the guidance provided in NOPSEMA's EP decision making guideline (NOPSEMA 2024) has been applied, whereby the level of ALARP assessment is dependent upon the:

- Residual impact and risk level (high versus low).
- The degree of uncertainty associated with the assessed impact or risk.

6.7.1 Residual Impact and Risk Levels

6.7.1.1 Lower-order Environmental Impacts and Risks

NOPSEMA defines lower-order environmental impacts and risks as those where the environment or receptor is not formally managed, less vulnerable, widely distributed, not protected and/or threatened and there is confidence in the effectiveness of adopted control measures.

Impacts and risks are considered to be lower-order and ALARP when, using the Beach Environmental Risk Assessment Matrix (Table 6.2), the impact consequence is rated as 'minor' or 'moderate' or risks are rated as 'low', 'medium' or 'high.' In these cases, applying 'good industry practice' (as defined in Section 6.7.2.1) is sufficient to manage the impact or risk to ALARP.

6.7.1.2 Higher-order Environmental Impacts and Risks

All other impacts and risks are defined by NOPSEMA as higher-order environmental impacts and risks (i.e., where the environment or receptor is formally managed, vulnerable, restricted in distribution, protected, or threatened and there is little confidence in the effectiveness of adopted control measures).

Impacts and risks are considered to be higher-order when, using the Beach Environmental Risk Assessment Matrix (Table 6.3), the impact consequence is rated as 'serious', 'major', 'critical' or 'catastrophic', or when the risk is rated as 'high' or 'very high'. In these cases, further controls must be considered as per Section 6.7.2.

An iterative risk evaluation process is employed until such time as any further reduction in the residual risk ranking is not reasonably practicable to implement. At this point, the impact or risk is reduced to ALARP. The determination of ALARP for the consequence of planned operations and the risks of unplanned events is outlined in Table 6.3.

Table 6.3 ALARP Determination for Consequence (Planned Operations) and Risk (Unplanned Events)

Consequence ranking	Minor	Moderate	Serious	Major	Critical	Catastrophic
Planned operations	Broadly acceptable	Tolerable if ALARP		Intolerable		
Residual impact category	Lower order		Higher order impacts			
Risk ranking	Low	Medium	High	Severe	Extreme	
Unplanned event	Broadly acceptable	Tolerable if ALARP		Intolerable		
Residual risk category	Lower order risks			Higher order risks		

6.7.2 Uncertainty of Impacts and Risks

In addition to the evaluation of residual impacts and risks as described above, the relative level of uncertainty associated with the impact or risk is also used to inform whether the application of industry good practice is sufficient to manage impacts and risks to ALARP, or if the evaluation of further controls is required.

In alignment with NOPSEMA's ALARP Guidance Note (NOPSEMA 2022a), Beach have adapted the approach developed by Oil and Gas UK (OGUK) (OGUK 2014) for use in an environmental context to determine the assessment technique required to demonstrate that potential impacts and risks are ALARP (Figure 6.2 and Table 6.4). Specifically, the framework considers impact severity and several guiding factors:

- Activity type
- Risk and uncertainty
- Stakeholder influence

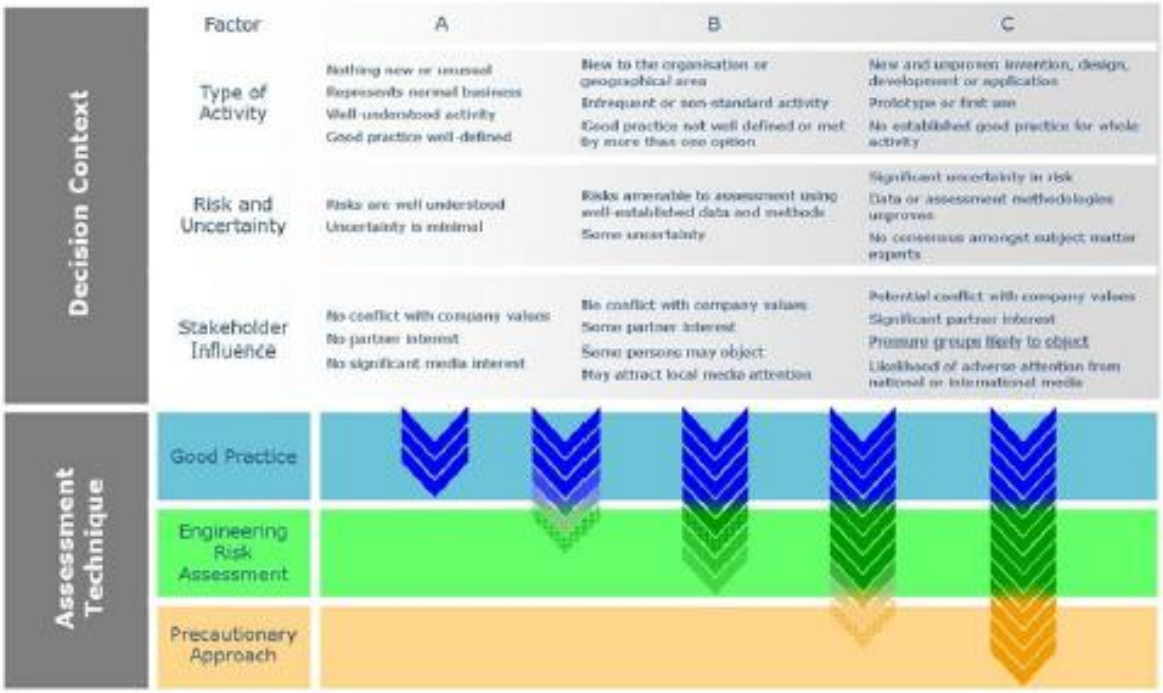


Figure 6.2: Impact and risk 'uncertainty' decision-making framework (OGUK, 2014)

Table 6.4 ALARP decision-making based upon level of uncertainty

Terms/acronym	Definition/expansion
Type A	A Type A decision is made if the risk is relatively well understood, the potential impacts are low, activities are well practised, and there are no conflicts with company values, no partner interests, and no significant media interests. However, if good practice is not sufficiently well-defined, additional assessment may be required.
Type B	A Type B decision is made if there is greater uncertainty or complexity around the activity and/or risk, the potential impact is moderate, and there are no conflict with company values, although there may be some partner interest, some persons may object, and it may attract local media attention. In this instance, established good practice is not considered sufficient and further assessment is required to support the decision and ensure the risk is ALARP.
Type C	A Type C decision typically involves sufficient complexity, high potential impact, uncertainty, or stakeholder influence to require a precautionary approach. In this case, relevant good practice still must be met, additional assessment is required, and the precautionary approach applied for those controls that only have a marginal cost benefit.

In accordance with the regulatory requirement to demonstrate that environmental impacts and risks are ALARP, Beach has considered the above decision context in determining the level of assessment required. The levels of assessment techniques considered include:

6.7.2.1 Good Practice

OGUK (2014) defines 'good practice' as the recognised risk management practices and measures that are used by competent organisations to manage well-understood impacts and risks arising from their activities.

'Good practice' can also be used as the generic term for those measures that are recognised as satisfying the law. For this EP, sources of good practice include:

- Requirements from Australian legislation and regulations.
- Relevant Australian policies.
- Relevant Australian Government guidance.
- Relevant industry standards and/or guidance material.
- Relevant international conventions.

If the ALARP technique is determined to be 'good practice', further assessment ('engineering risk assessment') is not required to identify additional controls. However, additional controls that provide a suitable environmental benefit for an insignificant cost are also identified at this point.

6.7.2.2 Engineering Risk Assessment

All potential impacts and risks that require further assessment are subject to an 'engineering risk assessment'. Based on the various approaches recommended in OGUK (2014), Beach believes the methodology most suited to this activity is a comparative assessment of risks, costs, and environmental benefit. A cost–benefit analysis should show the balance between the risk benefit (or environmental benefit) and the cost of implementing the identified measure, with differentiation required such that the benefit of the control can be seen and the reason for the benefit understood.

6.7.2.3 Precautionary Principle

OGUK (2014) states that if the assessment, considering all available engineering and scientific evidence, is insufficient, inconclusive, or uncertain, then a precautionary approach to impact and risk management is needed. A precautionary approach will mean that uncertain analysis is replaced by conservative assumptions that will result in control measures being more likely to be implemented.

That is, environmental considerations are expected to take precedence over economic considerations, meaning that a control measure that may reduce environmental impact is more likely to be implemented. In this decision context, the decision could have significant economic consequences to an organisation.

6.8 Demonstration of Acceptability

The OPGGS(E)R requires demonstration that environmental impacts and risks are of an acceptable level.

Beach considers a range of factors to demonstrate the acceptability of the environmental impacts and risks, including:

- The principles of ecologically sustainable development (ESD).
- Other requirements (e.g. laws, policies, standards, conventions, statutory instruments such as recovery plans for threatened species, plans of management for protected places).
- Internal context.
- External context.

6.8.1 Principles of Ecologically Sustainable Development

Based on Australia's National Strategy for Ecologically Sustainable Development (ESD) (Council of Australian Governments 1992), Section 3A of the EPBC Act defines ecologically sustainable development as:

> *Using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained and the total quality of life, now and in the future, can be increased.*

The principles of ESD as defined under the EPBC Act and a description of how the Beach impact and risk assessment methodology aligns with these principles are provided in Table 6.5.

Table 6.5: Assessment of ESD principles

Principle of ESD	Beach Implementation
Decision making processes should effectively integrate both long term and short term economic, environmental, social, and equitable considerations.	This principle is inherently met through the EP development process, as such this principal is not considered separately for each acceptability evaluation.
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.	If there is, the project shall assess whether there is significant uncertainty in the evaluation, and if so, whether the precautionary approach should be applied.
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.	The EP risk assessment methodology ensures that potential impacts and risks are ALARP, where the potential impacts and risks are determined to be serious or irreversible the precautionary principle is implemented to ensure the environment is maintained for the benefit of future generations. Consequently, this principal is not considered separately for each acceptability evaluation.
The conservation of biological diversity and ecological integrity should be a fundamental consideration in decision making.	Beach considers if there is the potential to affect biological diversity and ecological integrity through the impact and risk assessment process.

6.8.2 Other Requirements

- Aside from internal and external context, other requirements must be considered in the assessment of acceptability. These include:
- Environmental legislation (described in Section 2)
- Policies and guidelines (described in Section 2)
- International agreements (described in Section 2)
- EPBC Management Plans (described in Section 2)
- Australian Marine Park designations (described in Section 5)

This acceptance criteria is met when: compliance with specific laws or standards is demonstrated; management of the impact or risk is consistent with relevant industry practices; and the proposed impact or risk controls, EPOs and environmental performance standards (EPS) are consistent with the nature of the receiving environment based upon formal management plans.

6.8.3 Internal Context

Beach's OEMS includes Elements and Standards relevant to the way Beach operates.

At the core of the OEMS are 11 Elements (see Section 8.1) which detail specific performance requirements for the implementation of Beach's Environment Policy and management of potential HSE impacts and risks.

Elements and Standards in the OEMS which are relevant to either the activity, impact, control or receptor will be described within the internal context and contribute towards the assessment of acceptability.

To meet this acceptance criteria, the impact or risk must be compliant with the objectives of Beach's Environment Policy. Where specific internal procedures, guidelines, expectations are in place for management of the impact or risk in question, acceptability is demonstrated.

6.8.4 External Context

External context considers stakeholder expectations, obtained from stakeholder consultation.

Beach has undertaken stakeholder consultation, which is described in detail in Section 4. Where objections or claims have been raised, these are considered in the assessment of acceptability of related impacts and risks.

To meet this acceptance criteria, the merits of claims or objections raised by a relevant stakeholder must have been adequately assessed and additional controls adopted where appropriate.

6.9 Monitoring and Review

Monitoring and review activities are incorporated into the impact and risk management process to ensure that controls are effective and efficient in both design and operation. This is achieved through the EPO, EPS and measurement criteria that are described for each environmental impact or risk. Monitoring and review are described in detail in the Implementation Strategy (Section 8).

7 Environmental Impact and Risk Assessment

This chapter presents the assessment for the environmental impacts and risks identified for BassGas operations using the methodology described in Chapter 6, as required under Regulations 13(5)(6) of the OPGGS(E) and Regulations 15(3)(4)(5) of the OPGGS Regulations.

This chapter also presents the EPO, EPS and measurement criteria required to manage the identified impacts and risks. A summary of the impact consequence rankings and risk ranking for each hazard identified and assessed in this chapter is presented in Table 7.1.

Each of the control measures outlined for the hazards described in this chapter are assigned the following:

- Whether they apply to the platform, RGP, vessel or are common to all;
- Whether they apply to the operations, CoP or preservation phase; and
- Where necessary (by exception), whether they apply to only one regulatory jurisdiction (e.g., Commonwealth or Victoria).

Table 7.1: BassGas offshore operations environmental impacts and risk summary

No	Hazard	Inherent	Residual	Phases		
Impact		Consequence Rating		Operations	CoP	Preservation
1	Physical presence of infrastructure and vessels	Minor	Minor	✓	✓	✓
2	Infrastructure inspection, maintenance and repair	Minor	Minor	✓	✓	✓
3	Routine emissions – light	Minor	Minor	✓	✓	✓
4	Routine emissions – atmospheric	Minor	Minor	✓	✓	✓
5	Routine emissions – noise and vibration	Minor	Minor	✓	✓	✓
6	Routine discharges overboard – PFW	Moderate	Minor	✓	-	-
7	Routine discharges overboard – putrescible waste	Minor	Minor	✓	✓	✓
8	Routine discharges overboard – sewage and grey water	Minor	Minor	✓	✓	✓
9	Routine discharges overboard – cooling and brine water	Minor	Minor	✓	✓	✓
10	Routine discharges overboard – bilge water/deck drainage	Minor	Minor	✓	✓	✓
Risk		Risk Rating				
1	Accidental discharge of waste to the ocean	Low	Low	✓	✓	✓
2	Vessel collision with megafauna	Medium	Low	✓	✓	✓

No	Hazard	Inherent	Residual	Phases		
3	Introduction of invasive marine species	Medium	Low	✓	✓	✓
4	LoC (chemicals) – platform	Low	Low	✓	✓	-
5	LoWC (gas condensate) – wells	Medium	Low	✓	✓	✓
6	LoC (gas condensate & nitrogen) – RGP	Medium	Low	✓	✓	-
7	LoC (MDO) – vessels	Medium	Low	✓	✓	✓
8	Oil spill response activities – excluding well relief drilling	Medium	Low	✓	✓	✓
9	Oil spill response activities – relief well drilling	Low	Low	✓	✓	✓

The following sections assess environmental impacts (arising from planned events, being events that do or will happen), as listed in Table 7.1 and presented pictorially in Figure 7.1.

SIMPLIFIED PICTORIAL REPRESENTATION OF IMPACTS ARISING FROM THE BASSGAS OPERATIONS

BASS GAS ENVIRONMENT PLAN UPDATE | BASS GASS ENVIRONMENT PLAN

FIGURE 7.1

ERIAS

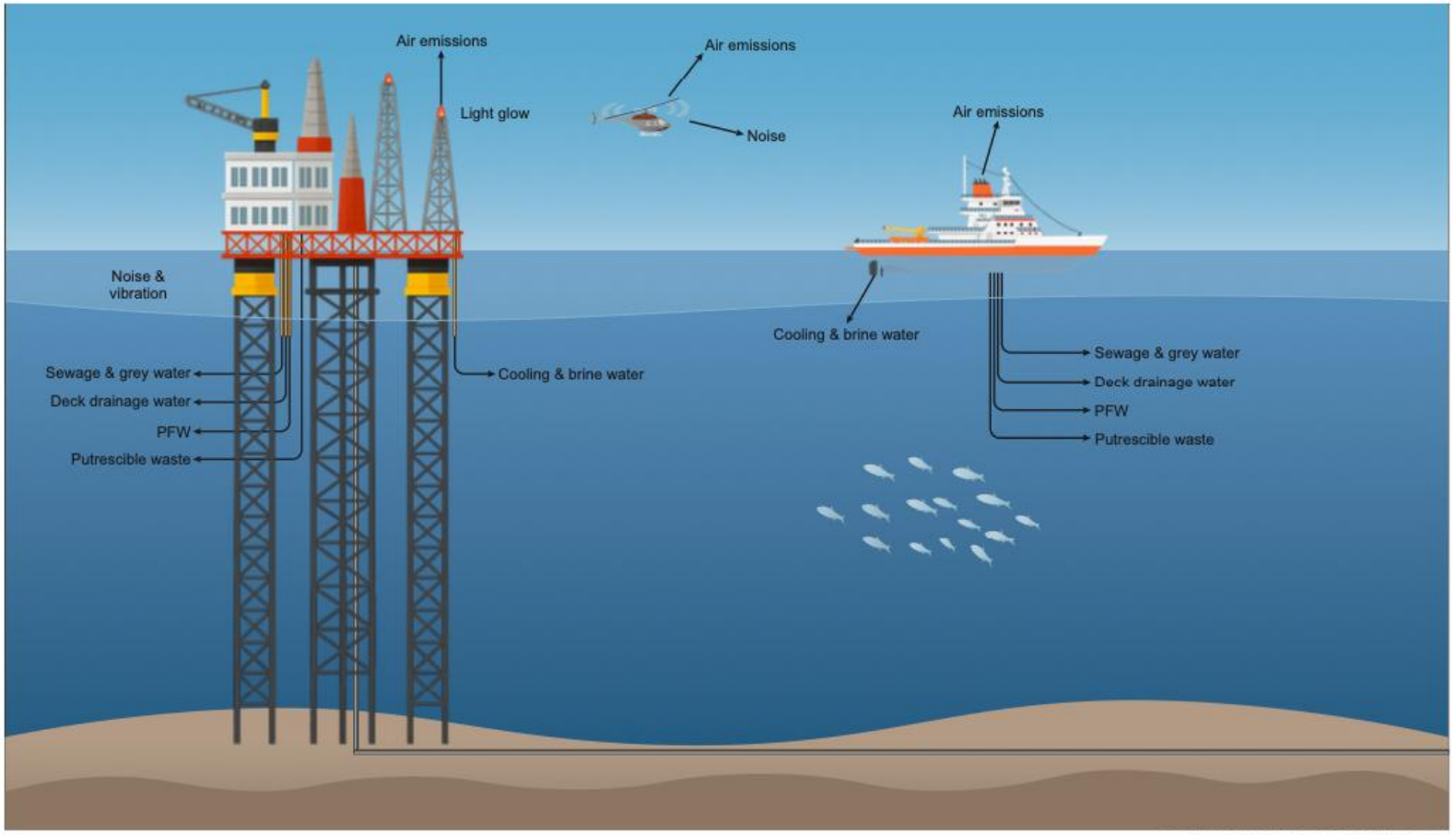


Figure 7.1: Simplified pictorial representation of impacts arising from the BassGas operations

7.1 IMPACT 1: Physical Presence of Infrastructure and Vessels

7.1.1 Source of Aspect

The Yolla-A platform and the RGP are physical hazards in the marine environment, noting that they have been in place since 2006 and that key fisheries stakeholders are aware of the presence of this infrastructure. The 500-m radius PSZ surrounding the platform prevents some marine activities, such as fishing. The RGP is a potential hazard to trawl fishing (it does not have an exclusion zone).

The presence of the PSV in the Yolla-A PSZ will have no impacts to third-party vessels, as third-party vessels are not permitted entry in the PSZ. Impacts to marine users from vessels undertaking IMR activities will only occur when they are operating along the RGP, which is infrequent and for short durations.

As outlined in Table 3.11,, project activities during the operations, CoP and preservation phases involves the continued presence of the platform and RGP, as well as support vessel movements. Accordingly, this aspect is relevant to all phases, as summarised below:

Hazard	Source	Operations	CoP	Preservation
Platform	Physical presence	✓	✓	✓
RGP	Physical presence	✓	✓	✓
Support vessels	Vessel movement	✓	✓	✓

7.1.2 Known and Potential Environmental Impacts

The physical presence of the platform and RGP has the potential environmental impacts:

- Loss of benthic habitat over the small area of the seabed impacted by the platform and pipeline footprint.
- Ship collision with platform and restricted vessel navigation around platform.
- Commercial fishing within the Yolla-A PSZ.
- Commercial fishing trawl equipment damage from snagging with the RGP.
- Potential for the subsea platform structure to act as an artificial substrate for marine growth, thereby changing the spatial distribution of fish and marine life in the vicinity of the infrastructure.
- Potential for the platform to attract birds to rest and nest, particularly when it is unmanned during the operations phase and then during the preservation phase. For operational reasons (such as helicopter landing and departure safety), there may be a need to implement measures to deter birds from resting and nesting on the platform, and these deterrent activities may have negative impacts on the birds.

In the last five years, there has been a single incident of a recreational vessel breaching the platform PSZ, which did not result in a collision with the platform.

The physical presence of vessels working alongside the RGP has the potential to create the following impacts:

- Collision potential with third-party vessels (and damage in the case of collision).
- Diversion of third-party vessels from their navigation paths.
- Damage to or loss of fishing equipment and/or loss of commercial fish catches.
- Changes to the function, interests and activities of other users.

7.1.3 EMBA

The potential impacts from the physical presence of infrastructure, for the Yolla-A platform is 78.5 ha (0.785 km^2) (representing the PSZ) and for the RGP 5.14 ha (0.05 km^2) represented by the Operational Area (Figure 5.1). Sensitive marine receptors likely to occur within the Operational Area are:

- Pelagic fauna (plankton, fish, marine mammals).
- Benthic habitats (sandy seabed and rocky reefs) and associated flora and fauna (invertebrates, fish, algae, seagrass).
- Demersal fauna (fish).
- Migratory birds and seabirds such as Albatrosses, Petrels and the Orange-bellied Parrot potentially affected by the platform lighting and illuminated boats and structures barriers to migration route (detailed further in Section 7.3), or attracted to the platform for resting or nesting.

The ecological receptors identified above are values of the following within the EMBA:

- Conservation values and sensitivities.
- Traditional Owners with cultural connection to these waters.

Socio-economic receptors and marine users within the EMBA

- Commercial and recreational fishing vessels and fishers.
- Commercial shipping.
- Local marine users for tourism and recreational purposes.

7.1.4 Jurisdiction of Hazard

The jurisdictions for this hazard are outlined below.

Commonwealth waters	Victorian waters
YES	YES
The platform and its PSZ, along with 93.5% of the length of the RGP, exist within Commonwealth waters.	Six and a half percent (6.5%) of the length of the RGP exists within Victorian waters

Vessels could be working along any part of the RGP

7.1.5 Evaluation of Environmental Impacts

7.1.5.1 Loss of benthic habitat over a small area of the seabed

The area of benthic habitat disturbed by the BassGas operations is limited to that occupied by the platform and the offshore RGP.

There are no known sensitive seabed features in the Operational area for this hazard. Surveys of the seabed around the Yolla-A platform have identified three depressions located on the east side of the platform formed from the spud cans of the jack-up drill rig that drilled the Yolla-5 and -6 wells (see Figure 5.11). The 36-m diameter depressions are preserved in a clay seabed base, and the total depression volume has not substantially changed over the course of surveys conducted between 2007 and 2019.

The pipeline, including locations previously subject to free span rectification, shows recovery of benthic fauna and soft sediment substrates over time as described in section 3.6, Plate 3.4.

The areas of seabed disturbed by the platform and pipeline area are small compared with the overall extent of the equivalent seabed habitat in the region. It is assessed that there will continue to be no long-term impacts to the diversity and abundance of benthic fauna, therefore the consequence is assessed as **Minor (1)**.

7.1.5.2 Ship collision with platform and restricted vessel navigation around platform

Bass Strait is one of the busiest shipping routes in Australia. The BassGas offshore assets are close to two minor shipping lanes, as detailed in Section 5.9.5.3. There are no impacts to shipping activity due to the pipeline during routine operations, while the loss of 78.5 ha of ocean (the PSZ area) for commercial shipping is insignificant in the context of the area of Bass Strait available for shipping. Any increased travel time and fuel use for marine users who must change their navigation path to avoid the platform is likely to be negligible and therefore the consequence is assessed as **Minor (1)**.

The platform has a fully automatic navigational aid system, as described in Section 3.5.17, that detects radar signals from passing ships and returns a coded response, and four navigational lights to provide cover in all directions with battery back-up. There have been no recorded breaches of the PSZ since BassGas became operational.

7.1.5.3 Vessel-to-Vessel Interactions

In the event of a collision between vessels along the pipeline, health and safety impacts are more likely than environmental impacts. It is unlikely that a collision would be forceful enough to breach a vessel's hull controls, due to high visibility of vessels, the advanced navigation aids employed by large vessels, and stakeholder consultations for inspection maintenance programs. Where an event occurs, it could lead to an MDO spill (further assessment of impacts for this event is provided in Section 7.17).

7.1.5.4 Commercial fishing trawl equipment damage due to snagging with the offshore RGP

While there is no exclusion zone around the offshore RGP, there is the potential for fishing equipment on the seabed to be damaged if it comes into contact with the pipeline. Both the pipeline and platform are identified on navigational charts for the area. Trawl fishing activity along the length of the pipeline

is low (see Section 5.9.5). To date, there have been no recorded incidents of fishing gear snagging the pipeline, indicating a Low risk of snagging. Regular inspections and free-span repairs (where required) ensure the snagging impact remains a low **Minor (1)** consequence.

7.1.5.5 Commercial fishing restriction within Yolla-A PSZ

Fishing and other maritime activities are not permitted within the Yolla-A PSZ. The platform is not in an area identified as having high fishing intensity (see Section 5.9.5), and the area covered by the PSZ is small compared to the overall fishing area available in Bass Strait.

Of the Commonwealth and Victorian managed fisheries identified as having the right to fish in the region (see Section 5.9.5), only the Commonwealth-managed Small Pelagic Fishery intersects the PSZ and this fishery continues to operate in the area without impacts from the BassGas operations.

Beach has in place a compensation scheme for genuine loss-of-catch or displacement claims to maintain a stable and fair working relationship with the fishing industry and has introduced a Fair Ocean Access procedure. The following process enables both the fishing and petroleum industries to carry on their lawful business with minimum interference with each other's activities:

- Communication to achieve on the water cooperation for safety and to avoid gear damage. Radio contact is via VHF channel.
- Cooperation that recognises that neither party has overriding rights of access, all fishermen will use their best endeavours to minimise disruption to Beach activities and Beach applies the same principle.
- Beach has adopted the recommended transit routes that have been used since BassGas operations began, except when there are occasions where bad weather, safety concerns or unforeseen circumstances may cause vessel masters to change route.
- Compensation where Beach activities result in loss or damage to fishers' equipment or catch for genuine substantiated claims but reserves the right to refuse this if fishers deliberately operate in the path of the support vessels or otherwise interfere or incite interference with BassGas operations.

In the event of a disputed claim, the parties will follow the 'Alternative Dispute Resolution' mechanism outlined below:

1. The party claiming there is a dispute must provide written notification to the other party, detailing the nature of the dispute.
2. Beach will then arrange a meeting between the parties involved in the dispute within seven days of receiving the notification. The other party is required to attend this meeting.
3. If the meeting does not resolve the dispute within seven days, Beach will immediately appoint a mediator.
4. The mediation will be conducted according to the Beach Mediation Code of Practice. The costs and expenses of the mediation will be shared equally between the parties. If one party pays more than its share, they may recover the excess from the other party. Otherwise, each party is

responsible for covering its own costs and expenses related to the mediation. From the date of notification to Beach regarding the dispute until the mediation is concluded, neither party will initiate legal proceedings against the other.

5. If mediation fails to resolve the dispute, either party may initiate legal proceedings as stated in Clause 6 of the Mediation Code of Practice.

The commercial fishing restriction are assessed as a **Minor (1)** consequence.

7.1.5.6 Potential for the platform to act as an artificial substrate for marine growth

The presence of subsea infrastructure creates a new habitat, allowing for the recruitment of flora and fauna onto and surrounding the artificial substrate.

Subsea equipment, such as platform jackets and pipelines, can provide long-term benefits by providing habitat for marine life and a localised increase in biodiversity. Studies have shown that the Gulf of Mexico's ecology is enhanced by using abandoned oil and gas platform jackets as artificial reefs (Fikes, 2013).

Offshore platforms and associated facilities provide highly productive, optimal microecosystems (Neira, 2005). The platform's jacket structure (including crossbeams, support struts, and vertical pilings) provides hard, reef-like surfaces for sessile invertebrates such as mussels and barnacles, which in turn provide food and shelter for other organisms. In addition, platform jackets occupy the entire water column, thereby providing alternative microhabitats from the sea surface to the seabed. They can also provide habitat for fish and larval invertebrates that disperse passively, thereby attracting small invertebrates and fish, and, in turn, attracting large predators. There is a greater abundance of juvenile and adult fish reported around Bass Strait platforms than adjacent natural reefs and surrounding waters. This supports the view that these artificial structures act as effective nurseries and marine refuges (Neira, 2005).

Seals in Bass Strait are routinely observed on and near offshore platforms, including at Yolla-A. Platform jackets benefit seals by providing a resting place and access to larger volumes of food (i.e., the fish attracted to the jacket structures and associated encrusting marine growth). It is possible that platforms may adversely impact seals by exposure to hydrocarbon contamination from waste discharges. However, the dispersion of treated discharged PFW is rapid in the central Bass Strait, and therefore, exposure is likely to be low (see Section 7.6).

The RGP crosses the seabed perpendicular to shore for a distance of approximately 147 km. Thales Geosolutions (2001) shows that, other than within a 19 km radius of the platform, where sediment is mainly very soft to soft sandy clay, the pipeline passes mostly over sand of medium to loose density and localised pockets of clay and gravel. In sections where it is emergent from the seabed, it provides a hard substrate for colonisation by epibenthic species. The extent to which the pipeline attracts biota depends on the proportion not buried or scoured by sand.

Regular ROV inspections of the RGP (refer Section 3.7.1) show sections of the pipeline that are completely or partially buried, and evidence of marine growth (mainly soft hydroids and tubeworm) on the outer concrete coated surface of the pipeline (refer Section 3, Plate 3.3).

The consequence is assessed as **Minor (1)** and is of an acceptable level.

7.1.5.7 Cultural values and sensitivities

First Nations cultural activities could be affected by restricted access to an area within the Operational Area. The extent of the impact is predicted to be access to the PSZ around the platform.

The consequence is assessed as **Minor (1)** and is of an acceptable level as no First Nations cultural activities have been identified to occur within the Operational Area.

7.1.5.8 Potential for the platform to act as resting or nesting site for seabirds

The presence of the Yolla-A platform introduces elevated structures within the marine environment that may potentially be utilised as a nesting or resting site for seabirds. These structures can provide refuge from open water conditions and may attract birds due to lighting, visual prominence or the presence of associated marine productivity.

As outlined in Section 5.6.4, seabirds remain one of the world's most threatened group of birds, with the Bass Strait being an ecologically important area for migratory seabirds traveling as far as Siberia, Russia, and the Scottish Highlands (DCCEEW, 2022). A range of migratory and resident seabird species occur within the Bass Strait region, including albatrosses, petrels, shearwaters and gulls, many of which spend the majority of their life at sea and primarily breed on remote islands.

The EPBC PMST identifies 64 threatened or migratory bird species that utilise the marine environment, with habitat and/or migratory pathways potentially occurring within the EMBA. Of these, four are classified as critically endangered and 29 as vulnerable (Section 5.6.4). Migratory species, particularly albatrosses, petrels and shearwaters are identified as having BIAs within the EMBA.

Albatross and petrel species spend approximately 95% of their lives foraging at sea (DCCEEW, 2022). There are 14 species of albatross known to forage and travel within the waters surrounding Bass Strait, as well as across waters within Australia. Only one of these species is known to breed within this area, the Shy albatross (*Thalassarche cauta*) (DCCEEW, 2026). The Shy albatross is known to breed exclusively on two offshore islands, Albatross Island and Mewstone, approximately 90 km and 550 km, from the Yolla platform, respecetively.

Shearwaters are small seabirds that frequent deep-sea environments (DCCEEW, 2026). Shearwater species nest onshore in burrows during the southern summer (September to May) and are highly pelagic, spending most of their time over deep ocean waters outside the breeding season. Three species are known in the Bass Strait region; the Sooty shearwater is EPBC-listed as vulnerable (Table 5.11, Section 5.6.4).

Table 7.2 demonstrates that most pelagic seabirds (e.g., albatrosses, petrels and shearwaters) are likely to visit the Yolla-A platform but are unlikely to use it for breeding or nesting, which reflects their reliance on terrestrial breeding habitats. Alternatively, opportunistic species such as gulls show a higher likelihood of using the platform for resting or roosting.

Table 7.2: Likelihood of seabirds visiting and using the Yolla-A platform

Bird Group	Key Species (examples)	Likelihood of Visiting Platform	Seasonal Presence (indicative)	Breeding/Habitat Use at Platform
True Seabirds				
Albatross	Endangered	Likely	Year-round (species-dependent) Peak • March – September	Unlikely
	Grey-headed albatross, shy albatross, Northern royal albatross			
	Vulnerable			
	Wandering albatross, Indian yellow-nosed albatross, Buller's albatross, Campbell albatross, Black-browed albatross, Sooty albatross, Southern royal albatross, Antipodean albatross, Gibson's albatross, Salvin's albatross, White-capped albatross			
	Not Threatened			
	Light-mantled sooty albatross			
Petrels	Endangered	Likely	Broad – many species present most of the year	Unlikely
	Southern giant petrel			
	Vulnerable			
	Northern giant petrel, soft-plumaged petrel, blue petrel, Gould's petrel, white-bellied storm petrel			
	Not Threatened			
	Common diving petrel, white faced petrel			
Shearwaters	Vulnerable	Likely	Summer peak • December – February	Unlikely
	Sooty shearwater			
	Not Threatened			
	Short-tailed shearwater, flesh-footed shearwater			
Gulls	Not Threatened	Likely	All seasons	Likely

Bird Group	Key Species (examples)	Likelihood of Visiting Platform	Seasonal Presence (indicative)	Breeding/Habitat Use at Platform
	Kelp gull, silver gull, pacific gull			
Terns	Vulnerable	Moderate	Peak • September – February	Unlikely
	Little tern, Australian fairy tern			
	Not Threatened			
	Crested tern, white-fronted tern			
Parrots (migratory)	Critically Endangered	Likely (transit)	Likely (transit) • September – December migration	Unlikely
	Swift-bellied parrot, orange-bellied parrot			
	Vulnerable			
	Blue-winged parrot			
Osprey and raptors	Not Threatened	Likely	• Seasonal (varies) – often summer – spring	Unlikely
	Osprey, white-bellied sea-eagle			
Shorebirds				
Sandpipers	Critically Endangered	Moderate	December – February (summer migrants)	Unlikely
	Curlew sandpiper			
	Vulnerable			
	Terek sandpiper, sharp-tailed sandpiper			
	Not Threatened			
	Wood sandpiper, marsh sandpiper, common sandpiper, pectoral sandpiper, broad-billed sandpiper			
Plovers and Knots	Endangered	Moderate	Winter or all-season depending on the species	Unlikely
	Lesser sand plover			
	Vulnerable			

Bird Group	Key Species (examples)	Likelihood of Visiting Platform	Seasonal Presence (indicative)	Breeding/Habitat Use at Platform
	Grey plover, eastern hooded plover, greater sand plover, red knot, great knot			
	Not Threatened			
	Pacific golden plover, red-capped plover, double-banded plover			
Other waders	Critically Endangered	Unlikely	Seasonal – mostly summer migrants	Unlikely
	Eastern curlew			
	Endangered			
	Black tailed godwit, Australian painted snipe			
	Vulnerable			
	Latham's snipe			
	Not Threatened			
	Little curlew, bar-tailed godwit, pin-tailed snipe			
Other seabirds	Endangered	Low-Moderate	All seasons	Generally unlikely
	Common greenshank			
	Vulnerable			
	Ruddy turnstone, white-throated needletail			
	Not Threatened			
	Little penguin, grey tailed tattler, wandering tattler, whimbrel, black-faced cormorant, fairy prion (southern), red-necked avocet, red-necked stint, satin flycatcher, pied stilt, sanderling, rufous fantail, fork-tailed swift, black faced monarch, cattle egret, brown skua, yellow wagtail, rainbow bee-eater			

Species more commonly associated with opportunistic use of infrastructure include gulls and other coastal birds, which may use platforms for resting or roosting. In contrast, pelagic species such as albatrosses, petrels and shearwaters are unlikely to use platforms for nesting due to their reliance on specific terrestrial breeding habitats.

Observations from Yolla-A and comparable offshore facilities indicate that seabird utilisation of infrastructure is typically limited and sporadic (see Table 7.3). Historical records show infrequent instances of perching, guano deposition and occasional nesting, with no evidence of sustained colony establishment. Incidents at Yolla-A platform occurred in approximately 28.6% of the years between 2012 and 2025, with an average rate of approximately 0.57 incidents per year.

Table 7.3: Recorded seabird interactions incidents at Yolla-A platform between 2012 and 2025

Year	No. Incidents	Incident Type
2012	1	Guano
2014	2	Guano x 1 Nesting x 1
2015	3	Helicopter bird strike x 2 Nesting on BOP x 1
2025	2	Guano x 2
Total years covered		2012-2025 (14 years)
Total number of incidents	8	Guano x 4 Nesting x 2 Helicopter bird strike x 2

As shown in Table 7.3, recorded interactions are infrequent, low in number and consist primarily of minor events such as guano accumulation and occasional nesting, with no evidence of persistent or increasing trends.

The introduction of an artificial resting substrate may result in a localised and temporary increase in bird presence; however, this is not expected to alter regional population dynamics or breeding behaviours. Potential adverse effects may include localised fouling (e.g. guano accumulation), operational interactions (e.g. bird strike risk during aviation activities), and minor disturbance to individual birds. These impacts are expected to be site-specific, short-term, and manageable through standard operational controls.

Overall, while the Yolla-A platform may provide opportunistic resting structure for certain seabird species, particularly gulls, it is unlikely to support significant or sustained rooting or nesting activity. Pelagic species of higher conversation significance (e.g., albatrosses, petrels and shearwaters) are unlikely to utilise the platform for breeding,

Recorded interaction data (Table 7.3) confirms that seabird use of the platform is infrequent, intermittent and low intensity, with no evidence of colony establishment or behavioural dependence on the infrastructure. Accordingly, impacts to seabirds are expected to be localised, intermittent and reversible.

Notwithstanding the low level of seabird interaction, seabirds and migratory birds may occasionally be attracted to and rest on the platform, particularly in the vicinity of the helideck. Unmanaged bird presence has the potential to present safety risks to helicopter take-off and landing operations. To minimise this risk, bird deterrent measures may be implemented in accordance with the Adaptive Bird Management Plan. These measures focus on minimising bird attraction to operational area, reducing perching and roosting opportunities, monitoring bird activity and optimising flight operations to reduce bird strike.

Bird deterrent measures include passive deterrents such as spike, bird wires and anti-perch wires installed where practicable to reduce perching and roosting opportunities, together with active deterrents including low-pressure seawater spray systems and marine horns where required. The seawater spray system utilises seawater to discourage birds from congregating on the helideck and discharges washdown water to the marine environment. These measures are designed to deter birds from operational areas without causing harm and are implemented primarily to manage aviation safety risks rather than to address ecological impacts associated with seabird use of the platform.

The consequence is assessed as Minor (1) and is of an acceptable level.

7.1.6 Cumulative Impact Evaluation

There is a low potential for cumulative impacts on marine fauna and on other marine users when vessels supporting the platform and vessels undertaking IMR along the RGP are operating simultaneously. The periods in which such simultaneous vessel activities would take place would be a few days per year at most. There are no other oil and gas operations in close proximity to BassGas, so the combination of BassGas activities and other oil and gas operations is not relevant to the hazard of physical presence of infrastructure. Additionally, routine maritime notifications and Beach communications make shipping and fishing traffic aware of the presence of vessels when undertaking IMR work along the RGP. This is effective at avoiding cumulative impacts.

7.1.7 Impact Assessment

An impact assessment for physical presence of infrastructure and vessels is presented in Table 7.4.

Table 7.4 Impact assessment for physical presence of infrastructure

ALARP decision context	
Impact decision framework context	Type A.
Activity	Nothing new or unusual, represents business as usual, well understood activity, good practice is well defined.
Level of certainty of impacts	Risks are well understood, uncertainty is minimal. There have been no recorded breaches of the PSZ since BassGas became operational, nor have there been any incidents of fishing gear snagging on the pipeline or any other impact to the pipeline from anchors, etc.
Stakeholder influence	No conflict with company values, no partner interest, no significant media interest.
Impact Consequence (inherent)	
Operations	Minor (1)

ALARP decision context	
CoP	Minor (1)
Preservation	Minor (1)

Assessment of Proposed Control Measures		
Control	**Cost/benefit analysis**	**Implemented?**
Mark infrastructure and platform PSZ on navigation charts. *(All phases)* *(Commonwealth and Victorian state waters)*	This control ensures that marine users are able to locate the infrastructure and plan to avoid it. It is also an AHO requirement that offshore oil and gas titleholders provide this data so it can be included on the charts. The Yolla-A platform and RGP have been marked on the navigational charts since it was developed. Implementation and maintenance of charting information is readily achievable through existing hydrographic and regulatory processes and incurs a low cost relative to the environmental benefit gained. The cost of implementing and maintaining this control is not grossly disproportionate to the reduction in risk achieved and therefore the control is considered reasonably practicable and has been adopted.	Yes **(IMP01-CM01)**
Navigational lights are installed and operational on the platform. *(All phases)* *(Commonwealth waters only)*	Having functional navigational lights on the platform is a requirement under the *Navigation Act 2012* (Cth). It reduces the likelihood of interactions with marine users and is routine practice for offshore platform operators. The cost of implementing and maintaining navigational lights is low relative to the environmental benefit of reducing the likelihood of vessel interaction with the platform and is not considered grossly disproportionate to that benefit. Accordingly, the control is considered reasonably practicable and has been adopted.	Yes **(IMP01-CM02)**
Implement a PSZ around the platform. *(All phases)* *(Commonwealth waters only)*	The PSZ is a legal requirement under Sections 616 and 617 of the OPGGS Act that is regulated and administered by NOPSEMA. By marking this on navigation charts, it reduces the likelihood of interactions with marine users. The Yolla-A 500 m PSZ (and 3-km radius cautionary zone) is actively monitored by the platform using AIS and radar to minimise the risk of vessel collision with the platform. This is routine practice for offshore platform operators. The implementation and maintenance costs associated with the PSZ and monitoring systems are low relative to the environmental benefit achieved through reducing the likelihood of vessel interaction with the platform. The cost is not considered grossly disproportionate to the reduction in environmental risk and the control is therefore considered reasonably practicable.	Yes **(IMP01-CM03)**
Implement an Adaptive Bird Management Plan. *(All phases)* *(Commonwealth waters only)*	An Adaptive Bird Management Plan provides key benefits by delivering site-specific, evidence-based understanding of seabird behaviour, enabling early detection of any changes in activity, and supporting adaptive, targeted management responses without introducing unnecessary controls. This is considered appropriate given the	Yes **(IMP01-CM04)**

ALARP decision context		
	historically low level of bird presence on the platform. Given the limited risk of exposure and the high cost and practical constraints associated with physical deterrents, the monitoring program represents a suitable and effective control that maintains environmental risk at ALARP, while allowing for escalation of management measures if required and avoiding unnecessary intervention where risk is demonstrably low. The costs associated with monitoring and adaptive management are proportionate to the environmental benefit achieved and provide a flexible mechanism to respond if bird activity increases. Accordingly, the control is considered reasonably practicable and has been adopted.	
Installation of passive bird deterrents on the Yolla-A platform. *(All phases)* *(Commonwealth waters only)*	The use of passive bird deterrents (e.g., spikes, bird wires and anti-perch wire) could reduce the risk of bird strike, bird infestation, nesting and the build-up of guano on the helideck. However, Beach has only recorded two instances of seabird use as habitat between 2014 and 2015, and seabird species are rarely observed using the platform for perching, foraging or resting. Therefore, the costs associated with installing passive bird deterrents above equipment on the Yolla-A platform is grossly disproportionate to the negligible environmental benefit.	Possible, if and as required **(IMP01-CM04)**
Installation of active bird deterrent system that utilises a light emitting component. *(All phases)* *(Commonwealth waters only)*	Installation of an active bird deterrent system utilising light-emitting components could reduce the risk of bird strike, nesting and the accumulation of guano on the helideck. However, artificial light emissions are known to deter and disorient migratory seabirds, potentially creating a barrier to migration pathways across the Bass Strait, and may disrupt nocturnal behaviours during breeding cycles. Given the potential for adverse environmental impacts and the historically low level of seabird activity at the platform, implementation costs and operational complexity would be disproportionate to the environmental benefit achieved.	Possible, if and as required **(IMP01-CM04)**
Installation of active bird deterrent system that utilises a noise emitting component. *(All phases)* *(Commonwealth waters only)*	Installation of an active bird deterrent system utilising noise-emitting components (e.g., air horn) could reduce the risk of bird strike, nesting and the accumulation of guano on the helideck. While the high-frequency noise generated by such systems is generally outside the sensitive hearing range of most marine fauna and any impacts to seabirds would be likely limited to short-term, localised avoidance, the effectiveness of these systems is known to diminish over time as bird species become habituated. Given the historically low level of seabird activity at the Yolla-A platform, the limited risk of exposure, and the potential for adverse ecological impacts, the cost and practicality constraints of implementing such a system are disproportionate to the benefit.	Possible, if and as required **(IMP01-CM04)**
Installation of active bird deterrent system that utilises a	Installation and operation of a seawater spray bird deterrent system can reduce the risk of bird strike, nesting and the accumulation of guano on the helideck by	Possible, if and as required **(IMP01-CM04)**

	ALARP decision context	
seawater spray component. *(All phases)* *(Commonwealth waters only)*	discouraging seabirds from perching and roosting in areas critical to helicopter operations. The system uses low-pressure seawater sprays to create a temporary disturbance that encourages birds to leave the helideck area without causing injury or long-term behavioural effects. The resulting discharge comprises untreated seawater returned directly to the marine environment and is not expected to result in measurable change to water quality. Given the historically low level of seabird activity at the Yolla-A platform, the environmental benefit of implementing a seawater bird deterrent spray system is limited. While the system may provide an additional control to manage aviation safety risks associated with occasional bird presence, any reduction in environmental risk would be marginal. Given the limited environmental benefit, infrequent need for deployment and the costs associated with installation, operation and maintenance of the system, implementation would be disproportionate to the environmental risk being managed.	
Reduce the radius of the Yolla-A PSZ. *(All phases)* *(Commonwealth waters only)*	Section 616 of the OPGGS Act states that a PSZ may extend to a maximum of 500 m around the infrastructure, meaning that reducing the area of the PSZ is possible. However, for consistency with other infrastructure in Australian waters and to ensure consistency of communications with marine users, Beach has retained the maximum 500 m radius. Retaining the existing 500 m PSZ provides a clear and consistent risk management approach for marine users with no material increase in implementation cost. The environmental benefit achieved is not disproportionate to the cost of implementation and the existing control has therefore been retained.	No
Implement a vessel assurance system during the procurement process. *(All phases)* *(Commonwealth and Victorian state waters)*	Beach implements its Marine Assurance System during the vessel procurement process to ensure that contracted vessels meet relevant maritime laws (such as certification requirements under the *Navigation Act 2012* (Cth) and associated Marine Orders). This is routine practice for offshore operators and is considered best practice. The assurance activities are readily implemented through existing procurement and contractor management processes, and the associated costs are not grossly disproportionate to the environmental benefit achieved through reducing the likelihood of marine incidents.	Yes **(IMP01-CM06)**
Notify the AHO and key fisheries stakeholders of vessel-based IMR campaigns ahead of time. *(All phases)*	This control enables the AHO to issue an update in their fortnightly Notice to Mariners (NTM) with the aim of reducing the likelihood of unplanned interactions with other vessels. Notifying other stakeholders directly, particularly fishers known to operate in the region, further minimises this likelihood.	Yes **(IMP01-CM07)**

ALARP decision context		
(Commonwealth and Victorian state waters)	This is routine practice for offshore operators and is considered best practice. The costs associated with stakeholder notification and publication processes are low relative to the environmental benefit achieved through reducing the likelihood of vessel interactions and are not considered grossly disproportionate.	
Use qualified and trained personnel to maintain visual and radar watch from the vessel bridges. *(All phases)* *(Commonwealth and Victorian state waters)*	This is a requirement of COLREG (Rule 5), SOLAS V/22, STCW watchkeeping procedures, and several Marine Orders under the *Navigation Act 2012* (Cth). SCTW training records are verified as part of implementing the Beach Marine Assurance System. This is routine practice for offshore platform operators and is considered best practice. The cost of maintaining trained and competent personnel is not considered grossly disproportionate to the environmental benefit achieved through reducing the likelihood of vessel interactions and associated environmental impacts.	Yes **(IMP01-CM08)**
Marine users impacted by interference with the BassGas infrastructure have a process to lodge a claim. *(All phases)* *(Commonwealth and Victorian state waters)*	This control measure allows marine users with claims of interference to be promptly investigated using documented procedures in process that aims to not favour one party over the other. Beach has developed the Fair Ocean Access Procedure to achieve this aim. While this is not a legislative requirement, it helps to meet the requirements of Section 280 of the OPGGS Act (do not interfere with navigation or fishing) and is considered best practice. The procedure can be implemented through existing management systems at low cost and provides a transparent mechanism for resolving interference concerns before they escalate. The associated costs are not grossly disproportionate to the environmental benefit achieved and the control is therefore considered reasonably practicable.	Yes **(IMP01-CM09)**
Install trawl guards over the length of the RGP. *(All phases)* *(Commonwealth and Victorian state waters)*	Over-trawl protection on the RGP could mitigate the potential for commercial fishing trawl gear to damage the pipeline or result in fishing gear loss. Over the RGP's operational life, there have been no such incidents recorded. At this late stage of the infrastructure's operating life (near to CoP), the cost of installing such protection is grossly disproportionate to the negligible environmental benefit.	No.
RGP and platform pipework will be filled with inert nitrogen. *(Preservation phase)* *(Commonwealth and Victorian state waters)*	This control measure ensures that residual hydrocarbons are pushed to shore and creates an oxygen-free, dry environment inside the RGP and platform pipework. In removing hydrocarbons and liquids, pipeline steel integrity is maintained until decommissioning, in turn preventing leaks of residual hydrocarbons. By maintaining integrity, equipment remains intact at the time of removal during decommissioning, further reducing risks associated with decommissioning. This control measure is feasible and represents standard industry practice for preserving pipeline integrity. The costs	Yes **(IMP01-CM05)**

ALARP decision context			
	associated with implementing the purge and preservation activities are not considered grossly disproportionate to the environmental benefit achieved through preventing hydrocarbon releases, maintaining equipment integrity and reducing future decommissioning risks. Accordingly, the control has been adopted.		
Environmental Controls and Performance Measurement			
EPO	**Control measure**	**EPS**	**Measurement criteria**
IMP01-EPO01 The presence of the platform and RGP do not interfere with marine users.	**Platform and RGP**		
	IMP01-CM01 The BassGas offshore infrastructure and PSZ are marked on maritime nautical charts (nautical charts Aus 150, 487 & 801). *(All phases)* *(Commonwealth and Victorian state waters)*	**IMP01-EPS01** AHO navigation chart requirements are met.	**IMP01-MC01** Maritime nautical charts for central Bass Strait have the BassGas facilities marked.
	IMP01-CM02 Navigational lights are operated on Yolla-A in accordance with *Navigation Act 2012* (Cth) requirements. *(All phases)* *(Commonwealth waters only)*	**IMP01-EPS02** The requirements of *Navigation Act 2012* (Cth) (Chapter 6, Part 3, Division 2 – Collisions, Lights and Signals) are met.	**IMP01-MC02** Inspection and maintenance records for the navigation lights verify that they are functioning properly.
	IMP01-CM03 The Yolla-A PSZ (and 3-km radius cautionary zone) is actively monitored by the platform using AIS and radar to minimise the risk of vessel collision with the platform. *(All phases)* *(Commonwealth waters only)*	**IMP01-EPS03** There are no unplanned interactions between other marine users and the platform or IMR vessels.	**IMP01-MC03** Inspection and maintenance records for the AIS and radar verify that they are functioning properly.
IMP01-EPO02 Seabird presence and behaviour at the Yolla-A platform does not result in unacceptable impacts to avifauna populations, including migratory and threatened seabird species.	**IMP01-CM04** Beach will implement an Adaptive Bird Management Plan on the Yolla-A platform to identify, track and manage seabird presence and behaviour. The program will include: • Bird deterrent system has been developed as per the recommendations of the bird management specialists. • Water sprinkler used when birds are present. • Operators of the bird deterrent systems are trained	**IMP01-EPS04** Seabird presence, behaviour and platform utilisation are monitored and assessed, and adaptive management measures are implemented where monitoring indicates an increasing trend in seabird activity or evidence that existing controls may not be effective.	**IMP01-MC04.1** Bird deterrent system report verifies implementation and operation of bird deterrents. **IMP01-MC04.2** Records of bird deterrent laser use (including platform camera observations and operational logs) verify that platform cameras were reviewed prior to deployment to confirm the absence of

ALARP decision context			
	and following standard operating systems. • Operators of the bird deterrent systems are trained and follow standard operating systems. • The water sprinkler is used daily (when birds are present), even when helicopter flights are not scheduled. This prevents birds from habituating to an inactive helideck, reducing the numbers and hence lowering the risk of being harmed. • Bird laser would initially be used for a limited time at dusk and dawn prior to scheduled helicopter operations. Further trials will be undertaken to determine whether nighttime operations would be effective. • Monitoring of the platform cameras will be used to determine that there are no species of concern on the helideck prior to operation of the laser. *(All phases)* *(Commonwealth waters only)*		species of concern on the helideck and that the laser was operated in accordance with the Adaptive Bird Management Plan prior to scheduled helicopter operations. **IMP01-MC04.3** Training and competency records verify that personnel responsible for operating bird deterrent systems have received training and are assessed as competent in accordance with standard operating instructions. **IMP01-MC04.4** Operational records, platform logs and camera observations verify that the seawater sprinkler system was operated when birds were present on the platform, including during periods when helicopter operations were not scheduled. **IMP01-MC04.5** Periodic bird management reports or environmental inspection records verify seabird observations, bird deterrent activities and any bird-related incidents were recorded, reviewed and managed in accordance with the Adaptive Bird Management Plan, including assessment of deterrent effectiveness and identification of any required adaptive management actions.
IMP01-EPO03 Facility (RGP and platform)	**IMP01-CM05** The integrity of the platform and RGP will be maintained through the	**IMP01-EPS05** The physical integrity of the platform and	**IMP01-MC05** PMS records verify that IMR on the RGP and

ALARP decision context			
integrity is maintained during the preservation phase.	preservation phase to ensure it is in a suitable condition for later decommissioning or alternate use. This includes maintaining the IMR program and filling the RGP and platform pipework with inert nitrogen. *(Preservation phase)* *(Commonwealth and Victorian state waters)*	RGP is intact at the time of decommissioning.	platform continued throughout the preservation phase.
IMP01-EPO04 The presence of the vessel in the platform PSZ or along the RGP does not interfere with marine users.	**Vessels (operating in Commonwealth & Victorian state waters)**		
	IMP01-CM06 The Beach Marine Assurance System is implemented to ensure that vessels meet relevant maritime laws. It includes pre-commencement vessel inspections of class certification requirements under the *Navigation Act 2012* (Cth) and associated Marine Orders, including but not limited to: • Marine Order 21 Safety and Emergency Arrangements. • Marine Order 27 Safety of Navigation and Radio Equipment. • Marine Order 30 Prevention of Collisions. • Marine Order 70 Seafarer Certification. *(All phases)*	**IMP01-EPS06** The Beach Marine Assurance System is followed when contracting new vessels.	**IMP01-MC06** Marine Assurance System records verify that contracted vessels meet certification requirements.
	IMP01-CM07 Beach will undertake consultation with maritime regulatory agencies (e.g., AHO, MSV) and fisheries ahead of IMR campaigns no less than four weeks prior to it commencing to enable the promulgation of Notice to Mariners and AusCoast navigational warnings. *(All phases)*	**IMP01-EPS07** Consultation with relevant persons meets the requirements of OPGGS(E) Regulation 5 and associated NOPSEMA guidance material.	**IMP01-MC07.1** Beach stakeholder engagement register verifies that consultation was undertaken ahead of IMR campaigns. **IMP01-MC07.2** Notices to Mariners verify that Beach's advice has been communicated to marine users.
	IMP01-CM08 Vessels implement routine vessel-to-vessel collision prevention and	**IMP01-EPS08** Visual watch meets the requirements of COLREG (Rule 5), SOLAS V/22	**IMP01-MC08.1** Beach Marine Assurance System records verify that

ALARP decision context			
	avoidance measures, including: • The Vessel Master and deck officers have valid SCTW certificates in accordance with Marine Order 70 (seafarer certification) to operate radio equipment to warn of potential third-party spatial conflicts (e.g., International Convention on Standards of Training, Certification and Watchkeeping for Seafarers [STCW95], GDMSS proficiency). • Maintaining visual and radar watch at all times. • The Vessel Master issues warnings (e.g., radio warning, flares, lights/horns) to third-party vessels approaching the vessel while it's within the platform PSZ or alongside the RGP. *(All phases)*	and STCW watchkeeping procedures.	STCW certificates are current. **IMP01-MC08.2** Radio communications/ bridge log verifies that warnings to third party vessels are issued as necessary.
IMP01-EPO05 Marine user claims of interference are promptly investigated in line with documented procedures.	**Common to platform, RGP and vessels (Commonwealth and Victorian state waters)**		
	IMP01-CM09 Upon notification of a claim of interference from a marine user, Beach will enter the details into the stakeholder engagement data base CMO incident management system and follow its Incident Management Procedure to investigate the complaint/incident and determine whether compensation is payable to the complainant in line with the Beach Fair Ocean Access Procedure. *(All phases)*	**IMP01-EPS09** The Beach Fair Ocean Access Procedure is followed for all claims of interference in support of Section 280 of the OPGGS Act.	**IMP01-MC09.1** Stakeholder engagement register or incident management system contains details of claims of interference. **IMP01-MC09.2** Stakeholder engagement or incident investigation records verify that the claim was investigated in line with the Fair Ocean Access Procedure.

Impact Consequence (residual)	
Operations	Minor (1)
CoP	Minor (1)

ALARP decision context	
Preservation	Minor (1)
ALARP Decision Justification	
With the controls outlined in this table in place, the impact consequence has been assessed as Minor (1) and is considered to be good practice (Decision Context A). This means any additional or alternative control measures do not lower the residual consequence further or would be grossly disproportionate to the residual consequence. Therefore, a Minor (1) residual impact consequence is considered to be ALARP.	
Acceptability Assessment	
Defined acceptable level	The physical presence of infrastructure and vessels is assessed as having a Minor (1) consequence, which is not considered as having the potential to result in serious or irreversible environmental damage.
Internal context	The proposed management of the impact is aligned with the Beach Environment Policy. Activities will be undertaken in accordance with the Implementation Strategy (Chapter 8).
External context	The BassGas Offshore Operations SEP is implemented to ensure that stakeholders are aware of operations issues. No objections or claims were raised by stakeholders in relation to the physical presence of infrastructure and vessels. During ongoing consultation any concern from stakeholder will be managed to close, for the life of asset.
Legislative context	The controls outlined in this table align with the requirements of: • OPGGS Act 2006 (Cth). ○ Section 280 – requires that a person carrying on activities in an offshore area under the permit, lease, licence, authority or consent must carry on those activities in a manner that does not interfere with navigation or fishing (among others). • OPGGS Act 2010 (Vic). ○ Section 276 – requires that a person carrying on activities in an offshore area under the permit, lease, licence, authority or consent must carry on those activities in a manner that does not interfere with navigation or fishing (among others). • *Navigation Act 2012* (Cth). ○ Chapter 6 (Safety of navigation), particularly Part 3 (Prevention of collisions). ○ AMSA Marine Orders Part 21 (Safety of Navigation and Emergency Procedures). ○ AMSA Marine Orders Part 27 (Safety of Navigation and Radio Equipment). ○ AMSA Marine Order Part 30 (Prevention of Collisions). • The Marking of Man-Made Offshore Structures (IALA, Ed 2, 2013). ○ Recommendation O-139.
Industry practice	The consideration and alignment of controls outlined in the below-listed guidelines and codes of practice demonstrates that BPEM is implemented for this activity.
	Environmental management in the upstream oil and gas industry (IOGP-IPIECA, 2020) — The control measures listed in this table meet the relevant mitigation measures listed for offshore activities with regard to: • Light emissions – minimise external lighting to that required for navigation and safety (**IMP01-CM02**).

ALARP decision context		
		• Physical presence – ensure facility is marked on navigation charts, exclusion zones are in place, navigation lighting is used (**IMP01-CM01**). • Develop exclusion zones in consultation with key stakeholders, including local fishing communities; raise awareness of exclusion zones with all stakeholders (**IMP01-CM01**) • Issue a Notice to Mariners through the relevant government agencies, detailing the area of operations (**IMP01-CM07**).
	Best Available Techniques Guidance Document on Upstream Hydrocarbon Exploration and Production (European Commission, 2019)	There are no guidelines specifically regarding interference with marine users.
	Environmental, Health and Safety Guidelines for Offshore Oil and Gas Development (World Bank Group, 2015)	The control measures listed in this table meet these guidelines with regard to: • Ship collision (item 120) - To avoid collisions with third-party vessels, offshore facilities should be equipped with navigational aids that meet national and international requirements, including navigational lights on vessels (**IMP01-CM02, -CM03**). • Ship collision (item 121) - The relevant maritime, port, or shipping authority should be notified of all permanent offshore facilities, as well as safety zones (**IMP01-CM01, -CM07**) • Ship collision (item 122) - A subsea pipeline corridor safety zone should be established to define anchoring exclusion zones and provide protection for fishing gear (**IMP01-CM01**).
	Code of Environmental Practice (APPEA, 2008)	The control measures listed in this table meet the following offshore development and production objectives: • To reduce the impact on other marine resource users to ALARP and to an acceptable level. • To reduce risks to public safety to ALARP and an acceptable level.
Environmental context	MNES	
	AMPs	No intersection or impacts.
	Ramsar wetlands	No intersection or impacts.
	NIWs	No intersection or impacts.
	TECs	No intersection or impacts.
	Nationally threatened and migratory species	Physical presence of infrastructure and vessels does not have any impacts on threatened or migratory species.
	Other matters	

ALARP decision context		
	State marine parks	Physical presence of infrastructure and vessels does not have any impacts on state marine parks.
	Species Conservation Advice/Recovery Plans/Threat Abatement Plans	As per the impact evaluation, the physical presence of infrastructure does not compromise the specific objectives or actions of species conservation, recovery or threat abatement plans.
ESD principles	The EIA presented throughout this EP demonstrates that ESD principles (a), (b), (c) and (d) are met (noting that principle (e) is not relevant).	
Environmental Monitoring		
Monitoring of potential impacts is undertaken via stakeholder consultation as detailed in Section 4.		
Record Keeping		
Platform & RGP • BassGas stakeholder engagement register. • Maritime navigation charts. • PMS records. • CMMS records. • Bird deterrent system report. • Platform operation logs. • Training and competency records. • Marine Assurance System records. • Notices to Mariners. • PSZ gazettal. • Incident records.	Vessels • Vessel PMS records. • Bridge communications logs.	

7.2 IMPACT 2: Infrastructure Inspection, Maintenance and Repair

7.2.1 Source of Aspect

Infrastructure IMR activities undertaken on the platform and offshore RGP (described in Section 3.7) may result in small areas of direct or indirect disturbance to the seabed and marine fauna.

As outlined in Table 3.11, project activities during the operations, CoP and preservation phases involve continued IMR activities, as well as support vessel movements. Accordingly, this aspect is relevant to all phases, as summarised below:

Hazard	Source	Operations	CoP	Preservation
Platform	IMR activities	✓	✓	✓
RGP	IMR activities	✓	✓	✓
Support vessels	Vessel movement	✓	✓	✓

7.2.2 Known and Potential Environmental Impacts

The IMR activities impact on marine receptors due to:

- Physical removal or disturbance of seabed sediments through localised water jetting or mattress placement.
- Temporary and localised reduction in water quality.
- Noise and vibration disturbance from sub-bottom profiling (to locate buried portions of pipeline) and other survey activities (see Section 7.5).
- The dislodgement (and possible death) of marine growth (e.g., macro-algae and epifauna such as sponges, ascidians and molluscs) previously attached to the subsea infrastructure.
- The generation of grit blasting material (generally sand) and dislodgement of scale and/or paint that settles on the seabed.

7.2.3 EMBA

The potential impacts from infrastructure inspection, maintenance and repair activities are limited in spatial extent to no greater than several metres radius from the activity, within the Operational Area (Figure 5.1).

Sensitive marine receptors likely to occur within the Operational Area are:

- Pelagic fauna (plankton, fish, marine mammals).
- Benthic habitats (sandy seabed and rocky reefs) and associated flora and fauna (invertebrates, fish, algae, seagrass).
- Demersal fauna (fish).
- Migratory birds and seabirds such as Albatrosses, Petrels and the Orange-bellied Parrot potentially affected by the Platform lighting and illuminated boats and structures barriers to migration route (detailed further in Section7.3).
- The ecological receptors identified above are values of the following within the EMBA:
- Conservation values and sensitivities.
- Traditional Owners with cultural connection to these waters.

Socio-economic receptors and marine users including:

  - Commercial and recreational fishing vessels and fishers.
  - Local marine users for tourism and recreational purposes.
  - Commercial shipping.

7.2.4 Jurisdiction of Hazard

The jurisdictions for this hazard are outlined below.

Commonwealth waters	Victorian waters
YES	YES
IMR activities occur on the platform topsides and jacket and the section of the RGP in Commonwealth waters.	Pipeline IMR activities occur on the section of the RGP that occurs in Victorian waters

7.2.5 Evaluation of Environmental Impacts

7.2.5.1 Removal or disturbance of seabed sediments

Maintenance activities may lead to localised disturbances of the seabed, which can be either direct or indirect. Such disturbances might arise from vessel anchoring (if dynamic positioning is not possible), the wash generated by ROV propellers, or sediment disruption around the infrastructure due to maintenance tasks (for example, water jetting sediments near pipelines). These activities can cause temporary and highly localised turbidity and habitat disturbance.

Considering the extensive coverage of soft sediments in Bass Strait, the infrequent nature of these activities, and the temporary nature of the disturbances, the overall consequence of these activities on benthic habitat and fauna are expected to be **Minor (1)**. For instance, anchor depressions can serve as traps for marine detritus and sand, which eventually fill in, indicating that the effect is temporary. Benthic organisms can quickly recolonise these areas (Currie and Isaac, 2005).

7.2.5.2 Reduction in water quality

Sand or water blasting may temporarily increase turbidity in the area due to disturbances in the surrounding sediments and the dislodgment of marine growth. However, this is unlikely to impact benthic productivity around the platform and pipeline, as the removal of marine growth will occur over short distances at any given location.

Since most of the pipeline alignment is situated in sandy seabed environments with sparse epifauna, disturbances to benthic habitats are expected to be temporary and limited to the immediate area around the infrastructure. Water quality in the water column will quickly return to pre-activity levels due to strong ocean bottom currents and the natural process of dilution. Overall, the consequences of this impact are considered **Minor (1).**

7.2.5.3 Dislodgement of marine growth

The dislodgement or death of marine life caused by blasting is assessed to have a short-term impact on biodiversity and productivity around the asset infrastructure. The organisms that originally colonised the infrastructure likely represent fauna from nearby stable environments, such as rocky reefs. It is expected that these habitats will serve as a source for species to recolonise the infrastructure once the marine growth has been removed. The consequences of this impact are considered to be **Minor (1).**

7.2.5.4 Additional sand settlement on the seabed

The use of sand or garnet in sandblasting activities, such as removing rust and preparing steel surfaces for painting, will result in material settling on the seabed. However, this is not expected to have long-term effects, as the seabed around the structures is primarily composed of sand. The discharged sand will settle and blend in with the surrounding environment.

Additionally, grit and paint chips or flakes generated from the blasting process that come to rest on the seabed are not anticipated to create any physical or chemical barriers for marine life settling on or within the seabed sediments. The impacted area will be small, localised around the platform or pipeline, and due to the dynamic nature of the seabed environment, characterised by rapid shifting and mixing of sands, the overall consequence is considered **Minor (1)**

7.2.5.5 Cultural values and sensitivities

IMR activities are limited in duration and scale with potential impacts outlined in Sections 7.2.5.1 to 7.2.5.4 above. Additional aspects associated with IMR are addressed in Impacts 1, 3, 4 and 5. Due to the scale and frequency of IMR activities within the Operational Area, potential consequences on cultural values and sensitivities are considered **Minor (1)**

7.2.6 Cumulative Impact Evaluation

There is a low potential for cumulative impacts on marine fauna and on other marine users when vessels supporting the platform and vessels undertaking IMR along the RGP are operating simultaneously. The periods in which such simultaneous activities would take place would be a few days per year at most.

There are no other oil and gas operations in close proximity to BassGas, so the combination of BassGas activities and other oil and gas operations is not relevant to the hazard of IMR. Additionally, routine maritime notifications and Beach communications make shipping and fishing traffic aware of the presence of vessels when undertaking IMR work along the RGP. This is effective at avoiding cumulative impacts.

7.2.7 Impact Assessment

An impact assessment for IMR activities is presented in Table 7.5.

Table 7.5: Impact assessment for infrastructure inspection, maintenance and repair activities

ALARP decision context	
Impact decision framework context	Type A.
Activity	Nothing new or unusual, represents business as usual, well understood activity, good practice is well defined.
Level of certainty of impacts	Risks are well understood, uncertainty is minimal. There have been no recorded breaches of the PSZ since BassGas became operational, nor have there been any incidents of fishing gear snagging on the pipeline.
Stakeholder influence	No conflict with company values, no partner interest, no significant media interest.
Impact Consequence (inherent)	

ALARP decision context	
Operations	Minor (1)
CoP	Minor (1)
Preservation	Minor (1)

Assessment of Proposed Control Measures		
Control	**Cost/benefit analysis**	**Implemented?**
Limit IMR activities to the immediate works area. *(All phases)* *(Commonwealth & Victorian state waters)*	There is no reason for IMR activities to occur outside the platform PSZ or the 500 m corridor along the RGP. Activities will be focused on the infrastructure itself, and therefore impacts will be concentrated on small areas around the infrastructure. The cost of implementing this control is not grossly disproportionate to the environmental benefit achieved through minimising the extent of seabed disturbance and associated impacts.	Yes **(IMP02-CM01)**
Use water blasting in preference to grit blasting. *(All phases)* *(Commonwealth & Victorian state waters)*	Seawater is abundantly available in the offshore environment and at no cost. However, there may be technical or other reasons for using grit rather than water, so while it will be used in preference to grit, grit must remain an option for use. The cost of implementing this control is not grossly disproportionate to the environmental benefit achieved and it is therefore considered reasonably practicable.	Yes **(IMP02-CM02)**
Where grit blasting is used on the platform jacket and topsides, use containment and recovery to minimise losses to the ocean. *(All phases)* *(Commonwealth waters)*	Minimises losses to the water column and seabed, which in turn minimises impacts to water quality and benthic habitats and fauna. It has the added benefit of minimising health and safety risks by containing blast dust to a small area. Containment and recovery systems are routinely used offshore and can be implemented using established equipment and procedures. The associated costs are not grossly disproportionate to the environmental benefit achieved through reducing discharges to the marine environment and minimising impacts to water quality and benthic habitats.	Yes **(IMP02-CM03)**
Where the use of grit blasting cannot be avoided, use inert grit. *(All phases)* *(Commonwealth & Victorian state waters)*	The use of inert, low-toxicity grit (such as garnet) avoids impacts associated with hazardous substances reaching the seabed and leaching into seabed sediments. Inert blasting media is readily available and widely used for offshore maintenance activities. The additional cost associated with using inert grit is not considered grossly disproportionate to the environmental benefit achieved through avoiding the introduction of hazardous substances to the marine environment.	Yes **(IMP02-CM04)**
Use only thruster Dynamic Positioning (DP) systems on vessels. *(All phases)*	No anchoring of vessels within OAs (except in emergency situations) minimises seabed disturbance from anchor and drag/placement.	No (See **IMP02-CM05)**

ALARP decision context		
(Commonwealth & Victorian state waters)	While the use of DP alone for maintaining station is feasible, it would lead to disproportionately higher continuous noise impacts to sensitive receptors and higher fuel costs as opposed to using propellers. The environmental benefit achieved by eliminating propeller use is therefore considered marginal relative to these impacts and operational constraints, and implementation is not considered reasonably practicable	
Anchoring of vessels within the PSZ is prohibited, except in emergency situations. *(All phases)* *(Commonwealth waters)*	Restricting anchoring within the PSZ minimises seabed disturbance associated with anchor placement and drag, thereby reducing potential impacts to benthic habitats. However, anchoring may be required in emergency circumstances or where specifically authorised to support safe vessel operations. The restriction is readily implemented through vessel operating procedures and voyage planning processes and imposes minimal additional cost. The cost of implementation is not grossly disproportionate to the environmental benefit achieved through reducing the potential for seabed disturbance within the PSZ.	Yes **(IMP02-CM11)**
All vessels used for IMR will be DP capable (or equivalent). *(All phases)* *(Commonwealth & Victorian state waters)*	Use of DP systems enables vessels to maintain station without the need for anchoring, thereby avoiding seabed disturbance associated with anchor placement and drag. DP-capable vessels are routinely used for offshore inspection and maintenance activities and are readily available within the market. The additional cost associated with using DP-capable vessels is not grossly disproportionate to the environmental benefit achieved through avoiding unnecessary seabed disturbance.	Yes **(IMP02-CM12)**
Do not use an ROV close to or on the seabed. *(All phases)* *(Commonwealth & Victorian state waters)*	ROV operations close to the seabed cannot be eliminated as they are required to safely undertake subsea inspection, maintenance and verification activities. Given the water depths within the Activity Area, the nature of the seabed and the proximity of infrastructure to the seabed, any disturbance from ROV operations is expected to be localised and negligible. Preventing ROV operations near the seabed is therefore technically infeasible. Preventing ROV operations near the seabed would compromise the ability to safely undertake subsea inspection, maintenance and verification activities and is therefore technically infeasible. Given the localised and negligible nature of any disturbance, the operational cost and loss of functionality associated with implementing this control would be grossly disproportionate to the environmental benefit achieved.	No
Monitoring and maintenance of subsea infrastructure to manage equipment integrity, scour and pipeline movement. *(All phases)*	Routine monitoring and maintenance of subsea infrastructure confirms equipment integrity and identifies scour or flowline movement before impacts extend beyond the designed infrastructure corridor. These activities support the ongoing management of seabed disturbance and ensure infrastructure remains within its approved integrity envelope.	Yes **(IMP02-CM08)**

ALARP decision context		
(Commonwealth & Victorian state waters)	These activities are standard offshore asset integrity measures and can be implemented through existing maintenance and inspection programs. The costs associated with monitoring and maintenance are not grossly disproportionate to the environmental benefit achieved through maintaining infrastructure integrity and minimising the potential for environmental impacts.	
Monitoring of seabed surrounding the platform and subsea infrastructure. *(All phases)* *(Commonwealth & Victorian state waters)*	Monitoring of benthic habitats surrounding the platform and subsea infrastructure could be achieved through review of ROV footage collected during routine subsea integrity surveys. However, operational activities are not expected to result in more than minor and temporary seabed disturbance, and the surrounding environment is characterised by low-sensitivity benthic habitats. Consequently, the additional environmental benefit gained from targeted benthic habitat monitoring is limited relative to the effort and cost required to implement the control. The implementation costs are therefore considered grossly disproportionate to the incremental environmental benefit that would be achieved.	No
Remove topsides equipment and property that are no longer in use. *(All phases)* *(Commonwealth & Victorian state waters)*	Redundant structures, equipment and property are removed in accordance with Section 572 of the OPGGS Act and the NOPSEMA Section 572: Maintenance and Removal of Property Policy. Where equipment is no longer required, assessments are undertaken to determine the feasibility and risks associated with removal. In circumstances where removal poses an unacceptable risk to operational infrastructure, equipment may remain in situ until decommissioning.	Yes **(IMP02-CM09)**
Undertake an ROV survey following IMR activities to confirm temporary equipment has been removed and record the location of new subsea infrastructure. *(All phases)* *(Commonwealth & Victorian state waters)*	Post-IMR ROV surveys verify that temporary equipment has been removed and confirm the location and condition of subsea infrastructure. These surveys support compliance with Section 572 of the OPGGS Act and facilitate the identification and management of any seabed disturbance associated with maintenance activities. ROV as-left surveys are standard operational practice and can be readily implemented. The cost of undertaking these surveys is not grossly disproportionate to the environmental benefit achieved through confirming equipment removal, recording infrastructure location and identifying any disturbance requiring management.	Yes **(IMP02-CM10)**
Report any UCH found at the seabed to DCCEEW and consult with the relevant First Nations groups to determine any exclusion areas or further UCH management procedures that may be required. *(All phases)*	Reporting unexpected UCH finds is a requirement of the *Underwater Cultural Heritage Act 2018* (Cth). Reporting and consultation activities can be readily undertaken through existing management and stakeholder engagement processes. The associated costs are not grossly disproportionate to the environmental benefit achieved through protecting potential underwater cultural heritage values and supporting appropriate management outcomes.	Yes **(IMP02-CM07)**

ALARP decision context			
(Commonwealth & Victorian state waters)			
Environmental Controls and Performance Measurement			
EPO	**Control measure**	**EPS**	**Measurement criteria**
IMP02-EPO01 Seabed disturbance is restricted to the Operational Area.	**Platform and RGP (Commonwealth and Victorian state waters)**		
	IMP02-CM01 IMR activities are limited to the immediate works area (i.e., no indiscriminate sand or water blasting). *(All phases)*	**IMP02-EPS01** No seabed disturbance beyond the immediate work area.	**IMP02-MC01** ROV footage is available and reviewed to ensure disturbance is limited to the area immediately around the infrastructure.
	IMP02-CM02 Water blasting is given preference to grit blasting. *(All phases)*	**IMP02-EPS02** Grit does not report to the seabed.	**IMP02-MC02** Maintenance activity reports verify that water blasting was considered.
	IMP02-CM03 Grit blasting on the platform jacket and topsides uses containment and recovery to minimise losses to the ocean. *(All phases)*	**IMP02-EPS03** Grit blasting activities are undertaken within an effective containment and recovery system such that no visible discharge to the ocean occurs and all recovered waste is collected and managed in accordance with the waste management procedure.	**IMP02-MC03** Maintenance activity reports verify that grit blasting containment and recovery methods were used.
	IMP02-CM04 Grit blasting material selection is undertaken in accordance with the Beach Chemical Selection Procedure (CDN/ID S4000AD719917) (see Section 8.19). *(All phases)*	**IMP02-EPS04** Grit blasting material is inert (non-toxic).	**IMP02-MC04** Maintenance activity reports verify that the chemical selection procedure was considered in the selection of grit.
	IMP02-CM05 Vessels used to undertake maintenance activities will preferentially use DP; they will only anchor where DP presents unacceptable safety risks. *(All phases)*	**IMP02-EPS05** No seabed disturbance from anchoring.	**IMP02-MC05** Maintenance activity reports verify that DP positioning was used in preference to anchors.
	IMP02-CM06 A SMR is in place and updated as required to ensure all equipment on the	**IMP02-EPS06** Property that is left on the seabed can	**IMP02-MC06** The SMR is up-to-date and verifies equipment, or

ALARP decision context			
	seabed in the Operational Area is recorded. *(All phases)*	be readily located for future removal.	infrastructure is stored within the Operational Area.
	IMP02-CM07 Should any UCH be identified during IMR work at the seabed, Beach will report the findings to DCCEEW in accordance with the *Underwater Cultural Heritage Act 2018* (Cth). If the UCH is not readily identified as non-Aboriginal, Beach will consult with the relevant First Nations groups (as identified in **Appendix 1**) to determine any exclusion areas or further UCH management procedures that may be required. *(All phases)*	**IMP02-EPS07** Requirements of the *Underwater Cultural Heritage Act 2018* (Cth) are met in the event of any unexpected UCH finds.	**IMP02-MC07** Communication records and incident report verifies that consultation with relevant First Nations groups have been engaged to determine steps required to manage a UCH find.
IMP02-EPO02 The condition of topsides and subsea infrastructure is managed to maintain infrastructure integrity and minimise environmental risks.	**IMP02-CM08** Monitoring and maintenance of subsea infrastructure is undertaken to manage equipment integrity, scour and pipeline movement. *(All phases)*	**IMP02-EPS08** Subsea infrastructure integrity, scour and pipeline movement are monitored and managed in accordance with maintenance requirements.	**IMP02-MC08** IMR records demonstrate that integrity, scour and flowline movement assessments have been completed and any required actions implemented.
	IMP02-CM09 All topsides equipment and property that are no longer in use are assessed to determine the need for retention or removal. *(All phases)*	**IMP02-EPS09** Redundant topsides equipment or property are assessed and recorded in a redundant topsides equipment register using the MoC process.	**IMP02-MC09** MoC documents and the redundant topsides equipment register verify that redundant equipment and property have been assessed or removed.
	IMP02-CM10 An ROV survey is undertaken following IMR activities to confirm temporary equipment has been removed and record the location of new subsea infrastructure. *(All phases)*	**IMP02-EPS10** Post-IMR verification confirms temporary equipment has been removed, and new subsea infrastructure locations have been recorded.	**IMP02-MC010** ROV survey records and reports confirm removal of temporary equipment and document the location of new subsea infrastructure.
IMP02-EPO03 Physical disturbance to the seabed and	**Vessels (Commonwealth and Victorian state waters)**		
	IMP02-CM11 Anchoring of vessels within the PSZ is	**IMP02-EPS11** No vessel anchoring occurs within the	**IMP02-MC11** Vessel logs, DP records and/or incident reports demonstrate that no non-

ALARP decision context			
interactions with subsea infrastructure are minimised.	prohibited, except in emergency situations. *(All phases)*	PSZ unless required for an emergency.	emergency anchoring occurred within the PSZ.
	IMP02-CM12 All vessels used for IMR activities are DP capable (or equivalent). *(All phases)*	**IMP02-EPS12** IMR vessels maintain position without the use of anchors under normal operating conditions.	**IMP02-MC12** Vessel specifications and operational records confirm DP capability (or equivalent) was used during IMR activities.

Impact Consequence (residual)	
Operations	Minor (1)
CoP	Minor (1)
Preservation	Minor (1)

ALARP Decision Justification

With the controls outlined in this table in place, the impact consequence has been assessed as Minor (1) and is considered to be good practice (Decision Context A). This means any additional or alternative control measures do not lower the residual consequence further or would be grossly disproportionate to the residual consequence. Therefore, a Minor (1) residual impact consequence is considered to be ALARP.

Acceptability Assessment		
Defined acceptable level	IMR activities are assessed as having a Minor (1) consequence, which is not considered as having the potential to result in serious or irreversible environmental damage.	
Internal context	The proposed management of the impact is aligned with the Beach Environment Policy. Activities will be undertaken in accordance with the Implementation Strategy (Chapter 8).	
External context	The BassGas Offshore Operations SEP is implemented to ensure that stakeholders are aware of operations issues. No objections or claims were raised by stakeholders in relation to IMR activities. During ongoing consultation any concerns from stakeholders will be managed to close, for the life of asset.	
Legislative context	The EPS outlined in this EP align with the requirements of: • OPGGS Act 2006 (Cth): ○ Section 572 – specifies that a titleholder must maintain all structures in good condition and repair. • OPGGS Act 2010 (Vic): ○ Section 621 – specifies that a titleholder must maintain all structures in good condition and repair.	
Industry practice	The consideration and alignment of controls outlined in the below-listed guidelines and codes of practice demonstrates that BPEM is implemented for this activity.	
	Environmental management in the upstream oil and gas industry (IOGP-IPIECA, 2020)	The control measures listed in this table meet the relevant mitigation measures listed for offshore activities with regard to: • Physical disturbance – reducing footprint to the minimum required (**IMP02-CM01**).
	Best Available Techniques Guidance	There are no guidelines specifically regarding IMR for offshore activities.

ALARP decision context		
	Document on Upstream Hydrocarbon Exploration and Production (European Commission, 2019)	
	Environmental, Health and Safety Guidelines for Offshore Oil and Gas Development (World Bank Group, 2015)	There are no guidelines specifically regarding IMR for offshore activities.
	Code of Environmental Practice (APPEA, 2008)	The control measures listed in this table meet the following offshore development and production objectives: • To reduce the impacts to benthic communities to ALARP and an acceptable level. • To reduce the risk of any unplanned release of material into the marine environment to ALARP and to an acceptable level.
Environmental context	MNES	
	AMPs	No intersection or impacts.
	Ramsar wetlands	No intersection or impacts.
	NIWs	No intersection or impacts.
	TECs	No intersection or impacts.
	Nationally threatened and migratory species	IMR does not have any impacts on threatened or migratory species.
	Other matters	
	State marine parks	IMR does not have any impacts on state marine parks.
	Species Conservation Advice/Recovery Plans/Threat Abatement Plans	As per the impact evaluation, IMR activities do not compromise the specific objectives or actions of species conservation, recovery or threat abatement plans.
ESD principles	The EIA presented throughout this EP demonstrates that ESD principles (a), (b), (c) and (d) arkme met (noting that principle (e) is not relevant).	

Environmental Monitoring

Not applicable.

Record Keeping

Platform & RGP

- Maintenance activity reports.
- ROV footage.
- ROV survey records.
- Incident reports.
- SMR.
- Communication records.

Vessels

- Vessel logs.
- DP records.
- Incident reports.
- Vessel specification records.

ALARP decision context
• IMR records. • Post-removal surveys.

7.3 IMPACT 3: Routine Emissions - Light

7.3.1 Source of Aspect

The following activities result in light emissions:

- Platform operations:
  - Navigational and vessel deck lighting is kept on 24 hours a day for maritime safety and crew safety purposes and CCTV monitoring by operators.
  - Flaring (including pilot light).
  - Emergency lighting (noting that evacuation lights [illuminating the water surface] is only activated as required via ESD or manually).
- PSV and other project vessel operations – navigational lighting is kept on 24 hours a day for maritime safety purposes, with deck lighting used as necessary.
- ROV operations – underwater light is used in order to illuminate an area of interest (e.g., the pipeline) during subsea inspection, maintenance and repair activities.

As outlined in Table 3.11, project activities during the operations, CoP and preservation phases involves continued light emissions. Accordingly, this aspect is relevant to all phases, as summarised below:

Hazard	Source	Operations	CoP	Preservation
Platform	Navigation lighting	✓	✓	✓
	Deck lighting	✓	✓	✓
	Flaring	✓	×	×
	Emergency lighting	✓	✓	✓
RGP	ROV (IMR activities)	✓	✓	✓
Support vessels	Navigation lighting	✓	✓	✓
	Deck lighting	✓	✓	✓

7.3.2 Known and Potential Environmental Impacts

The known and potential impacts of lighting are:

- Changes in fauna behaviour through attraction or avoidance of light-sensitive species.

In the last five years, there have been no recorded incidents of negative seabird interactions due to or with light sources on the platform (see also Section 7.1.5.8).

7.3.3 EMBA

The potential impacts from light emissions from operational activities undertaken within the Operational Area varies depending upon the source:

- Platform navigation lights - are designed to be seen from about 10 nm (18.5 km) away, but light glow per se is limited to approximately 200 m radius given the small size of the lights. Deck lighting is maintained at levels that allow safe operations and has an equally small radius of light glow.
- Flaring – routine operational flaring will not occur. The flare system will instead be maintained with a continuous pilot flame and flare purge gas to ensure it is available for safe management of gas during emergency events and process upsets. During such non-routine events, gas flaring may occur and produce a larger flame, with visibility dependent on the volume of gas flared. Based on a Yolla-specific light modelling study, flare light may be visible up to 33 km for fauna at mean sea level (Xodus, 2026).
- Vessel navigation lights - are designed to be seen from afar, but likely to result in light glow limited to 100 m radius given the small size of the lights.
- ROV lights – forward facing lamps are designed to illuminate an area several metres ahead of the ROV, with the distance dependent on the types of lights used and water clarity.

For the purpose of the impact assessment, the light EMBA for vessel-related activity along the RGP is assumed to be within the 20 km threshold consistent with the National Light Pollution Guidelines for Wildlife (DCCEEW, 2023). For the platform, the light EMBA is 33 km.

The light-sensitive receptors that may occur within the light EMBA, either as residents or migrants, are:

- Pelagic fauna (plankton, fish, marine mammals).
- Migratory birds and seabirds such as Albatrosses, Petrels and the Orange-bellied Parrot potentially affected by the Platform lighting and illuminated boats and structures barriers to migration route.

The ecological receptors identified above are values of the following within the light EMBA:

- Conservation values and sensitivities.
- Traditional Owners with cultural connection to these waters.

Socio-economic receptors and marine users within the light EMBA

- Commercial and recreational fishing vessels and fishers.
- Commercial shipping.
- Local marine users for tourism and recreational purposes.

7.3.4 Jurisdiction of Hazard

The jurisdictions for this hazard are outlined below.

Commonwealth waters	Victorian waters
YES	YES
The platform (and associated navigation lights) are located in Commonwealth waters. Similarly, vessels engaged in IMR activities may work alongside the platform or RGP in Commonwealth waters.	Vessels engaged in IMR activities may work alongside the RGP in Victorian waters.

7.3.5 Evaluation of Environmental Impacts

The *National Light Pollution Guidelines for Wildlife*, published by DCCEEW in 2023, recommend conducting a light impact assessment if there are important habitats for listed species sensitive to light located within 20 km of a light source (see Figure 5.1). The 20 km screening threshold (as defined as the light EMBA in Table 5.1) serves as a precautionary limit based on observed effects of sky glow on marine fauna and fledgling seabirds that have been influenced by artificial light as far as 15 km away (CoA, 2023). The phenomenon of seabird grounding, discussed in Rodriguez et al. (2014), refers to the impact of onshore fixed light sources, such as streetlights and buildings, on young fledgling birds making their first flights from their nests to the open ocean. Therefore, the 20 km distance is adopted as the EMBA extent to which light emissions may affect marine turtles, seabirds, and migratory shorebirds due to operational activities.

The Yolla-A platform is located within BIAs for several EPBC Act-listed seabird species and therefore a project-specific light modelling assessment was undertaken to quantify the spatial extent of light emissions associated with BassGas operations. The light modelling assessment considered both routine facility lighting (including the pilot light) and non-routine flaring operations (Xodus, 2026). The assessment modelled both the Potential Impact Area, defined as the area within which artificial light may measurably increase ambient light levels, and the Visible Light Exposure Area, defined as the maximum geometric line-of-sight extent over which light from the facility may be visible.

The modelling demonstrated that flaring is the dominant contributor to the overall light footprint of the BassGas Development. Under the worst-case flaring scenario, illuminance levels decrease to the adopted threshold of 0.001 lux at approximately 30 km from the Yolla-A Platform, defining a Potential Impact Area of 30 km (Xodus, 2026). The corresponding Visible Light Exposure Area extends to approximately 33 km from the platform for receptors located at sea level. Under routine facility-lighting-only conditions, the Potential Impact Area reduces to approximately 10 km, and the Visible Light Exposure Area reduces to approximately 26 km. To ensure a conservative assessment of potential light impacts, a light EMBA of 33 km has therefore been adopted.

The Guidelines also detail that for vessel lights zooplankton and their vertebrate predators descend away from the surface; these effects occurred at depths of up to 200 m, and up to 200 m horizontally from the light source. Experiments using light traps also detailed that some fish and zooplankton species are attracted to light sources (Meekan et al. 2001), with traps drawing catches from up to 90 m (Milicich et al. 1992). Thus, 200 m is adopted as the extent at which light emissions may impact zooplankton, invertebrates, and fish.

Shipping and fishing activities in Bass Strait, including squid fishing that utilises bright lights directed at the water's surface, are common. The lighting levels associated with the BassGas Development are

not significantly different from these existing sources and do not make a notable additional contribution.

There are no turtle nesting beaches in Bass Strait; therefore, the potential impacts of light on turtles are not assessed in this context.

The platform is located 91 km from the nearest shoreline and 125 km from the nearest town, Venus Bay, which means that the flare is not visible from land. The light modelling indicates that the maximum predicted Visible Light Exposure Area associated with flaring extends approximately 33 km from the facility under conservative assumptions (Xodus, 2026). Consequently, direct visibility of facility lighting and flaring from shoreline receptors in not expected under normal conditions. Since operations began in 2006, there have been no complaints from stakeholders regarding light from flaring.

7.3.5.1 Light glow at the surface

Seabirds

Seabirds may be attracted to the light glow at night. Bright lighting can disorientate birds, thereby increasing the likelihood of seabird injury or mortality through collision with infrastructure, or mortality from starvation due to disrupted foraging at sea (Wiese et al., 2001 in DSEWPC, 2011). This disorientation may also result in entrapment, stranding, grounding, and interference with navigation (DoEE, 2020).

Studies conducted between 1992 and 2002 in the North Sea confirmed that artificial light was the reason that birds were attracted to and accumulated around illuminated offshore infrastructure (Marquenie et al., 2008) and that lighting can attract birds from large catchment areas (Wiese et al., 2001). The light may enhance seabirds' ability to forage at night.

Several shorebird and seabirds are known to migrate through and forage within the Operational Area and the light EMBA (Table 5.11) including petrels, shearwaters, albatross, noddies, terns and penguins. Species with BIAs overlapped by the Operational Area and light EMBA are listed in Table 7.6 and shown in Figure 7.2, Figure 7.3, Figure 7.4, Figure 7.5, Figure 7.6 and Figure 7.7. In the event that deck or navigational lighting occasionally acts as an attractant to seabirds, it is not expected that this will permanently impact on migration or other behaviours.

The impacts of light emissions from the operations are assessed against the light mitigation toolbox in the *National Light Pollution Guidelines for Wildlife* (DCCEEW, 2023) (Table 7.7). Actions relating to breeding season have not been adopted due to the absence of reproduction BIAs for light sensitive seabird species that may be foraging in the operational area or light EMBA.

Table 7.6. Seabird BIAs that overlap the operational area or the light EMBA

Scientific name	Common name	BIA	BIA overlap with the operational area	BIA overlap with the 20 km light EMBA	BIA overlap with the 33km flare EMBA	BIA overlap with the light EMBA
Thalassarche cauta	Shy albatross	Foraging	0.012%	0.53%	0.29%	0.66%
Diomedea exulans (sensu lato)	Wandering albatross	Foraging	0.012%	0.52%	0.30%	0.66%
Thalassarche bulleri	Buller's albatross	Foraging	0.02%	0.87%	0.50%	1.11%
Thalassarche carteri	Indian yellow-nosed albatross	Foraging	0.013%	0.58%	0.33%	0.75%
Thalassarche impavida	Campbell albatross	Foraging	0.008%	0.37%	0.21%	0.47%
Thalassarche melanophris	Black-browed albatross	Foraging	0.008%	0.37%	0.21%	0.47
Ardenna tenuirostris	Short-tailed shearwater	Foraging	0.59%	2.54%	1.36%	3.16%
Eudyptula minor	Little penguin	Foraging	No overlap	0.72%	No overlap	0.72%
Pelagodroma marina	White-faced storm-petrel	Foraging	0.047%	2.09%	1.90%	2.75%
Pelecanoides urinatrix	Common diving petrel	Foraging	0.033%	1.62%	0.78%	1.82%

Due to the small overlap of the operational with seabird BIAs, the distance from breeding colonies and the inherent low impact nature of offshore light, it is unlikely that the activity will results in injury or mortality of seabirds, with the most likely impact being a minor disturbance, which will not result in impacts at the species population level or ecosystem level.

Beach has no records of seabird injuries occurring as a result of platform operations. This illustrates the low impact of permanent but low-level light emissions from the activity. As such, impacts to seabirds from light emissions have a **Minor (1)** consequence rating.

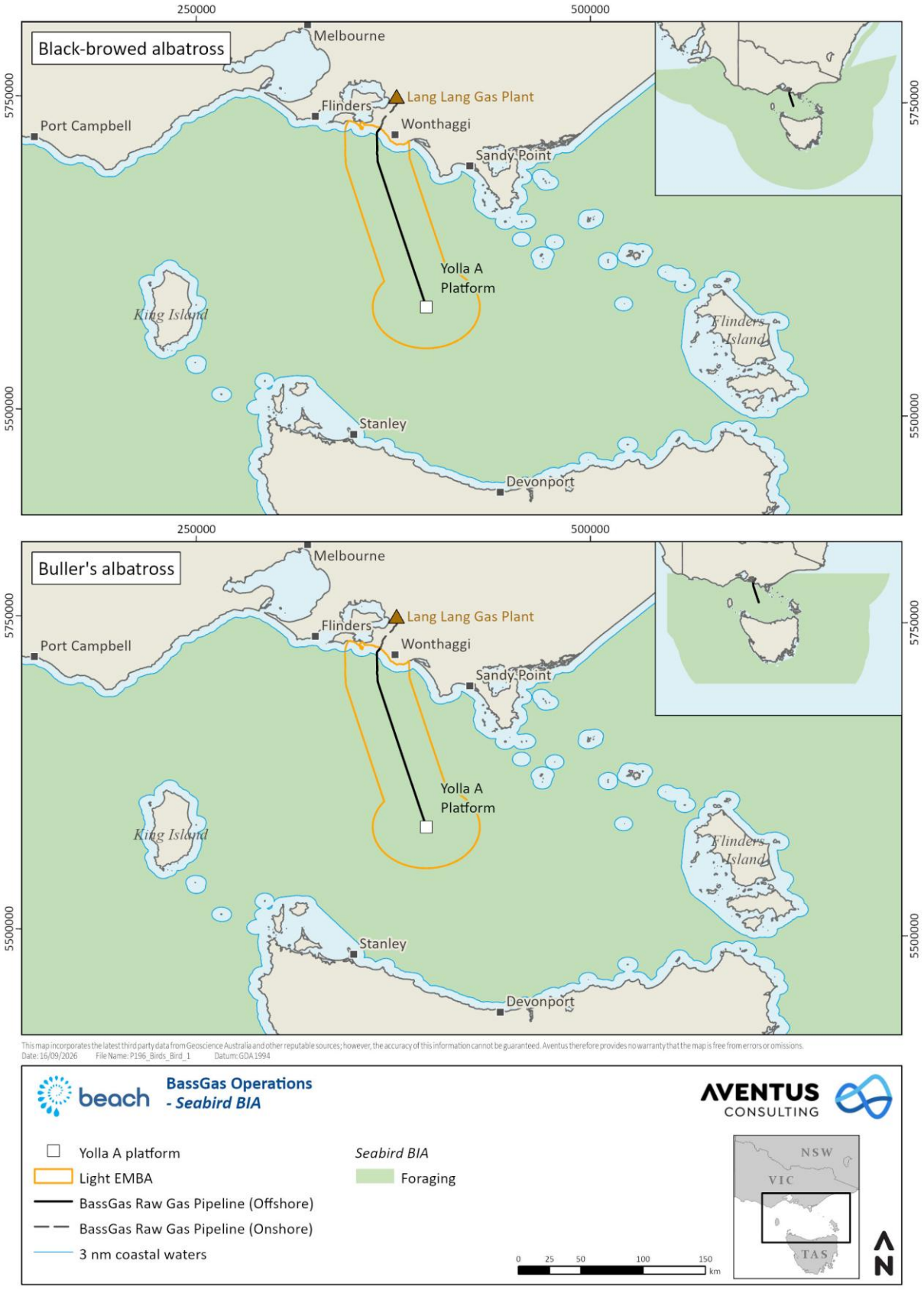


Figure 7.2. Foraging BIAs of the black-browed and Buller's albatross overlapping the operational area and the light EMBA.

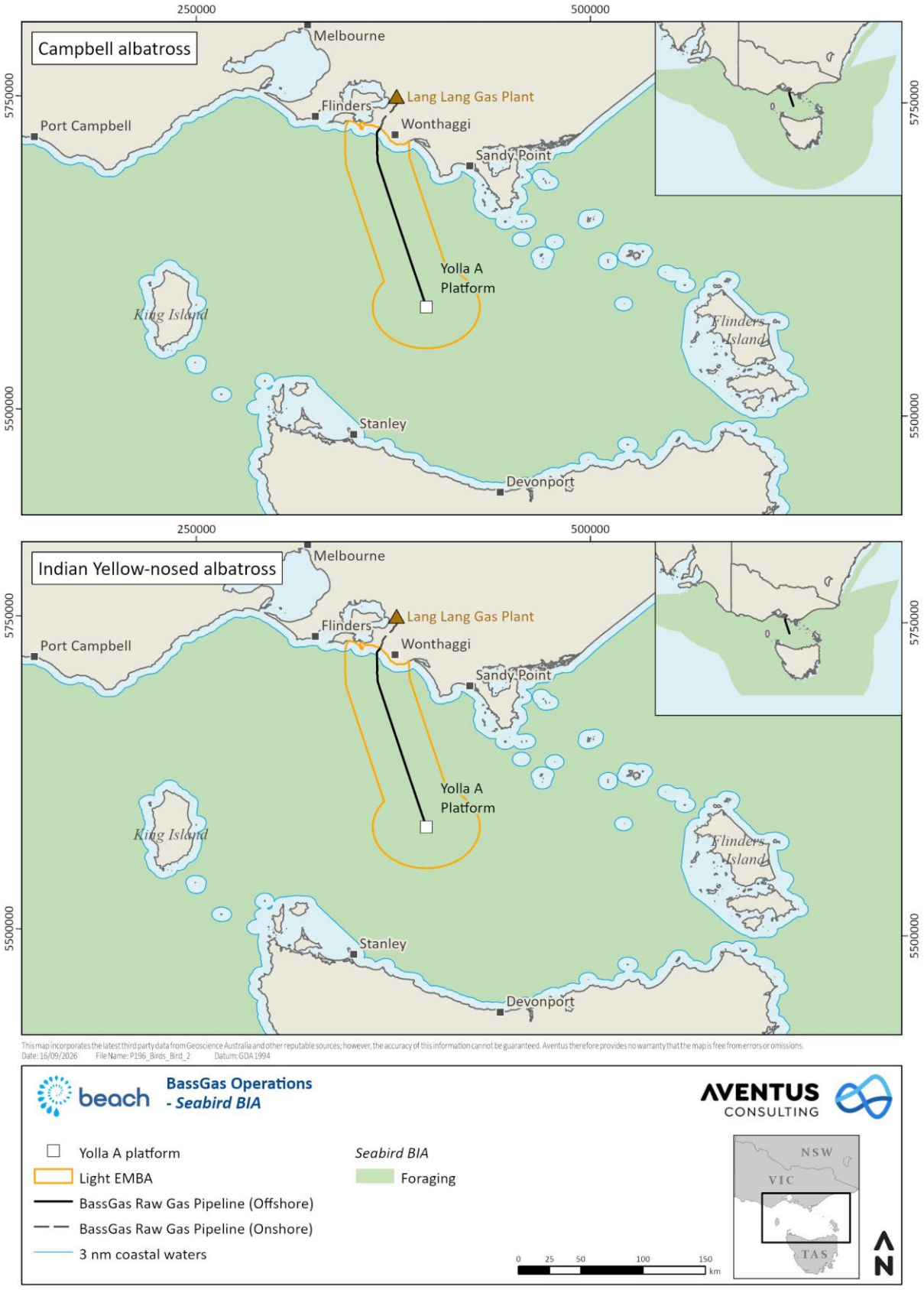


Figure 7.3. Foraging BIAs of the Campbell and Indian yellow-nosed albatross overlapping the operational area and the light EMBA.

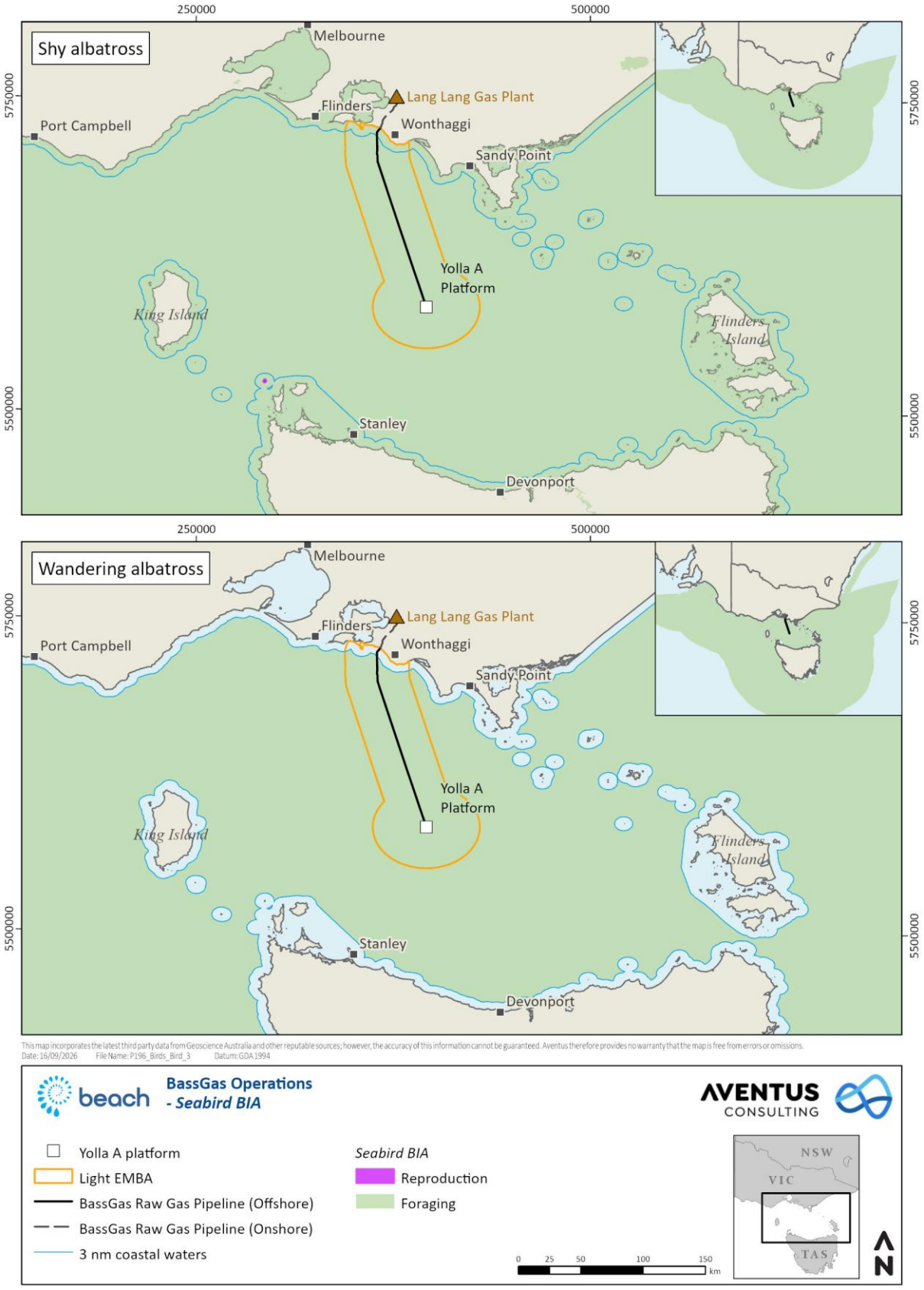


Figure 7.4. Foraging BIAs of the shy and wandering albatross overlapping the operational area and the light EMBA.

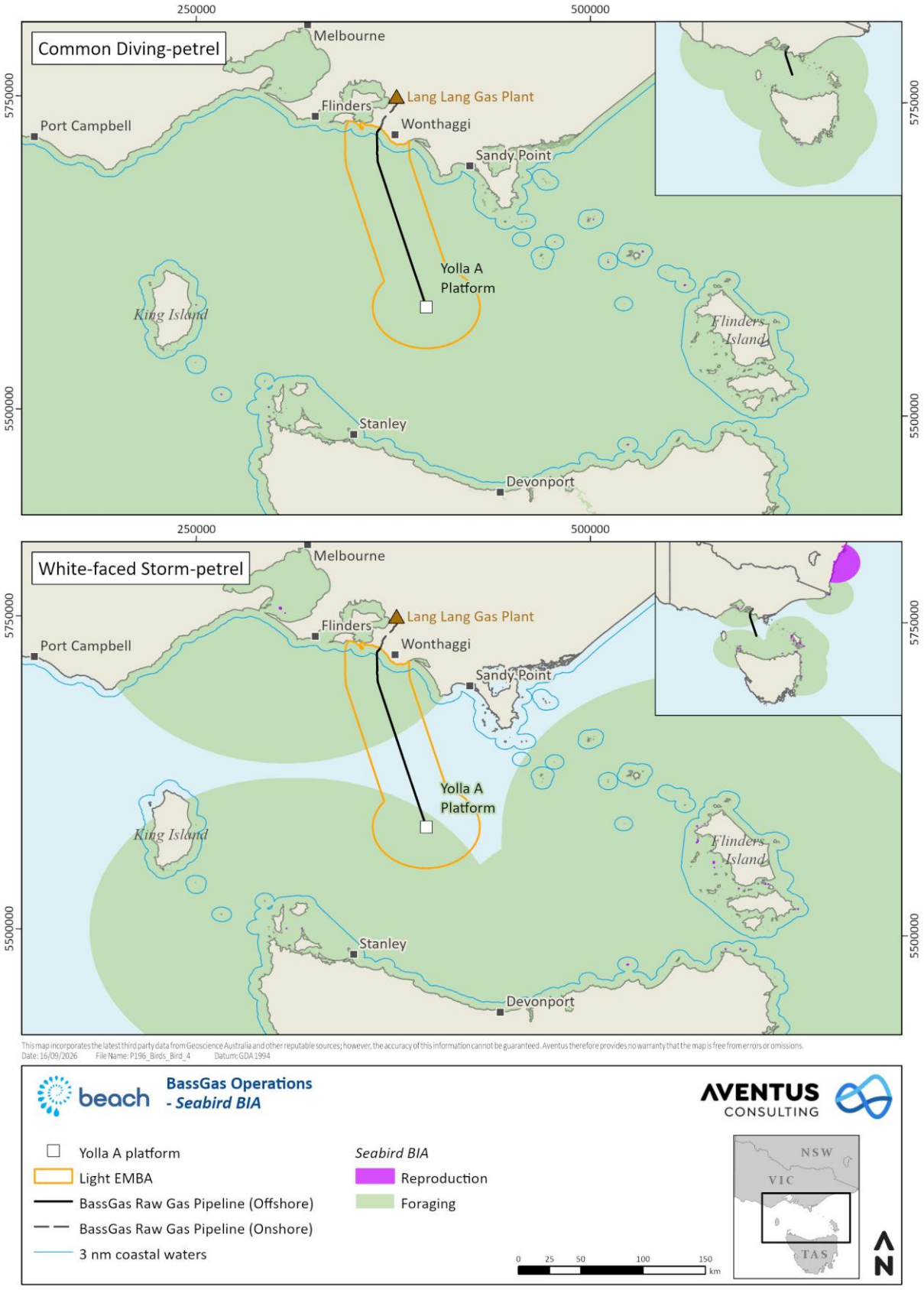


Figure 7.5. Foraging BIAs of the common-diving and white-faced storm-petrel overlapping the operational area and the light EMBA.

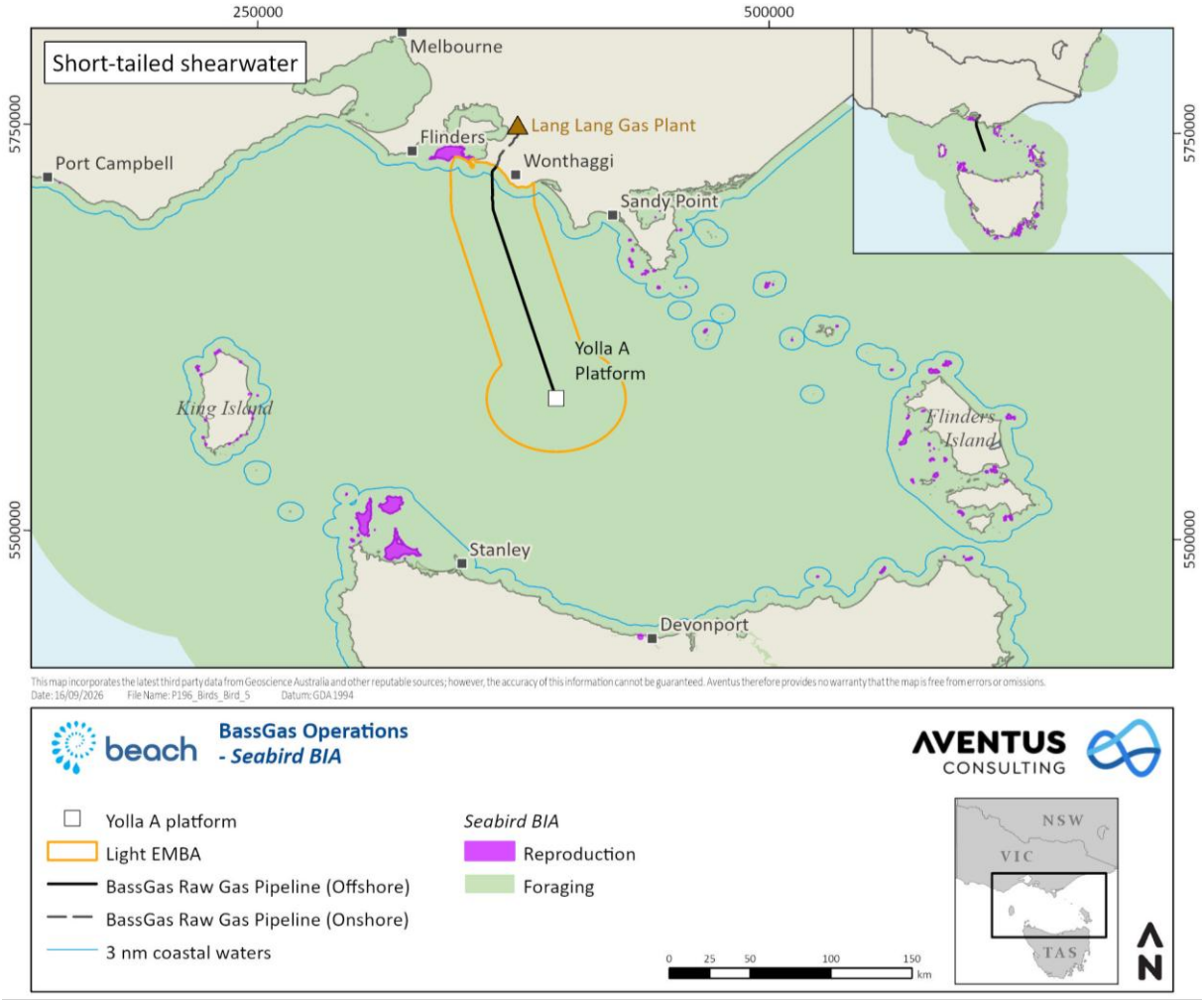


Figure 7.6. Foraging BIA of the short-tailed shearwater overlapping the operational area and the light EMBA.

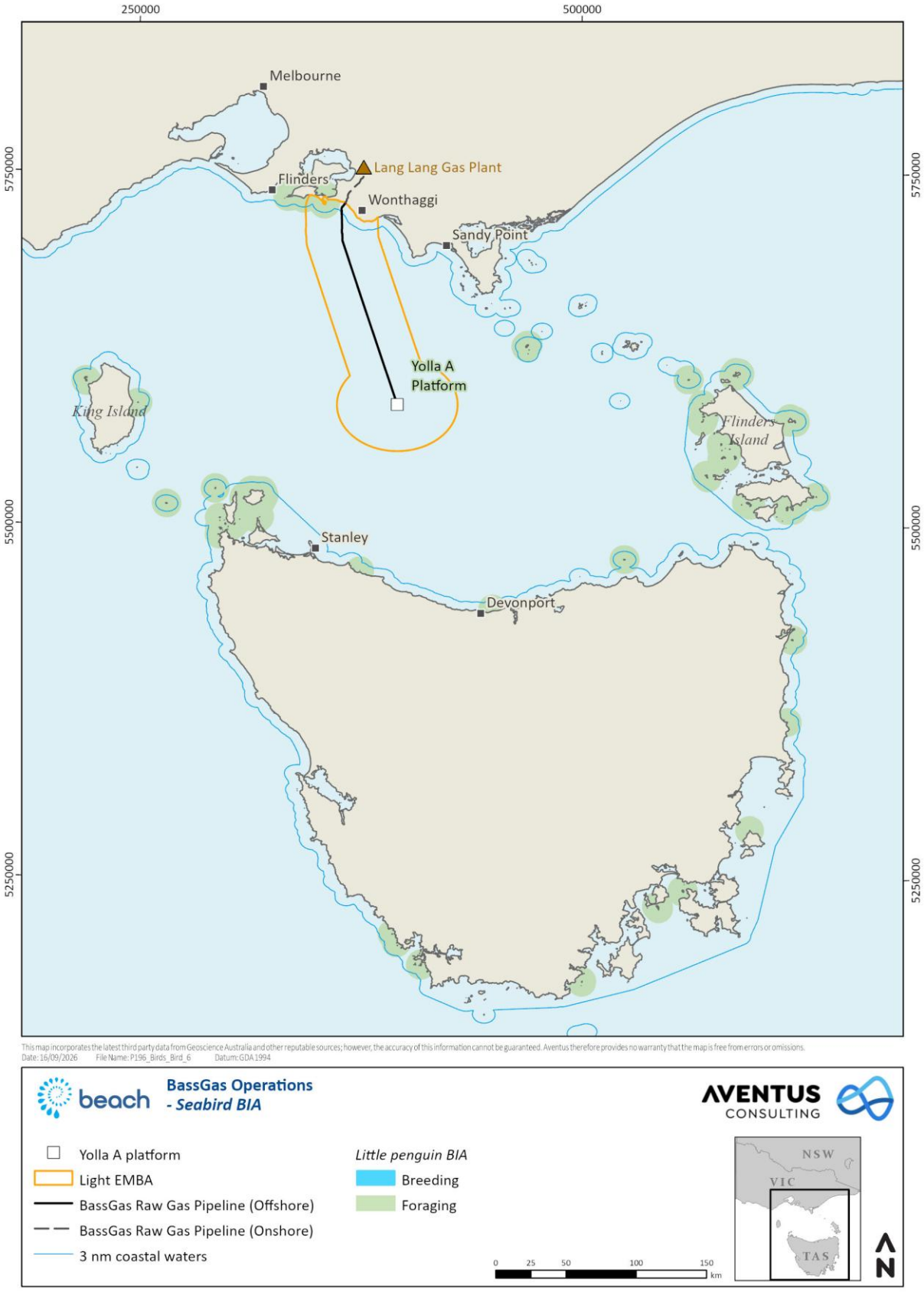


Figure 7.7. Foraging BIAs of the little penguin overlapping the operational area and the light EMBA.

Table 7.7. Assessment of the light management options for seabirds from the *National Light Pollution Guidelines for Wildlife* (DCCEEW, 2023)

Management Option	Achievable?	Justification
Maintain a dark zone between the rookery and the light sources.	**No**	The closest reproduction BIA is adjacent to the light EMBA on Phillip Island for the short-tailed shearwater located approximately 10 km west of the pipeline and over 100 km from Yolla-1 (Figure 7.6). The short-tailed shearwater will be present on Phillip Island between September to April to nest. Pipeline IMR is described in CHAPTER 3 occurring infrequently (less than annually) and normally use a dynamically positioned ISV, or the PSV. Other reproduction BIAs are located over 100 km away on the Tasmanian islands of Bass Strait. As such, there is a large dark zone between potential rookeries and the operational area.
Turn off lights during fledgling season.	**No**	Operations are conducted 24-hours a day and light is necessary for personnel safety. There are no bird breeding colonies within 20 km of the operational area.
Use curfews to manage lighting.	**No**	As above.
Aim (deck) lights downwards and direct them away from nesting areas.	**Yes**	Where practicable, lights are directed towards working areas for the safety of personnel (see Table 7.8).
Use flashing/intermittent lights instead of fixed beam.	**No**	Operations are conducted 24-hours a day and light is necessary for personnel safety. Lighting is reduced to the extent possible for safe operations (see Table 7.8).
Use motion sensors to turn lights on only when needed.	**No**	As above.
Prevent indoor lighting reaching outdoor environment.	**Yes**	
Reduce unnecessary outdoor deck lighting on all vessels and permanent and floating oil and gas installations in known seabird foraging areas at sea.	**Yes**	
Vessels working in seabird foraging areas during breeding season should implement a seabird management plan to prevent seabird landings on the ship, manage birds appropriately and report the interaction.	N/A	Most seabirds in the region are migratory. The closest reproduction BIA to the light EMBA is that of the short-tailed shearwater at Phillip Island, located approximately 10 km west of the RGP and over 100 km from the platform (Figure 7.6).
Use luminaires with spectral content appropriate for the species present.	**No**	Platforms and vessels are equipped with lighting required under legislation to identify itself to other vessels, reduce the risk of at-sea collision and provide for the safety of its crew.

		Most seabirds in the region are migratory, with the closest reproduction BIA is adjacent to the light EMBA on Phillip Island for the short-tailed shearwater located approximately 10 km west of the pipeline and over 100 km from Yolla-1 (Figure 7.6). See Table 7.8 for adopted control and associated EPS.
Shield gas flares and locate them inland and away from seabird rookeries.	N/A	Not applicable – this activity is located offshore and does not impact seabird rookeries along the coastline. Offshore gas flares cannot be shielded.
Minimise flaring on offshore oil and gas production facilities.	**Yes**	There is no routine flaring. As described in Section 3.5.10, flaring only occurs in the event of a process upset or emergency.

7.3.5.2 Fish and plankton

Light emissions may directly or indirectly attract Fish and zooplankton. Experiments using light traps have found that some fish and zooplankton species are attracted to light sources (Meekan et al., 2001), with traps drawing catches from up to 90 m (Milicich et al., 1992). Lindquist et al (2005) concluded from a study of larval fish populations around an oil and gas platform in the Gulf of Mexico that an enhanced abundance of clupeids (herring and sardines) and engraulids (anchovies), both of which are highly photopositive, was caused by the platforms' light fields. The concentration of organisms attracted to light increases the food supply for predatory species, and marine predators are known to aggregate at the edges of artificial light halos. Shaw et al (2002), in a similar light trap study, noted that juvenile tunas (Scombridae) and jacks (Carangidae), which are highly predatory, may have been preying upon concentrations of zooplankton attracted to the light field of the platforms. This could lead to higher predation rates than in unlit areas.

Light attraction from permanent light sources is highly localised and therefore unlikely to have impacts at the species or ecosystem level. Activities such as temporary vessel operations are assessed to have a **Minor (1)** consequence.

Marine mammals

Artificial light may indirectly influence marine mammal behaviour through changes to prey distribution. Artificial light can attract or concentrate fish, squid and zooplankton around illuminated offshore infrastructure, potentially altering local predator-prey interactions and foraging opportunities for marine mammals (DCCEEW, 2023; Marangoni *et al*., 2022). Light-sensitive marine mammal receptors that may occur within the EMBA include cetaceans (whales and dolphins) and pinnipeds.

Cetaceans predominantly rely on acoustic cues to navigate, communicate and locate prey rather than visual cues (Simmonds et al., 2004). There is limited evidence that artificial light from offshore petroleum facilities causes adverse impacts to cetacean migration, breeding or foraging behaviour. However, localised attraction of prey species to illuminated areas may result in temporary changes to predator-prey interactions and may attract some opportunistically foraging dolphins to the vicinity of the platform or vessels. Such effects would be limited to individual animals and are not expected to alter population-level abundance, distribution or biologically important behaviours.

Pinnipeds that may occur within the EMBA include the Australian fur seal, New Zealand fur seal, subantarctic fur seal and Australian sea lion. Australian fur seals are regularly observed using the Yolla-A platform jacket and seabed around the platform during IMR activities (see Section 5.4.6). The BassGas Development is located within the foraging range of Australian and New Zealand fur seals, and individuals may forage within the EMBA. Lighting associated with the platform may contribute to localised aggregations of fish and other prey in the immediate vicinity of the infrastructure. While this may provide temporary foraging opportunities for individual fur seals already present in the area, it is not expected to adversely affect pinniped behaviour, movement patterns, breeding success or population viability. The nearest breeding colonies and haul-out sites are located tens to hundreds of kilometres from the Yolla-A platform, and no pinniped breeding or haul-out habitat occurs within the operational area. Consequently, light emissions are not expected to interfere with breeding, pupping or other biologically important behaviours.

Light emissions from platform navigation and deck lighting, vessel lighting, flaring and temporary ROV operations are highly localised relative to the extensive marine habitat available to marine

mammals within Bass Strait. Any behavioural responses by cetaceans or pinnipeds are therefore expected to be restricted to individual animals in the immediate vicinity of the light source. Population-level impacts are not anticipated. Therefore, activities at the platform and temporary vessel operations are assessed to have a **Minor (1)** consequence.

7.3.5.3 Light glow in the water column

Underwater light from ROV activity is unlikely to cause environmental impacts. While the ROV dives, fauna in different strata of the water column will be exposed to light for only very brief moments, and usually for a few minutes at a time near the seabed, where the ROV conducts most of its work. Observations of ROV inspections at the seabed (Pinzone, pers. obs., 2013) indicate that fauna is not negatively affected by the bright light source, and, aside from some fauna exhibiting inquisitiveness, fish and other fauna continue to behave normally. Activities that exposed light glow in the water column are assessed to have a **Minor (1)** consequence.

7.3.5.4 Cultural values and sensitivities

From Section 5.7.3, the following cultural values and sensitivities have been identified as potentially affected by light:

- Birds.
- Fish.

Marine fauna are connected to places associated with songlines or connected to individuals through ceremony. The connection of marine fauna to places or individuals are considered cultural intangible values. Light emissions have the potential to impact marine fauna that have songlines, or spiritual connection to First Nations people. It is considered that impacts to species at a population level may prevent First Nations people's obligations to maintain spiritual connections and care for culturally significant species and their habitat. If First Nations people's obligations have not been met it may reinforce a sense of powerlessness to members of First Nations groups responsible for these obligations (Holcombe, 2022). As evaluated in Section 7.3.5.1 and 7.3.5.3 potential impacts to birds and fish (including eels) from light emissions will not impact these species at a population level. Minor behavioural changes to birds and fish are expected from the intermittent light emissions generated during Program activities. Based on that assessment the severity of impact to cultural values and sensitivities from light is assessed as **Minor (1)** and of an acceptable level.

7.3.6 Cumulative Impact Evaluation

There is a low potential for cumulative impacts on light-sensitive marine fauna from overlapping routine platform lighting, vessel navigation and deck lighting, flaring (including pilot lights), and temporary underwater lighting associated with ROV operations during IMR activities. These light sources operate concurrently and intermittently over the life of the BassGas asset, resulting in repeated short-duration exposure of fauna within the immediate vicinity of the platform and RGP. There is no evidence to suggest that such exposure results in injury or mortality of listed threatened or migratory species, or that biologically important behaviours such as migration, foraging, or breeding are disrupted beyond the immediate operational area.

There are no other oil and gas operations in close proximity to BassGas, so there is no overlap in light EMBAs from other similar activities.

Any vessel-based activities being undertaken by offshore wind developers in the offshore wind feasibility licences to the east of BassGas are too far away (over 130 km) to overlap, and their vessel lighting EMBAs too small, to have any cumulative impacts on fauna.

Given the offshore location, the absence of nearby breeding or roosting habitats, the highly localised spatial extent of light glow, and the application of industry-standard lighting controls, cumulative light emissions are not expected to result in population-level effects or prevent biologically important behaviours from continuing.

7.3.7 Impact Assessment

An impact assessment for light emissions is presented below in Table 7.8.

Table 7.8: Impact assessment for light emissions

ALARP decision context		
Impact decision framework context	Type A.	
Activity	Nothing new or unusual, represents business as usual, well understood activity, good practice is well defined.	
Level of certainty of impacts	Risks are well understood, uncertainty is minimal.	
Stakeholder influence	No conflict with company values, no partner interest, no significant media interest.	
Impact Consequence (inherent)		
Operations	Minor (1)	
CoP	Minor (1)	
Preservation	Minor (1)	
Assessment of Proposed Control Measures		
Control	**Cost/benefit analysis**	**Implemented?**
Limit or exclude night-time operations. *(Operations phase)* *(Commonwealth & Victorian State waters)*	Elimination of work lights associated with routine platform and vessel operations would result in a decrease in lighting. Limiting operations to day-time hours would not eliminate the impact of artificial light required for navigation and safe stand-by operations. Restricting night-time vessel operations or platform activities would increase the duration of activities, associated HSE risks and operational costs, while not eliminating lighting required for navigation and safe operations. The resulting environmental benefit would therefore be limited and is considered grossly disproportionate to the operational and safety impacts of implementing this control.	No
Use curfews to manage lighting. *(Operations phase)* *(Commonwealth & Victorian State waters)*	Implementation of lighting curfews, either through retrofitting external lighting with motion sensors or restricting night-time operations, would result in a decrease in artificial lighting. The use of motion sensors has been considered under a separate control measure and is not repeated here. Restricting operations after specified evening hours would not eliminate lighting	No

ALARP decision context		
	required for navigation, safety and essential operational activities. Curfews are primarily intended to minimise disruption to biologically important behaviours in coastal habitats, such as marine turtle nesting beaches and seabird rookeries. However, light emissions are not expected to be biologically relevant at distances greater than 20 km, and the platform is located approximately 91 km from the nearest shoreline and 80 km from the nearest seabird breeding colony. As such, implementation of lighting curfews is unlikely to provide a measurable environmental benefit or result in a reduction in residual risk. Restricting night-time operations or implementing lighting curfews would introduce operational constraints and associated costs that are grossly disproportionate to the limited environmental benefit likely to be achieved and would not result in a meaningful reduction in residual risk.	
Restrict operations to seasons outside of seabird migration. *(All phases)* *(Commonwealth & Victorian State waters)*	Operations are required to occur year-round, therefore activities may be undertaken at any time throughout the year. Controls have been identified to ensure lighting is reduced to that for safe operations considering that vessels may be required to resupply the platform and undertake IMR activities. Given the requirement for year-round operations and the limited environmental benefit beyond that already achieved through existing lighting controls, the operational constraints and associated costs of implementing seasonal restrictions would be grossly disproportionate to the marginal reduction in risk.	No
Implement an Adaptive Bird Management Plan. *(All phases)* *(Commonwealth waters only)*	An Adaptive Bird Management Plan provides key benefits by delivering site-specific, evidence-based understanding of seabird behaviour, enabling early detection of any changes in activity, and supporting adaptive, targeted management responses without introducing unnecessary controls. This is considered appropriate given the historically low level of bird presence on the platform. Given the limited risk of exposure and the high cost and practical constraints associated with physical deterrents, the monitoring program represents a suitable and effective control that maintains environmental risk at ALARP, while allowing for escalation of management measures if required and avoiding unnecessary intervention where risk is demonstrably low. The costs associated with monitoring and adaptive management are proportionate to the environmental benefit achieved and provide a practical mechanism to identify and respond to any increase in bird activity. Accordingly, the control is considered reasonably practicable and has been adopted.	Yes **(IMP03-CM03)**
Eliminate flaring. *(Operations phase)* *(Commonwealth waters)*	Removal of flaring eliminates a source of impact of artificial light for light-sensitive species. As flaring is a safety and integrity critical function of the facility, elimination of flaring is not technically feasible. The loss of this critical control would be grossly disproportionate to the limited environmental benefit associated with reducing light emissions.	No
Shields are used around lights on platform and vessel decks.	Shields reduces light glow to the marine environment. External lighting is required to meet safety and navigation requirements, and shielding may compromise the effectiveness of this lighting. Given the limited environmental benefit expected	No

	ALARP decision context	
(All phases) *(Commonwealth & Victorian State waters)*	and the potential impact on safe operations, implementation is not considered reasonably practicable and the associated costs and operational consequences would be disproportionate to the benefit achieved.	
Use of dark, matte surfaces on platform and support vessels. *(All phases)* *(Commonwealth & Victorian State waters)*	Dark, matte surfaces can reduce the reflection and scattering of light, thereby minimising light glow. However, repainting existing surfaces is unlikely to result in a significant reduction in overall light levels. The costs associated with repainting are considered grossly disproportionate to the marginal environmental benefit that would be achieved. Similarly, while the use of lighter-coloured coatings in some areas may marginally reduce heat absorption, the environmental gains would be minimal relative to the financial investment required. Furthermore, operational safety requirements take precedence, and implementation of this control measure is therefore not considered feasible.	No
Use of lighting with wavelengths that are less visible to turtles. *(All phases)* *(Commonwealth & Victorian State waters)*	Turtles see 'white' light in the violet, blue and green end of the spectrum (such as fluorescent or halogen light) and do not see yellow, orange or red light well (such as low-pressure sodium lights). Use of lighting at the yellow, orange or red end of the spectrum may reduce impacts to turtles. Given that there are few turtles in Bass Strait, no turtle BIAs or turtle nesting in Bass Strait, and no turtle hatchlings that would be attracted in great numbers around platform or vessels (that may lead to increased predation on them by fish, sharks or birds), implementing this control measure is not required. Given the low likelihood of interaction with turtles in Bass Strait and the absence of turtle nesting or biologically important areas within the Activity Area, the environmental benefit achieved by implementing this control would be negligible. The costs and operational implications associated with modifying lighting systems would therefore be grossly disproportionate to the benefit gained.	No
Eliminate lighting during seabird fledging, breeding and migration seasons. *(All phases)* *(Commonwealth & Victorian State waters)*	May reduce behavioural impacts to light-sensitive seabirds during critical life stages. Continuous operations and navigational safety requirements mean implementation of this control is not feasible. The operational and safety consequences of eliminating lighting would be grossly disproportionate to the negligible environmental benefit expected.	No
Implement MARPOL and AMSA maritime standards for platform and support vessel external lighting. *(All phases)* *(Commonwealth & Victorian State waters)*	Lighting is required to provide navigational safety and meet legislative requirements whilst protecting human safety. Lighting is reduced to the lowest practicable level to allow for safe work practices and legislative compliance; this keeps light to the minimum while reducing the likelihood of impacts to fauna from platform and vessel lighting. The control is readily implemented through existing facility and vessel management systems and the associated costs are not grossly disproportionate to the environmental benefit achieved	Yes **(IMP03-CM01)**

ALARP decision context		
	through minimising unnecessary lighting while maintaining safe operations.	
Implement controls outlined in the National Light Pollution Guidelines for Wildlife. *(All phases)* *(Commonwealth & Victorian State waters)*	Reduces impacts to light-sensitive species, particularly seabirds. Many of the controls outlined in the guidelines are consistent with standard offshore operating practices and can be readily implemented. The costs associated with implementation are not grossly disproportionate to the environmental benefit achieved through reducing potential impacts to light-sensitive fauna and supporting continuous improvement in light management.	Yes – as required **(IMP03-CM02)**

Environmental Controls and Performance Measurement			
EPO	**Control measure**	**EPS**	**Measurement criteria**
IMP03-EPO01 No injury or death of seabirds as a result of lighting.	**Platform and vessels (Commonwealth and Victorian state waters)**		
	IMP03-CM01 Vessel and platform lighting is limited to that required for safe navigation and crew working requirements and complies with the following maritime rules (made under the *Navigation Act 2012* to implement MARPOL requirements): • Marine Order 21 (Safety and Emergency Arrangements). • Marine Order 27 (Safety of Navigation and Radio Equipment). • Marine Order 30 (Prevention of Collisions). • Marine Order 58 (Safe Management of Vessels) • Marine Order Part 59 (Offshore Support Vessel Operations) *(All phases)*	**IMP03-EPS01** Lighting meets the requirements of the Navigation Act and Rules for Preventing Collisions at Sea (COLREGs) and industry standards.	**IMP03-MC01.1** Platform - CMMS records verify the platform comply with the following Marine Orders. **IMP03-MC01.2** Vessels - Annual vessel marine assurance review verifies that vessels meet *Navigation Act* requirements.
	IMP03-CM02 The BassGas Light Management Plan is implemented for the platform and vessels to reduce the impact of artificial light to seabirds and migrating shorebirds. The plan includes the following: • Non-essential outdoor lights are turned off when not in use.	**IMP03-EPS02** Lighting on the platform and vessels is managed in accordance with The National Light Pollution Guidelines for Wildlife.	**IMP03-MC02.1** EP assurance checklists and SAP work orders in CMMS verify: • Lights are directed only onto work areas and are shielded. • Platform navigation lights remain functional at all times. **IMP03-MC02.2**

ALARP decision context		
• Outdoor lighting is directed inboard onto work areas. • Window screens or blinds are closed at night. • Crew environmental induction covers handling and reporting requirements for marine fauna include grounded or injured seabirds. • Planned IMR will, where possible, consider seasonal timing to minimise adverse impact to migratory seabirds and marine fauna. *(All phases)*		Incident register/reports records verify fauna interaction is recorded. **IMP03-MC02.3** Personnel induction training records verify crew are inducted in handling and reporting requirements for marine fauna.
Platform only (Commonwealth waters)		
IMP03-CM03 Beach will implement an Adaptive Bird Management Plan on the Yolla-A platform to identify, track and manage seabird presence and behaviour. The program will include: • Bird deterrent system has been developed as per the recommendations of the bird management specialists. • Water sprinkler used when birds are present. • Operators of the bird deterrent systems are trained and following standard operating systems. • Operators of the bird deterrent systems are trained and follow standard operating systems. • The water sprinkler is used daily (when birds are present), even when helicopter flights are not scheduled. This prevents birds from habituating to an inactive helideck, reducing the numbers and hence lowering the risk of being harmed.	**IMP03-EPS03** Seabird presence, behaviour and platform utilisation are monitored and assessed, and adaptive management measures are implemented where monitoring indicates an increasing trend in seabird activity or evidence that existing controls may not be effective.	**IMP03-MC03.1** Bird deterrent system report verifies implementation and operation of bird deterrents. **IMP03-MC03.2** Records of bird deterrent laser use (including platform camera observations and operational logs) verify that platform cameras were reviewed prior to deployment to confirm the absence of species of concern on the helideck and that the laser was operated in accordance with the Adaptive Bird Management Plan prior to scheduled helicopter operations. **IMP03-MC03.3** Training and competency records verify that personnel responsible for operating bird deterrent systems have received training and are assessed as competent in accordance with standard operating instructions. **IMP03-MC03.4** Operational records, platform logs and camera observations verify that the seawater sprinkler system

ALARP decision context		
• Bird laser would initially be used for a limited time at dusk and dawn prior to scheduled helicopter operations. Further trials will be undertaken to determine whether nighttime operations would be effective. • Monitoring of the platform cameras will be used to determine that there are no species of concern on the helideck prior to operation of the laser. *(All phases)*		was operated when birds were present on the platform, including during periods when helicopter operations were not scheduled. **IMP03-MC03.5** Periodic bird management reports or environmental inspection records verify seabird observations, bird deterrent activities and any bird-related incidents were recorded, reviewed and managed in accordance with the Adaptive Bird Management Plan, including assessment of deterrent effectiveness and identification of any required adaptive management actions.
IMP03-CM04 Platform-based personnel report wildlife interactions on the platform that have the potential to be light-related (i.e., congregations of marine species in pools of light, collisions of birds with platform infrastructure). *(All phases)*	**IMP03-EPS04** Platform lighting is managed in accordance with The National Light Pollution Guidelines for Wildlife.	**IMP03-MC04** The CMO incident management system includes fauna incidents, with records of action taken to assesses if additional controls are required.
IMP03-CM05 Routine flaring will not take place. *(Operations phase)*	**IMP03-EPS05** Flaring is limited to non-routine events.	**IMP03-MC05** Records of flare volumes in the P2 Monitoring System verify that flaring is not a routine activity.

Impact Consequence (residual)	
Operations	Minor (1)
CoP	Minor (1)
Preservation	Minor (1)

ALARP Decision Justification

With the controls outlined in this table in place, the impact consequence has been assessed as Minor (1) and is considered to be good practice (Decision Context A). This means any additional or alternative control measures do not lower the residual consequence further or would be grossly disproportionate to the residual consequence. Therefore, a Minor (1) residual impact consequence is considered to be ALARP.

Acceptability Assessment	
Defined acceptable level	Light emissions are assessed as having a Minor (1) consequence, which is not considered as having the potential to result in serious or irreversible environmental damage.
Internal context	The proposed management of the impact is aligned with the Beach Environment Policy.

ALARP decision context		
	Activities will be undertaken in accordance with the Implementation Strategy (Chapter 8).	
External context	The BassGas Offshore Operations SEP is implemented to ensure that stakeholders are aware of operations issues. No objections or claims were raised by stakeholders in relation to light emissions. During ongoing consultation any concern from stakeholder will be managed to close, for the life of asset.	
Legislative context	The control measures outlined in this table align with the requirements of: *Navigation Act 2012 (Cth):* ▪ Part 3 (Prevention of Collisions). ▪ AMSA Marine Orders Part 21 (Safety of Navigation and Emergency Procedures). ▪ AMSA Marine Orders Part 27 (Safety of Navigation and Radio Equipment). ▪ AMSA Marine Orders Part 30 (Prevention of Collisions). ▪ AMSA Marine Order 58 (Safe Management of Vessels).	
Industry practice	The consideration and alignment of controls outlined in the below-listed guidelines and codes of practice demonstrates that BPEM is implemented for this activity.	
	Environmental management in the upstream oil and gas industry (IOGP-IPIECA, 2020)	The control measures listed in this table meet the relevant mitigation measures listed for offshore activities with regard to: • Light emissions – minimise external lighting to that required for navigation and safety (**IMP03-CM02**).
	Best Available Techniques Guidance Document on Upstream Hydrocarbon Exploration and Production (European Commission, 2019)	There are no guidelines specifically regarding lighting for offshore activities.
	Environmental, Health and Safety Guidelines for Offshore Oil and Gas Development (World Bank Group, 2015)	The control measures listed in this table meet these guidelines with regard to: • Ship collision (item 120). To avoid collisions with third-party vessels, offshore facilities should be equipped with navigational aids that meet national and international requirements, including navigational lights on vessels (**IMP03-CM01**).
	Code of Environmental Practice (APPEA, 2008)	The control measures listed in this table meet the following offshore development and production objectives: • To reduce the impact of planned light emissions to ALARP and to an acceptable level. • To reduce the risks to public safety to ALARP and to an acceptable level.
	Light-specific guidance	
	National Light Pollution Guidelines for Wildlife (CoA 2023).	Light emissions will be managed in accordance with the National Light Pollution Guidelines for Wildlife (CoA 2023). The Guidelines recommend: • Infrastructure with artificial lighting that is externally visible should have best practice lighting design implemented (**IMP03-CM02**).

ALARP decision context		
		• Where there is important habitat for seabirds within 20 km of a project, an EIA should be undertaken (**this EP**).
Environmental context	MNES	
	AMPs	The South-east Marine Parks Network Management Plan 2025 (DNP, 2025) identifies light pollution as a pressure to the AMP network. The controls listed in this table aimed at minimising light emitted from the platform and support vessels do not conflict with the strategies outlined in the plan that aim to address this threat.
	Ramsar wetlands	No intersection or impacts.
	NIWs	No intersection or impacts.
	TECs	No intersection or impacts.
	Nationally threatened and migratory species	Localised light glow does not have any impacts on threatened or migratory species.
	Other matters	
	State marine parks	No intersection or impacts.
	Species Conservation Advice/Recovery Plans/Threat Abatement Plans	The light EMBA does not overlap any seabird breeding and roosting areas. Light pollution is identified as a threat in the Wildlife Conservation Plan for Seabirds (CoA 2020a) and the National Recovery Plan for Albatrosses and Petrels 2022 (CoA 2022a). The National Recovery Plan for the Orange-bellied Parrot (DELWP 2016) identifies illuminated boats and structures as a threat with the action of 'assess the risk from barriers on the migration route' with the action of 'manage threat if the risk rating warrants action.' The control measures listed in this table aim to ensure that lighting is managed in a manner that is not inconsistent with these conservation plans.
ESD principles	The EIA presented throughout this EP demonstrates that ESD principles (a), (b), (c) and (d) are met (noting that principle (e) is not relevant).	

Environmental Monitoring
Fauna interactions with lighting.

Record Keeping	
Platform	Vessels
• CMMS records. • EP assurance checklists. • SAP work orders. • BassGas Light Management Plan. • P2 monitoring system records.	• Annual vessel marine assurance review. • PMS records. • Personnel induction training records. • Incident register/reports

ALARP decision context
• Platform lighting assessment/inspection/audit reports. • PMS records. • Wildlife incident reports. • Personnel induction training records. • Bird deterrent system report. • Platform operation logs.

7.4 IMPACT 4: Routine Emissions - Atmospheric

7.4.1 Source of Aspect

Atmospheric emissions are pollutants released into the air from various sources, which can be categorised as point, non-point, or mobile sources. These emissions can significantly contribute to air pollution and adversely affect both the environment and public health.

The most significant source of atmospheric emissions within the BassGas Offshore Operations boundary is through combustion – this includes fuel gas and diesel used for operating equipment, and the flaring of hydrocarbons as part of safe operations. This produces pollutants such as oxides of NOx, CO, SO_2, PM_{10}/$PM_{2.5}$, and BTEX and other VOCs.

Atmospheric emissions also encompass greenhouse gases (GHG) such as carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). These gases trap heat in the atmosphere and are primary contributors to climate change. GHG emissions are reported according to the *NGER Act 2007* and associated instruments, while other pollutants (excluding GHGs) are reported under the *National Environment Protection (National Pollutant Inventory) Measure 1998*. The NPI NEPM includes reporting of air, water and land pollutants, estimated according to the prescribed Emission Estimation Techniques for each source.

As described in Section 3.11, during the CoP phase, pipework on the platform and the RGP will be filled with nitrogen gas (N_2) that remains in place during for the duration of the preservation phase.

Point sources are stationary and identifiable sources of pollution, such as the Yolla-A platform. Emissions from these locations are easier to monitor and control because they are fixed. In contrast, non-point sources are diffuse and do not originate from a single location, such as precipitation, drainage, and seepage. These sources can be more challenging to manage because they involve a variety of activities spread across larger areas. Mobile sources relevant to the BassGas operations include any transportation vehicles that consume and produce emissions, such as vessels, aircraft, and onshore vehicles, i.e., cars and trucks.

The key sources of atmospheric emissions are described in the following sections.

As outlined in Table 3.11, project activities during the operations, CoP and preservation phases involves continued atmospheric emissions. Accordingly, this aspect is relevant to all phases, as summarised below:

Hazard	Source	Operations	CoP	Preservation

Platform	Combustion of gaseous liquids and liquid fuels	✓	✓	✓
	Flaring	✓	✗	✗
	Fugitive emissions	✓	✓	✓
RGP	Fugitive emissions	✓	✓	✓
Support vessels	Fuel combustion in the operational area	✓	✓	✓
Helicopters	Combustion of aviation gas in the operational area	✓	✓	✓

Note that GHG emissions from the platform and RGP are reported by Beach under NGER as Scope 1 emissions. GHG emissions from support vessels and helicopters are Scope 3. Refer to section 7.4.1.6 for further detail.

7.4.1.1 Yolla-A platform

- Combustion of fuel gas in the main power generators, turbine and export compressor.
- Combustion of MDO in fixed mobile deck equipment including the crane and standby generator.
- Flaring – the system includes both pilot gas and purge gas.
- Painting and paint storage, resulting in the release of fugitive VOCs as vapours.
- Fugitive emissions.

7.4.1.2 Helicopters

- Combustion of aviation gas (Jet A-1) while in the PSZ.

7.4.1.3 Support vessels

- Combustion of MDO from engines, generators and fixed mobile deck equipment including the crane (and standby generator, lifeboat winches, etc).

7.4.1.4 Raw Gas Pipeline

- Fugitive emissions.

Fugitive emissions are small volumes of gases or vapours are released from pressure-containing equipment such as valves, piping flanges, pumps, storage tanks, compressors, etc. Volumes are kept to a minimum through upkeep of machinery aboard the rig and vessels, during implementation of the planned maintenance system.

7.4.1.5 CoP and Preservation

In addition to routine production activities, atmospheric emissions may be generated during CoP and preservation activities if these activities occur during the life of this EP.

CoP activities have the potential to generate atmospheric emissions through depressurisation of process equipment, pigging of the offshore RGP, displacement of residual hydrocarbons with nitrogen and flaring associated with the removal of hydrocarbons from topsides process systems. During the preservation phase, atmospheric emissions may arise from support vessel and helicopter operations, maintenance visits, operation of diesel-powered equipment and backup power generation where required. Relative to routine production operations, these activities are expected to be infrequent, short duration and temporary in nature.

Note that GHG emissions from the platform and RGP are reported by Beach under NGER as Scope 1 emissions. GHG emissions from support vessels and helicopters are Scope 3. This classification continues to apply during the CoP and preservation phases.

7.4.1.6 BassGas Offshore Operations – GHG emissions context of value chain

BassGas Offshore Operations activity includes the production and flow of gas and condensate through the Yolla-A platform and wells, then through the subsea pipeline. The boundary is the point in the raw gas pipeline when it comes ashore. From this point, through LLGP then the sales gas pipeline, the hydrocarbons are outside the boundary of BassGas Offshore Operations, but still under the operational control of Beach (Figure 7.8). Note that there are other product streams which are distributed from LLGP in trucks – carbon dioxide, LPG and condensate.

For these assets that are under Beach's operational control, Scope 1 and Scope 2 emissions are reported under the *National Greenhouse and Energy Reporting Act 2007 (NGER)* and associated instruments such as the *NGER Regulations 2008* and the *NGER (Measurement) Determination 2008*. The latter provides standardised methods with detailed formulae and emission factors for calculating emissions from various sources.

Beach's GHG Management Plan documents the approach to be used for emissions reporting, governance and assurance. NGER facilities are described in internal Basis of Preparation (BoP) documents, which are reviewed each year and include the facility definition, emission sources, NGER activity, calculation method and data inputs to be used. The BoP also includes the approach to be used for quality assurance and data validation, with assigned roles and responsibilities. Annual emissions and energy reports are independently assured by a qualified third party prior to submission to the CER.

Once custody of the product streams has been passed to the buyers at the custody transfer meters, Beach no longer has operational control. This is the downstream part of its value chain and emissions are categorised as Scope 3.

In the context of this EP, the upstream value chain includes purchased goods and services, including marine and aviation transport services. Beach calculates Scope 3 emissions based on the Greenhouse Gas Protocol's Corporate Value Chain (Scope 3) Accounting and Reporting Standard and Scope 3 guidance documents (GHG Protocol). This standard must be applied consistently across Beach to enable compliant reporting under *AASB S2 Climate-related Disclosures*. From FY27, independent assurance of Scope 3 emissions by a qualified third party will be mandatory for compliance with AASB S2.

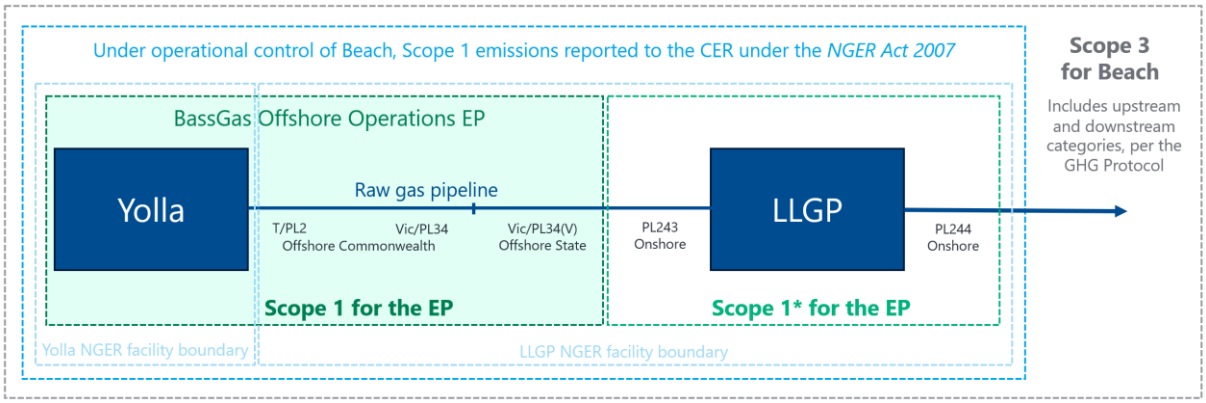


Figure 7.8: Illustrated emissions context of the value chain

For clarity, the following notation is applied:

- Scope 1: Direct emissions from the combustion of fuel, venting, flaring and fugitive emissions from Beach owned or controlled sources, and within the BassGas Offshore Operations boundary (i.e., within the scope of this EP).
- Scope 1*: Emissions from the combustion of fuel, venting, flaring and fugitive emissions from Beach-owned or controlled sources, but not within the scope of the BassGas Offshore Operations (i.e., outside the scope of this EP).
- Scope 2: Indirect emissions from the generation of purchased electricity, steam, heating, and cooling consumed by the company.
- Scope 3: All other indirect emissions upstream and downstream in the value chain, as described by the GHG Protocol.

The activities and sources of GHG emissions are described in Table 7.9. Direct emissions (Scopes 1 and 1*) are consistent with NGER reporting. Indirect emissions (Scope 3) are consistent with the categories as defined in the GHG Protocol with material contributions from the BassGas Offshore Operations EP. Categories 2, 8, 12, 13, 14 and 15 have been evaluated as immaterial.

Table 7.9: GHG emissions source categorisation

GHG Scope	Category	Source / Activities
BassGas Offshore Operations		
1	Fuel Gas	Platform gas turbine compressors
		Platform gas turbine generators
	Fuel Diesel	Platform emergency generator
		Pedestal crane
		Firewater pumps
		Additional diesel for workovers

GHG Scope	Category	Source / Activities
	Fugitives	Fugitive emissions from: • Platform • RGP • PFW
	Flaring	Platform flare system
	Venting	Glycol dehydrator
		Gas driven pneumatic device
LLGP		
1*	Fuel Gas	LLGP gas turbine compressors
		LLGP gas turbine generators
	Fuel Diesel	LLGP emergency generator
		Firewater pumps, etc.
	Fugitives	Fugitive emissions from: • LLGP • Sales gas pipeline
	Flaring	LLGP Flare
	Venting	LLGP Reservoir carbon dioxide (CO_2) vent
		LLGP Non routine venting
Indirect Emissions		
2	There are no Scope 2 emissions at either Yolla or LLGP.	
3	Purchased goods and services *(Category 1)*	Contractors and specialist services Chemicals
	Fuel and energy related activities *(Category 3)*	Purchased diesel Purchased LPG
	Upstream transportation and distribution *(Category 4)*	Vessels Helicopters
	Waste generated in operations *(Category 5)*	Waste
	Business travel *(Category 6)*	Business travel
	Employee commuting *(Category 7)*	Employee commuting
	Downstream transportation and distribution *(Category 9)*	Fugitive emissions from third party natural gas transmission Trucking of liquid products
	Processing of sold products *(Category 10)*	Refining of products

GHG Scope	Category	Source / Activities
	Use of sold product *(Category 11)*	Natural gas Condensate Liquefied petroleum gas (LPG) CO_2

Source: Xodus 2025

Over the five-year duration of the EP revision:

- The Scope 1 emissions associated with the BassGas Offshore Operations are forecast to be 224,080 tCO_2e. This represents an annual average of 44,816 tCO_2e/year.
- The Scope 1* emissions associated with the LLGP are forecast to be 406,050 tCO_2e. This represents an annual average of 81,210 tCO_2e/year.
- The Scope 3 emissions associated with the BassGas Offshore Operations over this duration is forecast to be 1,433,200 tCO_2e, or an annual average of 286,640 tCO_2e/year.

This is described in more detail Table 7.10 which shows emissions sources from BassGas operations, including throughout the value chain, for the five-year life of the EP. Direct (Scope 1 and 1*) emissions have been forecast using Beach's NGER submissions from the past five years, with adjustments made for recognised changes such as the use of LDAR to enable the more detailed Method 3 calculations for fugitive losses and production changes following well interventions.

The most significant indirect (Scope 3) emission sources have been estimated based on forecast activity such as forecast production profiles and expected vessel and helicopter use. Historical spend-based data was used to forecast the remainder.

It should be noted that estimation, forecasting and disclosure of Scope 3 emissions is an emerging practice in Australia. According to the requirements of AASB S2 *Climate-related Disclosures*, Group 1 companies (which includes Beach) must disclose Scope 3 emissions in annual Sustainability Reports from FY27. These disclosures will be subject to mandatory assurance. As more companies throughout the value chain disclose their emissions, and more local data becomes available, it is expected that data-sharing will increase and Scope 3 reporting processes will mature.

Beach has been working to develop Scope 3 emissions reporting systems since FY23, publishing estimated total Scope 3 emissions for the company within annual Sustainability Reports. The initial focus was on the largest source, Category 11: Use of Sold Products, before expanding consideration to other upstream and downstream categories.

Table 7.10: Emissions estimated from the BassGas Offshore Operations (calculated on the basis of continued operations over the life of the EP).

Emissions Source (tCO_2e)	Forecast Emissions over the life of the EP		
	Scope 1	Scope 1*	Scope 3
BASSGAS OFFSHORE EP			
Fuel	165,250	-	-
Flaring	54,860	-	-
Fugitives	3,650	-	-

Emissions Source (tCO_2e)	Forecast Emissions over the life of the EP		
Venting	320	-	-
ONSHORE (UNDER BEACH OPERATIONAL CONTROL, OUTSIDE OF THE SCOPE OF THIS EP)			
Fuel	-	261,530	-
Venting	-	136,630	-
Fugitives	-	7,100	-
Flaring	-	790	-
INDIRECT (SCOPE 3) EMISSIONS			
Category 11: Use of sold products [a]	-	-	1,326,630
Category 9: Downstream transportation and distribution	-	-	35,410
Category 1: Purchased goods and services	-	-	33,740
Category 10: Processing of sold products	-	-	28,590
Category 4: Upstream transportation and distribution	-	-	7,800
Category 5: Waste generated in operations	-	-	470
Category 7: Employee commuting	-	-	300
Category 3: Fuel and energy related activities	-	-	190
Category 6: Business travel	-	-	70
TOTALS (by Scope)	**224,080**	**406,050**	**1,433,200**
GRAND TOTAL (all Scopes)			**2,063,330**

[a] Forecast based on Beach portfolio projections for FY27-FY31.

Fuel gas consumed by the compressors and generators is the most significant source of Scope 1 emissions within the boundary of the BassGas Offshore Operations, accounting for 74%. Flaring accounts for 24%, and fugitives 2%. Emissions from venting are a minor contributor.

This distribution has been reasonably consistent over the past 5 years of operation, with the proportion of emissions from fuel consumption being reduced in years with lower production. As production declines and the facility approaches CoP, it is expected that this shift in proportions will be observed again.

When considering Scope 3 emissions, the majority (93%) arise from the use of sold products. Value chain emissions from downstream transportation and distribution is the next most significant but only accounts for 2%.

When considering all Scopes (1, 1* and 3), the majority are Scope 3 emissions (69%), largely due to the use of the sold hydrocarbon products. Scope 1, within the boundary of the BassGas EP, accounts for 11%, with the balance being Scope 1* as the raw gas is processed through LLGP.

As BassGas Offshore Operations transitions to CoP, absolute emissions will reduce. It is expected that emissions intensity will increase for a time, as production reduces but equipment is still required in service, resulting in more tCO2e of emissions per unit of energy produced. As hydrocarbons are displaced by nitrogen during the CoP process, it is expected that they will be combusted via the flare, which is typical for a shutdown procedure on Yolla. These emissions will be reported through the normal NGER process.

7.4.2 Known and Potential Environmental Impacts

The environmental impacts of atmospheric emissions include:

- A localised and temporary decrease in air quality due to gaseous emissions and particulates from diesel combustion.
- The addition of GHG to the atmosphere, which contributes to climate change.

7.4.3 EMBA

Air quality

Predicted impacts from atmospheric emissions associated with the activities will be limited to the Operational Area. Receptors that may be affected by atmospheric emissions within the Operational Area include:

- Seabirds.

GHG Emissions

The accumulation of GHG emissions in the atmosphere has been shown to contribute to climate change (BOM and CSIRO 2024, IPCC 2022a). Climate change impacts occur at a global scale over a long timeframe and cannot be attributed to any single source of emissions or specific activities.

Climate change associated with an increase in GHG emissions is likely to affect various values and sensitivities within Australia, such as:

- Physical environment, such as oceanography, water quality, climate.
- Ecological receptors associated with marine, terrestrial and wetland ecosystems.
- Socio-economic receptors, such as coastal communities and fisheries.
- Cultural values and sensitivities.

It is important to acknowledge that climate change impacts cannot be directly attributed to any one activity. Rather they are the result of global GHG emissions minus global GHG sinks, that have accumulated in the atmosphere since the industrial revolution began.

7.4.4 Jurisdiction of source of aspect

The jurisdictions for this hazard are outlined below.

Commonwealth waters	Victorian waters
YES	YES
Yolla-A generates atmospheric emissions associated with production of gas and resupply and IMR activities.	Vessels undertaking IMR along the portion of the RGP within state waters combust fuel that generate atmospheric emissions.

7.4.5 Evaluation of Environmental Impacts

This evaluation only considers Scope 1 emissions that are within the scope of this EP.

The combustion of fuel gas and diesel in compressors, turbines and generators, together with the use of the flare as necessary for safe operations, on the Yolla-A platform may cause a localised and temporary decline in air quality and contribute to GHG emissions. Similarly, the combustion of MDO from engines, generators, and deck equipment on board vessels can further degrade air quality and increase GHG emissions.

Atmospheric emissions during CoP are expected to be short-duration and infrequent compared with routine production operations. While temporary increases in flaring may occur during depressurisation and hydrocarbon displacement activities, these activities are one-off events associated with transition of the facility into preservation mode. Impacts are expected to remain localised and temporary and do not alter the consequence assessment.

7.4.5.1 Air quality

Atmospheric emissions from the platform, vessels, and helicopters will result in a minor deterioration in local air quality. It is expected that this localised reduction in air quality will be short-lived given the rapid dispersion in the offshore environment. The estimated low emissions mean that no adverse impacts to marine fauna, seabirds or coastal communities are expected. Non-GHG air pollutants are reported annually under NPI, where facility-level activity or substance thresholds are exceeded. This data is publicly accessible via the DCCEEW website, the latest values (2024-2025) are shown in Table 7.11

Table 7.11 Non-GHG air pollutants released from Yolla-A (2024-2025)

Substance	Volume (kg)
Oxides of nitrogen (NO_2)	260,000
Carbon monoxide (CO)	170,000
Total volatile organic compounds	88,000
Formaldehyde (methyl aldehyde)	11,000
Particulate matter 10.0 um	1,500
Particulate matter 2.5 um	1,500
n-Hexane	490
Sulfur dioxide	290
Toluene (methylbenzene)	120
Benzene	97
Xylenes (individual or mixed isomers)	57
Hydrogen sulphide	0.69
Polycyclic aromatic hydrocarbons (B[a]Peq)	0.035

NO_2 and CO are the substances with the highest volume of emissions that that are released annually and are discussed within this section.

The National Environment Protection (Ambient Air Quality) Measure (NEPM) recommends that exposure to nitrogen dioxide (NO_2) on an hourly basis should be below 80 ppb and less than 15 ppb annually (average). The data outlined in Table 7.11 indicates that 260,000 kg of NO_2 was

released in 2024-2025, equating to a release rate of approximately 29 kg per hour. Assuming that all substances are distributed evenly over 1km^3 of air that otherwise does not contain NO_X, the average hourly concentration of NOx is 15.8 ppb at Yolla-A. Therefore, no adverse effects will occur to wildlife (such as seabirds) as the estimated hourly release of NO_X is below the threshold advised by the NEPM.

The NEPM recommends that exposure to carbon monoxide (CO) over an eight-hour period should be below 9,000 ppb. The data outlined in Table 7.11 indicates that 170,000 kg of CO was released in 2024-2025, equating to a release rate of approximately 19 kg per hour. Assuming that all substances are distributed evenly over 1km^3 of air that otherwise does not contain CO, the average hourly concentration of CO is 16 ppb at Yolla-A. Given the CO emitted per hour is significantly lower than the threshold identified by the NEPM, no adverse effects to wildlife (such as seabirds) will occur as a result of day-to-day CO emissions.

Therefore, therefore impacts from air pollutants are considered to have a **Minor (1)** consequence.

The use of MDO to power engines and generators on support vessels, as well as mobile and fixed equipment such as cranes, alongside aviation gas for helicopters, is a key component of modern maritime and industrial operations, designed to reduce specific air pollutants compared to heavier fuel oils such as Heavy Fuel Oil (HFO). This approach can lead to a significant reduction in non-GHG pollutants, such as sulphur oxides and particulate matter (PM), thereby improving air quality.

The combustion of MDO can create continuous or discontinuous plumes of particulate matter (soot or black smoke) (PM). Inhaling this particulate matter can cause or exacerbate health impacts on humans exposed to it, such as offshore personnel (e.g., respiratory illnesses such as asthma), depending on the volume of particles inhaled. Similarly, the inhalation of particulate matter may affect the respiratory systems of fauna. Around Yolla-A, this is limited to seabirds overflying routine support vessels and the platform. These emissions are not considered to have a determinable local-scale impact and therefore impacts are considered to be a **Minor (1)** consequence.

Particulate matter released from the vessels is not likely to impact the health or amenity of the nearest human coastal settlements (e.g., Venus Bay, Inverloch), as winds will rapidly disperse and dilute particulate matter. This rapid dispersion and dilution will also ensure that seabirds are not exposed to concentrated plumes of particulate matter from vessel and platform exhaust points. Particulate matter emissions are assessed as a **Negligible** consequence.

The extent of the operational area of potential impact is assessed to be close to the emission source for the duration of emissions. The consequence is assessed as **Minor (1)** and is of an acceptable level based on:

- Low level of emissions
- Open ocean environment and prevailing winds of the bass basin mean that atmospheric emissions will rapidly disperse to background levels close the emissions source.
- Impact to seabirds is low.
- Impact to marine users is low.

7.4.5.2 Greenhouse gas emissions

The GHG effect is a natural process that warms the Earth's surface. When the sun's energy reaches the Earth's atmosphere, some is reflected into space, and some is absorbed and re-radiated by GHG. Greenhouse gases include carbon dioxide, methane, nitrous oxide, ozone, and some artificial chemicals such as chlorofluorocarbons (CFCs). The absorbed energy warms the atmosphere and the Earth's surface. This process maintains the Earth's temperature at around 33°C warmer than it would otherwise be, allowing life on Earth to exist (DCCEEW, 2025).

The activities conducted by the BassGas offshore operations, which include the combustion of fuel gas and diesel, contribute to GHG concentrations in the atmosphere through release GHG emissions such as CO_2, CH_4, and N_2O. Although these emissions contribute to the GHG effect, they are small in scale compared to national and international inventories. In FY25, corporations reported a total of 296.6 MtCO_2e direct (Scope 1) emissions[16]. The Scope 1 emissions for the BassGas EP in FY25 represents 0.016% of this total.

GHG emissions from operational activities are assessed to have a **Minor (1)** consequence.

7.4.5.3 Nitrogen emissions

Fugitive releases of nitrogen gas (N_2) from platform equipment, piping, valves or fittings would disperse rapidly into the atmosphere. Nitrogen is the primary constituent of air and is chemically inert under normal environmental conditions. Consequently, fugitive emissions are not expected to affect air quality, contribute to GHG emissions or result in adverse impacts to fauna or other environmental values. Any increase in local atmospheric nitrogen concentrations would be temporary, highly localised and rapidly diluted within the surrounding airshed. Given the small volumes typically associated with equipment leaks and the large natural atmospheric reservoir of nitrogen, impacts are not expected to be measurable beyond the immediate vicinity of the leak source.

Fugitive releases of nitrogen from the RGP would enter the surrounding seawater and disperse rapidly through dilution, mixing and natural air-sea gas exchange processes. Nitrogen is a naturally occurring dissolved gas in marine waters and does not exhibit toxic properties in its elemental form. Consequently, small-scale releases are not expected to adversely affect marine fauna, benthic habitats, planktonic communities or ecosystem processes. Any localised increase in dissolved nitrogen concentrations would be temporary and quickly return to background levels through natural dispersion processes. While adverse biological effects can occur where dissolved gases become substantially supersaturated, such conditions are generally associated with large-scale, high-volume releases and are not expected from fugitive leaks associated with offshore petroleum infrastructure. Accordingly, impacts to the marine environment are expected to be negligible, localised, temporary and reversible. provides overarching guidance for protection of aquatic ecosystems through maintenance of water quality and avoidance of stressors that could adversely affect aquatic biota (DCCEEW, 2024; ANZECC and ARMCANZ, 2000).

Fugitive releases of nitrogen gas to the atmosphere or marine environment are expected to be localised, temporary and reversible. Due to the inert nature of nitrogen and the rapid dilution and

[16] 2024–25 published data highlights | Clean Energy Regulator

dispersion that would occur following a leak, no measurable impacts on environmental values are expected.

7.4.5.4 Cultural values and sensitivities

Impacts to cultural heritage sites and places of spiritual importance in coastal locations may also be experienced due to rising sea levels. Sea levels have been estimated to have risen on average by 1.2 mm per year between 1920 and 2000 due to climate change (Church et al. 2006). By 2100, research is expecting sea levels to have increased by a further 18 to 59 cm in response thermal expansion and melting of icesheets (Solomon et al. 2007). Whilst the release of GHG emissions is known to contribute to global climate change, the amount estimated to be released as a result of the Bass Gas production activities is insignificant on a global scale and is not expected to have determinable impacts.

The consequence severity of GHG emissions from the activities within this EP, on the physical, ecological, conservation, socio-economic and cultural receptors and values described above is assessed as **Minor (1)** and of an acceptable level.

7.4.5.5 Impacts to Fauna

The Australian Government releases the State of the Environment (SoE) report every five years. The 2021 report concludes that climate change and extreme weather events are impacting the Australian environment and various taxa. In many cases the impacts are exacerbated by other pressures such as land clearing and invasive species, but in some cases impacts can be unequivocally attributed to climate change (DELWP, 2021).

While the activity does generate emissions, the volume compared to a national and global scale is minimal, meaning direct impacts to fauna are not measurable.

Table 7.12 evaluates the impact of climate change on marine fauna and impacts from the activity.

Table 7.12 Impacts of climate change on marine species

Fauna group	Relevant conservation plan	Climate change impacts	Impacts from this activity
Cetaceans (PBW & SRW)	National Recovery Plan for the SRW (*Eubalaena australis*) (DCCEEW, 2024) The CMPBW (CoA, 2015)	SRW: • Likely to have a negative impact on krill populations and in association the baleen whale species that feed on them. • Variability in prey abundance has been linked with climate cycles. • Strong correlations have been observed between environmental conditions on SRW high latitude feeding grounds and female reproductive success and recovery on their winter breeding grounds. PBW: • Expected to cause changes in migratory timing and destinations,	Climate change impacts are due to an accumulation of GHG released into the atmosphere on a national and global level that in turn influences climate patterns. The activity generates a very small amount of GHG emissions on an annual basis compared to Australia's overall GHG emissions (0.01%). Therefore, emissions associated with the activity cannot be directly attributable to changes in prey abundance and ocean temperature increases, particularly with emissions set to decrease with the upcoming CoP and preservation phases.

Fauna group	Relevant conservation plan	Climate change impacts	Impacts from this activity
		population range, breeding schedule, reproductive success and survival. • It is predicted that PBWs will experience a southward shift in distribution as ocean temperature increases. • Changes in distribution and abundance of their prey.	
Seabirds	The Wildlife Conservation Plan for Seabirds (CoA, 2020)	• increase in extreme weather events, reduced or changed prey abundance and distribution, and decrease in nesting habitat • Several seabird species have been identified as being at high risk from exposure to climate change and sensitive to climate change, of which two are known to occur within the operational area, the white-bellied storm petrel and the white-necked petrel • Projected sea level rises are likely to adversely affect beach-nesting seabirds. • Marine productivity has decreased as a result of the strengthening EAC and warming waters, which is likely to affect seabirds.	As above. Emissions from the activity cannot be directly attributable to the loss of marine productivity.
Shorebirds	Wildlife Conservation Plan for Migratory Shorebirds (CoA, 2015)	• Has the potential to affect migratory shorebirds and their habitats by reducing the extent of coastal and inland wetlands or through a poleward shift in the range of many species. • Likely species loss and habitat degradation.	As above. Emissions from the activity cannot be directly attributable to habitat degradation.
Fish (white shark)	Recovery Plan for the White Shark (*Carcharodon carcharias*)	Identifies climate change as a potential threat and does not elaborate further.	As above.
Pinnipeds	N/A. No conservation advice or recovery plan exists for this species.	Speakman (n.d.) suggests that under La Niña conditions, females increase their foraging effort to make up for changes in the abundance and location of their prey. Climate predictions suggest an increasing frequency and severity of La Niña events could have massive implications for Australian fur seal foraging, particularly if prey shift away from the core foraging areas.	As above. Emissions associated with the activity will not directly cause changes in fur seal foraging behaviour.
Turtles	Recovery Plan for Marine Turtles in	Expected to cause changes in dispersal patterns, food webs, species range,	As above.

Fauna group	Relevant conservation plan	Climate change impacts	Impacts from this activity
	Australia (CoA, 2017)	primary sex ratios, habitat availability, reproductive success and survivorship.	In conjunction with the lack of known turtle range in the Bass Strait as well as an absence of BIAs and breeding sites in the operational area, emissions associated with the activity will not directly impact turtle species.

Overall, the activity generates a very small amount of GHG emissions on an annual basis compared to Australia's overall Scope 1 emissions (see Section 7.4.5.2). This means that emissions associated with the activity have a **Minor (1)** consequence.

7.4.6 Cumulative Impact Evaluation

There is potential for cumulative impacts on the local airshed from overlapping routine atmospheric emissions, including GHGs generated by the Yolla-A platform, support vessels, helicopters, and associated inspection, maintenance, and logistics activities undertaken over the life of the BassGas asset. These emissions include combustion exhausts, venting and flaring events, fugitive emissions from equipment, and intermittent vessel and aviation operations, which may occur concurrently or repeatedly during routine operations. Cumulative impact considerations should also address how these atmospheric and GHG emissions may affect not only marine fauna and ecosystems, but also other marine users such as commercial shipping and fishing operators, with potential implications for air quality, visibility, and occupational health within the marine environment. Consultation with these users will be undertaken as part of the ongoing management of cumulative air quality and GHG impacts.

The cumulative effect of these sources may result in short-term and localised reductions in air quality within the immediate operational area. However, emissions are rapidly dispersed by prevailing winds and offshore meteorological conditions, limiting the potential for sustained accumulation within the local airshed. When considered cumulatively with existing regional shipping and offshore industrial activities in Bass Strait, BassGas atmospheric emissions do not represent a substantial additional contribution to local air quality degradation.

Deposition of particulate matter to the marine environment is expected to be minimal and highly dispersed, with no potential for accumulation or unrecoverable changes to seabed quality. Given the offshore location, low emission intensity relative to regional sources, strong atmospheric dispersion, and the application of established emissions management, monitoring, and reporting controls, cumulative atmospheric emissions are not expected to result in a substantial reduction in air quality or adversely affect seabed quality, biodiversity, ecological integrity, social amenity, cultural values, or human health.

7.4.7 Impact Assessment

An impact assessment for atmospheric emissions is presented in Table 7.13.

Table 7.13: Impact assessment from atmospheric emissions

ALARP decision context	
Impact decision framework context	Type A.
Activity	Nothing new or unusual, represents business as usual, well understood activity, good practice is well defined.
Level of certainty of impacts	Risks are well understood, uncertainty is minimal.
Stakeholder influence	No conflict with company values, no partner interest, no significant media interest.

Impact Consequence (inherent)	
Operations	Minor (1)
CoP	Minor (1)
Preservation	Minor (1)

Assessment of Proposed Control Measures		
Control	**Cost/benefit analysis**	**Implemented?**
Maintain combustion equipment on the platform. *(All phases)* *(Commonwealth waters)*	This control ensures the efficient operation of combustion equipment, which avoids the excess combustion of fuel (gas and diesel), thereby minimising excess emissions to air. Undertaking equipment maintenance is routine practice for offshore operations. The costs associated with routine inspection and maintenance are not grossly disproportionate to the environmental benefit achieved through improving combustion efficiency and reducing unnecessary emissions.	Yes **(IMP04-CM01)**
Monitor and report on fuel use, flaring and venting. *(Operations phase)* *(Commonwealth waters)*	Regular monitoring enables timely identification of unexpected fuel gas use. Fuel gas usage in equipment such as compressors is generally consistent. Fuel gas usage is reported on a monthly basis as part of the mandatory production allocation process. The cost of monitoring and reporting is low relative to the environmental benefit achieved through identifying unexpected emissions and supporting ongoing emissions management and reduction initiatives.	Yes **(IMP04-CM02, -CM03)**
Maintain flare auto-ignition, flame-out monitoring and back-up purge protection systems. *(Operations phase)* *(Commonwealth waters)*	These systems are standard flare management controls and can be readily implemented through existing operational and maintenance programs. The associated costs are not grossly disproportionate to the environmental benefit achieved through reducing cold venting and associated emissions.	Yes **(IMP04-CM02)**
Undertake continuous monitoring of flaring volumes to identify trends. *(Operations phase)*	Monitoring flaring trends enables the early detection of anomalies, allowing Beach to find solutions to minimise flaring where practicable. Flare volumes are reported on a monthly basis as part of the mandatory production allocation process. The costs associated with monitoring are not grossly	Yes **(IMP04-CM03)**

(Commonwealth waters)	disproportionate to the environmental benefit achieved through identifying opportunities to minimise flaring and improve operational performance.	
Maintain a minimum pilot light flow rate to ensure continuous flare ignition. *(Operations phase)* *(Commonwealth waters)*	The maintenance of a minimum pilot light flow rate is a standard operational control and incurs minimal additional cost. The cost is not grossly disproportionate to the environmental benefit achieved through ensuring efficient combustion and reducing venting and air emissions.	Yes **(IMP04-CM04)**
Use low sulphur marine diesel fuel (<0.5% m/m) in all combustion equipment. *(All phases)* *(Commonwealth & Victorian state waters)*	The use of low sulphur marine diesel fuel is standard industry practice and a MARPOL requirement. Any additional fuel cost is not grossly disproportionate to the environmental benefit achieved through reducing sulphur oxide emissions.	Yes **(IMP04-CM05)**
Do not incinerate waste on the platform. *(All phases)* *(Commonwealth waters)*	Backloading waste for onshore disposal can be readily achieved using existing supply vessel logistics. The associated costs are not grossly disproportionate to the environmental benefit achieved through avoiding atmospheric pollutant emissions from waste incineration.	Yes **(IMP04-CM06)**
Adopt a Scope 1 and 2 equity emissions intensity reduction target of 35% by 2030 (from a 2018 base year) across the Beach portfolio. *(All phases)* *(Commonwealth waters)*	The implementation of portfolio-wide emissions reduction initiatives is considered feasible and ensures Beach operates consistent with the objectives in the *Climate Change Act 2022*. The associated investment is not considered grossly disproportionate to the environmental benefit achieved through reducing greenhouse gas emissions across Beach's operations.	Yes **(IMP04-CM07)**
Use renewable energy to power the platform during the CoP phase of operations. *(Preservation phase)* *(Commonwealth waters)*	The use of renewable energy during the CoP phase reduces reliance on diesel-powered generation and associated emissions. The costs associated with implementation are not grossly disproportionate to the environmental benefit achieved through reducing air emissions and greenhouse gas emissions.	Yes **(IMP04-CM08)**
Implement a GHG Management Plan. *(All phases)* *(Commonwealth & Victorian State waters)*	Implementation of a GHG Management Plan can be achieved through existing governance and management systems. The associated costs are not grossly disproportionate to the environmental benefit achieved through identifying, managing and reducing emissions across the activity and ensures that Beach operates consistent with the *NGER Act 2007*.	Yes **(IMP04-CM09)**
Report GHG emissions in line with NGER requirements. *(All phases)* *(Commonwealth & Victorian State waters)*	Beach has an ambition to meet net zero Scope 1 and 2 emissions by 2050, with a Scope 1 and 2 equity emissions intensity reduction target of 35% by 2030 (from a 2018 base year) across its portfolio. Monitoring of emissions is a key part of understanding whether this ambition can be met. Operated emissions are reported annually to the CER according to the requirements of the *NGER Act 2007*.	Yes **(IMP04-CM10)**

	Equity emissions intensity is reported annually in the Sustainability Report according to the requirements of AASB S2. The costs associated with emissions reporting are not grossly disproportionate to the environmental benefit achieved through improved understanding, management and transparency of emissions performance.	
Report pollutants from emissions (other than GHG emissions) in line with NPI requirements. *(All phases)* *(Commonwealth & Victorian State waters)*	Emissions are estimated and reported in accordance with the *National Environment Protection (National Pollutant Inventory) Measure 1998* (NPI NEPM), as implemented through applicable state legislation. Reporting of emissions is important for transparency and understanding key emissions sources so they can be managed appropriately. The costs associated with reporting are not grossly disproportionate to the environmental benefit achieved through improved emissions management.	Yes **(IMP04-CM13)**
Undertake fugitive leak surveys. *(Operations phase)* *(Commonwealth & Victorian State waters)*	LDAR surveys are feasible and are undertaken at Yolla-A to enable reporting of fugitive emissions related to natural gas production to be reported according to Method 3 under section 3.73H of the NGER Measurement Determination. Surveys are generally annual to ensure compliance, but the NGER Measurement Determination includes provisions for when surveys are not possible, (e.g. unable to attend site due to inclement weather). Fugitive leak surveys are established industry practice and can be readily undertaken during routine operations. The costs associated with conducting surveys are not grossly disproportionate to the environmental benefit achieved through identifying and reducing fugitive emissions.	Yes **(IMP04-CM11)**
Fugitive leak repairs are undertaken after detection. *(Operations phase)* *(Commonwealth & Victorian State waters)*	Leaks detected by the annual fugitive leak survey are raised as a CMMS maintenance work order for rectification. Rectification of identified leaks can be incorporated into existing maintenance programs, and repairing fugitive leaks reduces overall emissions. The costs associated with repairs are not grossly disproportionate to the environmental benefit achieved through reducing emissions and maintaining equipment integrity.	Yes **(IMP04-CM12)**
Eliminate platform flaring and venting *(Operations phase)* *(Commonwealth waters)*	Eliminates air emissions. Flaring/venting is required for operability and safety requirements. Flaring and venting durations are provided in Section 3.5.10. No reasonably practicable alternative methods for reduction or mitigation of vented or fugitive emissions have been identified (flare gas recovery system has been assessed – see below) that would further reduce the impacts. Given the critical safety function of these systems and the absence of reasonably practicable alternatives that would achieve a meaningful reduction in	No

	emissions, the operational and safety consequences of eliminating flaring and venting would be grossly disproportionate to the environmental benefit gained.	
Flare gas recovery system *(Operations phase)* *(Commonwealth waters)*	A flare gas recovery system (FGRS) recovers gas normally directed to the flare system. The existing flare system primarily serves a safety function and is used intermittently during process upsets, maintenance and emergency depressurisation events. Installation of flare gas recovery infrastructure would require significant modifications to the platform, including compressors, piping, control systems and associated power generation upgrades. Given the relatively low flare volumes, mature asset status and limited remaining field life, the significant capital expenditure, infrastructure modifications and ongoing operational complexity associated with installation are considered grossly disproportionate to the minor reduction in emissions that would be achieved.	No
Implement carbon capture and storage technology. *(All phases)* *(Commonwealth waters)*	Reduces GHG emissions. Carbon capture and storage (CCS) was assessed by Beach as a potential emissions reduction opportunity. The assessment concluded that the technology would require very high capital expenditure and major modifications to existing infrastructure. Given the mature stage of the asset, limited remaining operational life and substantial capital and operational requirements, the costs associated with implementing CCS are considered grossly disproportionate to the emissions reduction benefit that could reasonably be achieved during the remaining life of the facility. Accordingly, CCS is not considered a reasonably practicable control measure.	No

Environmental Controls and Performance Measurement			
EPO	**Control measure**	**EPS**	**Measurement criteria**
IMP04-EPO01 Emissions to atmosphere from fuel combustion are minimised through efficient equipment use.	**Platform (Commonwealth waters)**		
	IMP04-CM01 Combustion equipment on the platform is maintained through the Beach Energy PMS to ensure it operates efficiently. *(All phases)*	**IMP04-EPS01** Air emissions are managed in line with the requirements of the *Protection of the Sea (Prevention of Pollution by Ships) Act 1983* (Cth).	**IMP04-MC01** Maintenance work orders verify that combustion and associated monitoring and protection equipment and systems are inspected and maintained to schedule.
	IMP04-CM02 Flare auto-ignition, flame-out monitoring and back-up purge protection systems are maintained in accordance with the PMS to minimise cold venting.	**IMP04-EPS02** Flare auto-ignition, flame-out monitoring and back-up purge protection systems are installed, functional and	**IMP04-MC02** Maintenance work orders verify flare systems are maintained.

	(Operations phase)	maintained in accordance with the PMS throughout operations.	
	IMP04-CM03 Flaring volumes are monitored so that abnormalities are rapidly detected and addressed. There will be no flaring during the preservation phase. *(Operations phase)*	**IMP04-EPS03** Flaring volumes are continuously monitored during operations, abnormal flaring events are investigated and corrective actions implemented, and no planned flaring occurs during the preservation phase.	**IMP04-MC03** Monthly technical reports verify flare volumes are continuously recorded.
	IMP04-CM04 A minimum pilot light flow rate is maintained to ensure continuous flare ignition. There will be no flaring during the preservation phase. *(Operations phase)*	**IMP04-EPS04** The flare pilot light is maintained at or above the minimum operational flow rate required for continuous ignition whenever the flare is in service.	**IMP04-MC04** Monthly technical reports verify the pilot light remains lit.
	IMP04-CM05 Only low-sulphur (<0.5% m/m) marine diesel fuel is used for the crane and diesel generator. *(All phases)*	**IMP04-EPS05** Marine diesel fuel used by the crane and diesel generator has a sulphur content of less than 0.5% m/m.	**IMP04-MC05** Bunker receipts verify the use of low-sulphur diesel.
	IMP04-CM06 Waste is not incinerated. *(All phases)*	**IMP04-EPS06** No waste is incinerated offshore and all wastes are managed in accordance with the approved waste management process.	**IMP04-MC06** The Garbage Record Book verifies that all waste is backloaded to support vessels for onshore disposal.
IMP04-EPO02 GHG emissions from BassGas operations are managed to support Beach's equity emissions reduction target.	**IMP04-CM07** Beach, as described in its Sustainability Report, has: • A net zero Scope 1 and 2 emissions ambition by 2050. • A Scope 1 and 2 equity emissions intensity reduction target of 35% by 2030 (from a 2018 base year) across its portfolio. *(All phases)*	**IMP04-EPS07** Beach's 2030 target is consistent with the objectives in the *Climate Change Act 2022*.	**IMP04-MC07** The Sustainability Report reports on GHG measures and achievements and is publicly available on the Beach website.
	IMP04-CM08 Energy pods generating renewable power are used during the	**IMP04-EPS08** Renewable energy pod(s) are installed,	**IMP04-MC08.1** Renewable energy pod is installed and operational

preservation phase to power essential platform functions, such as navigation lighting and maintaining communications to LLGP. *(Preservation phase)*	operational and provide power to essential platform functions (including navigation lighting and communications) during the preservation phase, with diesel-powered generation limited to crane operations and contingency/back-up power requirements.	to support essential functions during preservation phase. **IMP04-MC08.2** PMS records verify diesel power generation is limited to crane use or backup power.
IMP04-CM09 Beach implements a GHG Management Plan that details the following: • Methodology for reporting GHG emissions from all Beach-operated facilities, including the BassGas activities. • Approach to setting and achieving emissions reduction targets, including the approach to abatement and offsetting as appropriate. • Approach to governance and assurance requirements. *(All phases)*	**IMP04-EPS09** *NGER Act 2007* reporting requirements are met.	**IMP04-MC09.1** Annual effectiveness review of the GHG Management Plan verifies regular review takes place. **IMP04-MC09.2** Annual review of NGER Basis of Preparation document for LLGP and Yolla (the RGP is within the NGER facility boundary for LLGP).
IMP04-CM10 Emissions from Yolla-A, including flaring, are reported to the Clean Energy Regulator according to the requirements of the *NGER Act 2007* on an annual basis. *(All phases)*	**IMP04-EPS10** GHG emissions from Yolla-A, including flaring emissions, are accurately calculated and reported to the CER within required statutory timeframes and in accordance with the requirements of the *NGER Act 2007*.	**IMP04-MC10.1** NGER reports are submitted to the CER on time. **IMP04-MC10.2** NGER reports audited by a qualified third party according to *NGER (Audit) Determination 2009* prior to submission to the CER.
IMP04-CM11 Annual surveys for fugitive emissions on the platform are undertaken for to meet NGER reporting requirements. *(Operations phase)*	**IMP04-EPS011** The requirements of Method 3 under Section 3.73H of the NGER Measurement Determination are met.	**IMP04-MC11** Annual NGER reports verify that fugitive emission surveys were undertaken.

	IMP04-CM12 Where fugitive leaks are identified during the annual survey and able to be repaired, they are lodged as a work order in PMS. *(Operations phase)*	**IMP04-EPS12** The leak detection, quantification and repair approach remains effective, fit-for-purpose, and aligned with current operational conditions and best-practice methodologies.	**IMP04-MC12** PMS records verify fugitive leak repairs are lodged and completed.
IMP04-EPO03 Beach reports air pollutants in line with NPI requirements.	**IMP04-CM13** Beach calculates non-GHG air pollutants and reports these annually to DCCEEW. *(Operations and preservation phases)*	**IMP04-EPS13** The calculation and reporting requirements of the National Environment Protection (National Pollutant Inventory) Measure 1998 are met.	**IMP04-MC13** Annual NPI reports verify that pollutants to air are calculated and reported.
IMP04-EPO04 Fuel-combusting equipment operates in accordance with MARPOL Annex VI (Prevention of Air Pollution from Ships).	**Vessels (Commonwealth and Victorian state waters)**		
	IMP04-CM14 The Beach Marine Assurance System is implemented, which ensures that vessels meet relevant maritime laws regarding air emissions, including but not limited to compliance with: • Marine Orders Part 97 (Marine Pollution Prevention – Air Pollution (appropriate to vessel class) for emissions from combustion of fuel, which includes: • Currency of a valid International Air Pollution Prevention (IAPP) certificate and an International Energy Efficiency certificate. • A Ship Energy Efficiency Management Plan to reduce emissions. • Use of low-sulphur (<0.5% m/m) marine diesel fuel. *(All phases)*	**IMP04-EPS14** Combustion equipment meets the requirement of MARPOL Annex VI.	**IMP04-MC14** Marine Assurance System records verify that contracted vessels meet certification requirements.

Impact Consequence (residual)	
Operations	Minor (1)
CoP	Minor (1)
Preservation	Minor (1)
ALARP Decision Justification	

With the controls outlined in this table in place, the impact consequence has been assessed as Minor (1) and is considered to be good practice (Decision Context A). This means any additional or alternative control measures do not lower the residual consequence further or would be grossly disproportionate to the residual consequence. Therefore, a Minor (1) residual impact consequence is considered to be ALARP.

Acceptability Assessment		
Defined acceptable level	Atmospheric emissions are assessed as having a Minor (1) consequence, which is not considered as having the potential to result in serious or irreversible environmental damage.	
Internal context	The management of the impact is aligned with the Beach Environment Policy. Activities are undertaken in accordance with the Implementation Strategy (Section 8).	
External context	The BassGas Offshore Operations SEP is implemented to ensure that stakeholders are aware of operations issues. Stakeholders have not raised concerns about atmospheric emissions.	
Legislative context	Atmospheric emissions are managed in accordance with the applicable legislative requirements such as the: • *Navigation Act* 2012 (Cth): ○ Chapter 4 (Prevention of Pollution). ○ AMSA Marine Order Part 79 (Marine pollution prevention – air pollution). • *Protection of the Sea (Prevention of Pollution by Ships) Act 1983* (Cth): ○ Part IIID (Prevention of Air Pollution). ○ AMSA Marine Orders Part 97 (Air Pollution), enacting MARPOL Annex VI (especially Regulations 6, 14, 16). • *National Greenhouse and Energy Reporting Act* 2007 (Cth). • *Climate Change Act 2022* (Cth). • National Environment Protection (National Pollutant Inventory) Measure 1998 (NPI NEPM).	
Industry practice	The consideration and alignment of controls with the below-listed guidelines and codes of practice demonstrates that BPEM will be implemented for this activity.	
	Environmental management in the upstream oil and gas industry (IOGP-IPIECA, 2020)	The control measures listed in this table meet the relevant mitigation measures listed for offshore activities with regard to: • Combustion emissions – regular plant maintenance (**IMP04-CM01**). • Combustion emissions – selection of low sulphur fuel and undertaking regular equipment maintenance (**IMP04-CM05**). • Combustion emissions – integration of renewable energy sources into developments (**IMP04-CM08**). • Fugitive emissions – implementation of effective and regular leak detection and repair programs (**IMP04-CM11**). • Venting – preferentially flare rather than vent (**IMP04-CM02**). • Flaring – minimise risk of pilot blowout by ensuring sufficient exit velocity and providing wind guards (**IMP04-CM04**).

	Best Available Techniques Guidance Document on Upstream Hydrocarbon Exploration and Production (European Commission, 2019)	The control measures listed in this table meet these guidelines for offshore activities with regard to: • Flaring and venting (item 21). The BAT are met for Yolla-A operations (**IMP04-CM01 to CM04**). • Management of fugitive emissions (item 22). The BAT are met for Yolla-A operations (**IMP04-CM11**).
	Environmental, Health and Safety Guidelines for Offshore Oil and Gas Development (World Bank Group, 2015)	Guidelines met with regard to: • Air emissions (item 11). The overall objective to reduce air emissions (**IMP04-all CMs**). • Air emissions (item 12). During equipment selection, air emission specifications should be considered, as should the use of very low sulphur content fuels and/or natural gas (**IMP04-CM05**).
	Code of Environmental Practice (APPEA, 2008)	The EPS listed in this table meet the following offshore development and production objectives: • To reduce the impact of air emissions to ALARP and an acceptable level. • To reduce GHG emissions to ALARP and an acceptable level.
	Atmospheric emissions-specific guidance	
	Guidance on Upstream Flaring and Venting; Policy and regulation (Global Gas Flaring Reduction Partnership, 2009)	This guideline is directed at regulators, but Beach complies with the key issues to be regulated, which are focussed on monitoring and reporting of emissions.
Environmental context	MNES	
	AMPs	No intersection or impacts.
	Ramsar wetlands	No intersection or impacts.
	NIWs	No intersection or impacts.
	TECs	No intersection or impacts.
	Nationally threatened and migratory species	This hazard does not have any impacts on threatened or migratory species.
	Other matters	
	State marine parks	This hazard does not intersect any state marine parks.
	Species Conservation Advice/Recovery Plans/Threat Abatement Plans	There are several seabird, fish and cetacean conservation plans that identify climate change as a threat to the relevant marine environment, as outlined in the impact evaluation. Atmospheric emissions, including GHG, will be managed in in a manner that is not inconsistent with these conservation plans.
ESD principles	The EIA presented throughout this EP demonstrates that ESD principles (a), (b), (c) and (d) are met (noting that principle (e) is not relevant).	

Environmental Monitoring
Stakeholder consultation will be ongoing, as detailed in Section 4.

Record Keeping	
Platform & RGP	Vessels
• Maintenance work orders. • Monthly technical reports. • Garbage record book. • Annual Sustainability Reports, prepared in compliance with AASB S2. • PMS records. • Annual effectiveness review of GHG Management Plan. • NGER Basis of Preparation for LLGP and Yolla, which identifies data sources and emissions calculation methods. • Annual NGER reports as submitted to the CER. • Annual assurance reports from qualified third-party auditors regarding NGER reports. • Annual NPI reports. • Fuel bunkering volumes. • Annual data sets as required to produce compliant NGER reports, which include GHG emission calculations. • Maintaining GHG emissions forecasts for annual reporting, tracking of performance against reduction targets, and evaluation of emission reduction strategies. • Engineering technical reports (for flare volumes).	• Vessel bunkering receipts. • Marine assurance system records.

7.5 IMPACT 5: Routine Emissions - Noise and Vibration

7.5.1 Source of Aspect

Noise and vibration are generated by the activities associated with the operation of BassGas infrastructure and vessels as described in this section.

This aspect is relevant to the operations, CoP and preservation phases, as noise and vibration are generated by the continued presence and operation of offshore infrastructure, vessel movement, helicopter transfers, power generation equipment and monitoring activities. The nature and frequency of noise-generating activities vary between phases. During operations, noise and vibration are associated with production activities, routine vessel visits and regular helicopter transfers. During CoP, additional activities associated with well shut-in, depressurisation and preservation of infrastructure may also generate noise and vibration. During preservation, the platform and RGP remain in place, with ongoing power generation, remote monitoring, periodic vessel visits and occasional helicopter transfers continuing to contribute to noise and vibration emissions. In the last five years, there have been no recorded incidents related to noise and vibration.

As outlined in Table 20 (Section 3.11), activities undertaken during the operations, CoP and preservation phases involve the continued presence and operation of offshore infrastructure, support vessel movements and helicopter transfers. Accordingly, this aspect is relevant to all phases, as summarised below:

Hazard	Source	Operations	CoP	Preservation
Platform	General production equipment	✓	✓	✓
	Flaring	✓	×	×
	Wireline activities	✓	✓	×
RGP	High-gas flow	✓	✓	×
Support vessels	Engine noise	✓	✓	✓
	DP	✓	✓	✓
IMR	Geophysical activities - SBP	✓	×	×
	ROV inspection	✓	✓	✓
	Abrasive blasting	✓	✓	×
Helicopters	Operations	✓	✓	✓

7.5.1.1 Airborne noise and vibration

- General production equipment, including power generation (required 24 hours per day), crane use, and unusual equipment operation on the platform.
- Flaring (non-routine).
- Helicopter operation (within the PSZ). During normal operations there are approximately three return flights per week to and from Yolla-A.

7.5.1.2 Underwater noise and vibration

- High gas flow through the RGP.
- Wireline activities.
- IMR activities.
    - Geophysical activities (primarily SBP), to locate buried portions of the RGP.
    - ROV inspections of the raw gas pipeline.
    - Abrasive blasting to remove paint and marine growth from the platform structure or RGP.
- Vessel operations within the Operational Area during IMR activities (engine noise transmitted through hull, DP thrusters and/or propellers).
- Helicopter operation (within the PSZ).

Additional details about these activities is presented here, and for each activity, consideration is given to the 2024 Updated Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing by the U.S. National Marine Fisheries Service (NMFS, 2024), in line with

NOPSEMA's advice regarding assessment of underwater sound impacts and risks under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations (NOPSEMA 2024). The updated guidance provides thresholds for the onset of auditory injury, including Permanent Threshold Shift (PTS) and Temporary Threshold Shift (TTS) for marine mammals, using the best available scientific data. The guidance considers low-frequency cetaceans (baleen whales), high-frequency cetaceans (dolphins, toothed whales, beaked whales, bottlenose whales) and very high-frequency cetaceans (sperm whales). In addition, criteria are provided for phocid pinnipeds (true seals) and otariid pinnipeds (sea lions and fur-seals), the latter being most relevant to the Yolla-A operations, given Australian and New Zealand fur-seals are observed to congregate on and around the platform infrastructure.

Further, to support the EP update, JASCO Applied Sciences (JASCO) was engaged by Beach Energy to update the modelling scenarios used in a previously completed underwater sound study for the Yolla platform, which included associated support vessel operations (**Appendix 7**). The revisions accounted for recent changes in noise effect criteria as well as modelling scenario assumptions to better reflect changes in the operational context. Specifically, as Beach Energy has altered its contractual arrangements for vessel supply services to Yolla platform, the modelling conservatively incorporated the parameters for the largest vessel that may reasonably be expected to be used to provide support services for the platform.

In summary, the revisions to the modelling were:

- The platform's sound source profile was updated using measurements made of a similar platform in the local region. Previously, the platform was represented by an assumed underwater noise level based on a jack-up rig.
- To incorporate the sound source profile of both the SEA1-operated Anchor Handling Tug Supply (AHTS) vessel and a generic offshore vessel (OSV).
- Reprocessing of all scenarios using the recently revised NMFS 2024/Accomando 2025 noise effect criteria.

7.5.1.3 Platform activities

Airborne noise

General production machinery and equipment can generate airborne noise in the vicinity of the source. However, the Yolla Platform operates at a relatively stable level of activity, generating mostly continuous mechanical and operational sounds rather than intense, impulsive noise events. Further, airborne noise dissipates rapidly over open water, with wind, wave action, and atmospheric conditions further masking platform sounds well before they reach coastal or offshore island habitats. As such, the potential for marine animals to be exposed to airborne noise is minimal, given that there are no haul-out structures for fur seals to utilise on the platform and other marine animals typically remain submerged. In addition, most seabird species in the region, such as shearwaters, petrels, and gannets, spend the majority of their time in flight or on the sea surface, where ambient environmental noise is already high and predominated by wind and wave energy. Underwater noise from normal production operations, such as pump or generator activity, is largely confined to low frequencies and low sound pressure levels that attenuate quickly with distance, reducing the potential for significant disturbance or physiological effects. Additionally, there is no

evidence of large seabird colonies, rookeries, or critical breeding habitats in close proximity to Yolla-A that could experience chronic disturbance or displacement.

Underwater noise

Structure-borne underwater noise (i.e., vibration from machinery passing through the legs into the water column) is the dominant pathway for sound generation for fixed platforms (Spence et al. 2007, as cited in JASCO Applied Sciences (2025)). The frequency and level of noise received underwater from the topsides equipment depends on a range of factors, including the type of equipment, the size of engines and the local hydroacoustic and geoacoustic environment (Erbe, 2011). However, as reported by JASCO Applied Sciences (2025), underwater noise produced from platforms standing on metal jack-up legs is relatively low because the machinery sits above the waterline and there is a relatively small surface area available for sound transmission. As such, the effects of underwater noise generated by equipment on Yolla-A is expected to be low because the equipment is located above sea level.

An estimate of underwater noise from a platform's machinery has been drawn from a study by McCauley (1998) of noise from a drilling rig when it is working but not drilling, with the rig tender at anchor. The comparison is considered conservative, thus overestimating the sound being produced from a platform. The highest level encountered by McCauley (1998) was recorded as 117 dB re 1 µPa at 125 m. This noise was audible up to 1 to 2 km away.

The NMFS (2024) thresholds suggest non-impulsive underwater noise levels (such as those generated from platform machinery) of 117 dB are unlikely to result in an exceedance of PTS, TTS or behavioural (harassment) thresholds for any of the marine mammal hearing groups.

Further, these lower-level sounds are typically below thresholds known to cause physiological harm or significant behavioural disruption in most fish species. As a result, the likelihood of auditory damage, stress responses, or avoidance behaviour is likely to be minimal. Furthermore, the continuous nature of this noise allows many fish species to habituate over time, reducing potential impacts.

In addition, studies show that while some diving seabirds have underwater hearing abilities comparable to certain marine mammals in mid-frequency ranges (around 1-4 kHz), their overall sensitivity underwater is lower and more specialised than that of marine mammals or fish. Diving birds will also typically have short underwater exposure times during their foraging dives, usually lasting between 20 to 40 seconds on average. These short dive times limit the period during which diving birds may be exposed to underwater noise, reducing the potential for prolonged disturbance or physiological impacts.

7.5.1.4 Gas flow through the offshore RGP

Sound from the flow of gas through the offshore RGP is expected to be negligible. A study conducted by Glaholt et al (2011) found that sound measurements made over a 25.4 cm (10") diameter subsea high-pressure gas pipeline suggest that the pipeline was not producing any clearly resolvable noise. Methods for assessment of operational noise generated from the pipeline included a combination of field measurements, laboratory investigation and pipeline component analysis.

Given that the underwater noise produced by the gas flow through the pipeline is expected to be below the noise levels of the ambient soundscape, the potential for impacts is likely to be negligible.

7.5.1.5 Wireline activities

Reservoir management wireline work on the wells is carried out on an as-required basis and is likely to occur once per well during the life of this EP (5 years). A specialist wireline crew typically includes 6-8 personnel (24-hour operations) who visit the platform to set up and execute the intervention activities, taking approximately 4-5 days per well. The wireline activities for reservoir management will not include Vertical Seismic Profiling (VSP). As such, the wireline operations are generally considered lower risk for underwater noise impacts compared to other offshore activities such as pile driving, seismic surveys, or heavy vessel operations. The primary underwater noise sources during wireline activities are from support vessels rather than the wireline operation itself, as the wireline tools and cable deployment produce minimal acoustic energy in the water. Underwater noise associated with vessel use is discussed elsewhere.

7.5.1.6 Geophysical surveys

Single-beam echo sounders (SBES), multi-beam echo sounders (MBES), side scan sonar (SSS), and sub-bottom profiling are commonly used geophysical survey tools in Bass Strait, and in other offshore areas around Australia. Compared to seismic airgun surveys, these systems are generally considered to pose a low risk to cetaceans (which are considered the most sensitive group to underwater noise), as these acoustic systems generally emit sound at lower source levels and/or higher frequencies than seismic airguns (CMST, 2016). Cetaceans, particularly baleen whales, are most sensitive to low-frequency, high-intensity sounds produced by seismic airguns, not the higher-frequency, lower-intensity pulses associated with these surveys. Comparisons between the underwater noise potentially generated by each type of geophysical survey to the threshold levels provided by NMFS (2024) support this. Notwithstanding, to minimise interactions with cetaceans, all geophysical surveys for the activity are undertaken in consideration of the EPBC Act Policy Statement 2.1 (2008), which sets out procedures for managing interactions with whales.

Additional information regarding the frequency ranges associated with different geophysical surveys is outlined herein.

Single-beam echo sounder

A SBES typically has a frequency range between 120 and 710 kHz and a maximum sounding rate of 20 Hz. The beam width varies between 10º (120 kHz) and 2.8º (710 kHz). The single beam bathymetry received sound exposure level typically does not exceed 160 dB.

Multi-beam echo sounder

The frequency range of the MBES is typically 200–500 kHz (classified as high frequency) with a maximum angular coverage of 160º. The maximum source levels are about 236–242 dB re 1 µPa @ 1 m for the 1° and 2° beams (DoC, 2016).

Side scan sonar

A SSS typically operates in the 100–500 kHz frequency range (classified as high frequency). The maximum source levels are about 210-220 dB re 1µPa @ 1 m (DoC, 2016). The SSS towfish is

typically towed 10–15 m above the seabed (depending on water depth and the exact frequency) at a distance of about 150- 200 m behind the vessel.

Sub-bottom profiler

Acoustic emissions from SBPs are typically in the frequency range of 0.05 to 12 kHz, with peak sound pressure level (SPL) of up to 220 dB re 1µPa @ 1 m. There are three different types of SBP, which exhibit a trade-off of in resolution versus depth of penetration based on the frequency of the acoustic signal:

1. CHIRP – uses an FM signal across a full range of frequencies, typically either 2-16 kHz or 4-24 kHz (low to high frequency). The maximum source levels of a CHIRP are about 200– 205 dB re 1 µPa @ 1 m (DoC, 2016).

2. High-frequency boomers – the typical frequency spectrum of boomer systems ranges between 0.2 and 10 kHz, with an effective bandwidth of 1 to 10 kHz (low to high frequency). The sound source level can vary from 100 to 220 dB re 1 µPa @ 1 m.

3. Medium-frequency sparkers – the generated frequencies are generally between 50 Hz (0.05 kHz) and 4 kHz (low to high frequency). The sound source level is typically between 215 and 225 dB re 1 µPa @ 1 m.

7.5.1.7 Vessel sound

Since the previous EP update, Beach has amended its support vessel contractual arrangements meaning that in addition to utilising regular OSV, there is a possibility of using larger 'vessels of opportunity' to support Bass Gas operations. It is considered that it is most likely that the smaller OSVs will be utilised for the majority of support and IMR activities for the BassGas Operations. However, Beach has requested that the update to the acoustic modelling consider the use of regular OSV and the larger AHTS vessels.

As reported in JASCO (2025), the largest vessel assumed to be providing such support services was a vessel analogous to the SEA1 Sapphire (previously Siem Sapphire), an AHTS. JASCO (2025) outlined that this vessel features two bow tunnel thrusters rated at 1,000 kW each and two stern tunnel thrusters rated at 880 kW each. These tunnel thrusters are unlikely to be used in normal operations; however, they could potentially be engaged if the tug must hold station in heavy weather or for safety reasons. While performing resupply duties, the vessel will use Dynamic Positioning (DP). This vessel is assumed to be louder than the previously modelled a smaller/quieter OSV.

The sound levels and frequency characteristics of underwater sound produced by vessels are related to vessel size and speed. When idle or moving at slow speed (i.e., within the Yolla-A PSZ or alongside the pipeline), vessels generally emit low-level noise. The typical sound levels generated by vessels are:

- Tugboats, crew boats, supply ships and many research vessels in the 50-100 m size class – 165-180 dB re 1µPa range (Gotz et al., 2009).

- Vessels up to 20 m size class – 151-156 dB re 1µPa (Richardson et al., 1995).

- Trawlers – peak at around 175 dB re 1µPa (Gotz et al., 2009).

- Large ships – levels exceeding 190 dB re 1µPa (Gotz et al., 2009).

Noise from vessels acts to increase the sound in the water column above ambient noise levels. For example, noise emissions from idling vessels are low. However, noise from thrusters and strong thrusts from the main engines on vessels operating under the control of DP systems produces more significant vessel noise. Vessel noise from large DP vessels is described as being a low-frequency broadband sound, with some tonal components ranging from 30Hz to 3kHz, with sound pressure levels reported between 180 to 197 dB re 1µPa at 1m (Talisman Energy, 2006; Wyatt, 2008; and Xodus, 2014, as cited in NorthConnect KS 2017). The predicted underwater sounds produced by a range of vessels exceed the 120 dB re 1 µPa NFMS (2024) Level B harassment acoustic threshold for continuous, non-impulsive underwater noise. Based on this information, underwater noise from vessels using DP may be detectable to marine animals, depending on their proximity to the source. Cetaceans and pinnipeds are likely to be most susceptible to vessel noise exposure, followed by fish to a lesser extent, with seabirds and benthic invertebrates generally at low risk from underwater noise generated by vessels in typical operational scenarios. Therefore, the evaluation of environmental impacts in Section 7.5.4 has been updated, and considers the potential effects associated with noise and vibration generated by vessels. Refer to sections 3.10.6 and 3.10.7 for further detail on the proposed activity campaigns at the platform and along the RGP.

7.5.1.8 Helicopter sound

Sound emitted from helicopter operations is typically below 500 Hz (Richardson et al., 1985). Sound travelling from a source in the air (e.g., 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. The received sound level underwater depends on the altitude of the sound source and lateral distance from the receiver, receiver depth, water depth, and other variables.

The angle at which the line from the aircraft and receiver intersects the water surface is important. In calm conditions, at angles above 13° from the vertical much of the sound is reflected and does not penetrate into the water (Richardson et al., 1995; NRC, 2003). Therefore, strong underwater sounds are detectable for a period roughly corresponding to the time the helicopter is within a 26º cone above the receiver. This ‘zone of ensonification’ can be enlarged in rough seas and can also be enlarged in shallow waters (Richardson et al., 1995).

Most air traffic supporting offshore installations involves turbine helicopters flying along straight lines. Usually, a helicopter can be heard in air well before and after the brief period it passes overhead and is heard underwater. Sound pressure in the water directly below a helicopter is greatest at the surface and diminishes with increasing receiver depth. The peak received level diminishes with increasing helicopter altitude, but the duration of audibility often increases with increasing altitude. Richardson et al (1995) report figures for a Bell 214 helicopter (considered to be one of the loudest) being audible in air for four minutes before it passed over underwater hydrophones but detectable underwater for only 38 seconds at 3 m depth and 11 seconds at 18 m depth. Known and Potential Environmental Impacts

The following section contains receptors and sensitivities that are known or have potential to be impacted by noise and vibration. Conservation values and sensitivities and socio-economic receptors that do not have potential to be impacted by underwater noise and vibration have not been included in this assessment.

As outlined in Section 7.5.1, platform activities, gas flow through the offshore RGP, wireline activities, geophysical surveys and helicopter sound are all considered to pose a low risk to marine receptors. Vessel sound is considered to pose a potential risk to marine receptors (specifically, cetaceans, pinnipeds and fish) and is therefore considered further.

The impacts and risks resulting from underwater sound are generally well understood with regard to potential mortality and/or physiological injury for species in the water column. However, uncertainty lies in understanding the spatial and temporal extents of behavioural disturbances and the potential effects on populations and requires the application of context-specific information. The potential impacts on marine fauna from elevated levels of underwater sound are:

- Physical injury to auditory tissues or other air-filled organs.
- Hearing impairment
    - TTS – the temporary loss of hearing sensitivity caused by excessive noise exposure, in which the animal recovers.
    - PTS – a permanent loss of hearing sensitivity caused by excessive noise exposure, considered an auditory injury, from which the animal does not recover.
- Direct behavioural effects through disturbance or displacement, and consequent disruption of natural behaviours or processes (e.g., migration, resting, calving or spawning).
- Indirect behavioural effects by impairing/masking the ability to navigate, find food or communicate, or by affecting the distribution or abundance of prey species.

The noise modelling report evaluated underwater noise impacts focusing on two types of vessels conducting resupply operations under DP for either 4 or 8 hours. Four scenarios were modelled:

- Scenario 1: Yolla Platform + AHTS vessel under DP for 4 hours.
- Scenario 2: Yolla Platform + AHTS under DP for 8 hours.
- Scenario 3: Yolla Platform + Generic OSV under DP for 4 hours.
- Scenario 4: Yolla Platform + Generic OSV under DP for 8 hours.

Modelled resupply scenarios 1, 2, 3 & 4 are also appropriate proxies forIMR activities based on similar water depths, sound sources and seabed characteristics.

Table 7.14 details the criteria and furthest modelled distances to them for each scenario.

Table 7.14: Marine mammal Auditory injury (PTS), TTS and behaviour sound exposure criteria and predicted furthest distances for each modelling scenario.

Sound exposure criteria		Scenario 1: Platform Operations + AHTS under DP conducting Resupply Ops (4 h)	Scenario 2: Platform Operations + AHTS under DP conducting Resupply Ops (8 h)	Scenario 3: Platform Operations + Generic OSV under DP conducting Resupply Ops (4 h)	Scenario 4: Platform Operations + Generic OSV under DP conducting Resupply Ops (8 h)
Hearing group	**SEL_{24h} threshold ($L_{E,24h}$; dB re 1 µPa²·s)**	**R_{max} (km)**	**R_{max} (km)**	**R_{max} (km)**	**R_{max} (km)**
Auditory injury (PTS)					
LF cetaceans	197	0.11	0.20	0.03	0.04
HF cetaceans	201	-	-	-	-
VHF cetaceans	181	0.02	0.04	-	-
Otariid seals	199	-	-	-	-
Sea turtles	198	0.05	0.08	-	0.03
TTS					
LF cetaceans	177	2.88	4.26	0.57	0.94
HF cetaceans	181	0.20	0.33	0.04	0.05
VHF cetaceans	161	0.33	0.50	0.20	0.28
Otariid seals	179	0.14	0.24	0.04	0.05
Sea turtles	178	1.48	2.31	0.37	0.73
Sound pressure level thresholds	**SPL threshold (L_p; dB re 1 µPa)**	**R_{max} (km)**	**R_{max} (km)**	**R_{max} (km)**	**R_{max} (km)**
Marine mammal Behavioural response	120	21.9	21.9	5.94	5.94
Fish (12h TTS)	158	0.08	0.08	0.03	0.03

Sound exposure criteria		Scenario 1: Platform Operations + AHTS under DP conducting Resupply Ops (4 h)	Scenario 2: Platform Operations + AHTS under DP conducting Resupply Ops (8 h)	Scenario 3: Platform Operations + Generic OSV under DP conducting Resupply Ops (4 h)	Scenario 4: Platform Operations + Generic OSV under DP conducting Resupply Ops (8 h)
Fish (48h recoverable injury)	170	-	-	-	-

7.5.1.9 Key Outcomes:

Marine Mammals

- Behavioural response threshold (120 dB SPL): Maximum distance (Rmax) ranged from 5.94 km (Scenarios 3 & 4 with OSV) to 21.9 km (Scenarios 1 & 2 with AHTS).
- Auditory injury (PTS) threshold for low-frequency cetaceans: Rmax was 0.20 km for Scenario 2 (AHTS, 8 hours) and 0.04 km for Scenario 4 (OSV, 8 hours).
- Temporary threshold shift (TTS) threshold for low-frequency cetaceans: Rmax was 4.26 km for Scenario 2 (AHTS, 8 hours) and 0.94 km for Scenario 4 (OSV, 8 hours).

Sea Turtles

- TTS threshold: Rmax was 2.31 km for Scenario 2 (AHTS, 8 hours) and 0.73 km for Scenario 4 (OSV, 8 hours).
- PTS threshold: Rmax was 0.08 km for Scenario 2 (AHTS, 8 hours), and thresholds were not reached for Scenario 4 (OSV, 8 hours).

Fish

- Sound levels did not reach recoverable injury thresholds for fish with swim bladders involved in hearing.
- TTS thresholds were reached at maximum distances of 0.08 km (Scenarios 1 & 2 with AHTS) and 0.03 km (Scenarios 3 & 4 with OSV).

7.5.1.10 Observations

- The AHTS vessel produced higher noise levels (~10 dB louder) than the generic OSV, resulting in greater distances to noise effect thresholds.
- Longer operation durations (8 hours vs. 4 hours) increased the cumulative sound exposure levels (SEL24h), further extending the distances to TTS and PTS thresholds.
- The largest ensonified area was observed in Scenario 2 (AHTS, 8 hours), with the longest range to all assessed noise effect criteria.
- The marine mammal behavioural response threshold (120 dB SPL) had the greatest distance across all scenarios, with Scenario 2 reaching up to 21.9 km.

Table 7.15 outlines the criteria for effects of non-impulsive noise exposure for marine mammals, as provided in JASCO (2025).

Table 7.15: Criteria for effects of non-impulsive noise exposure for marine mammals

Hearing group	NOAA (2024)	NMFS (2024) and Accomando et al. (2025) for sirenians	
	Behaviour	TTS onset thresholds (received level)	PTS/AUD INJ onset thresholds (received level)
	SPL (L_p; dB re 1 µPa)	Weighted SEL_{24h} ($L_{E,24h}$; dB re 1 $\mu Pa^2 \cdot s$)	Weighted SEL_{24h} ($L_{E,24h}$; dB re 1 $\mu Pa^2 \cdot s$)
LF cetaceans	120	177	197
HF cetaceans		181	201
VHF cetaceans		161	181
Otariid Seals		179	199

L_p denotes sound pressure level and has a reference value of 1 µPa.

L_E denotes cumulative sound exposure over a 24 h period and has a reference value of 1 $\mu Pa^2 \cdot s$

Source: JASCO, 2025

In addition, Table 7.16 outlines the relative risks for fish, including estimated distances from the source for effects that may be associated with shipping and continuous noise. The information was sourced from JASCO (2025) and is based on information provided in Popper et al. (2014). As reported in JASCO (2025), there is some evidence that suggests fish sensitive to acoustic pressure show a recoverable loss in hearing sensitivity, or injury when exposed to high levels of noise (Scholik and Yan 2002, Amoser and Ladich 2003, Smith et al. 2006, as cited in JASCO 2025); this is reflected in the SPL thresholds for fish with a swim bladder involved in hearing (shaded cells in Table 7.16).

Table 7.16: Relative risk for vessel noise exposure for fish, adapted from Popper et al. (2014)

Type of animal	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 (primary 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

Type of animal	Mortality and potential mortal injury	Impairment			Behaviour
		Recoverable injury	TTS	Masking	
Sound pressure level dB re 1 µpa.					
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 meters, and far (F) – thousands of meters.					

Source: JASCO, 2025

7.5.2 EMBA

The potential impacts from noise and vibration depend on the noise source and prevailing atmospheric and underwater conditions. During operational activities—including routine IMR—the EMBA's maximum spatial extent reaches up to 21.9 km. As per the key findings evaluating the marine mammal behavioral response threshold (120 dB SPL), detailed in Section 7.5.1.9

The noise-sensitive receptors that may occur within this EMBA, either as residents or migrants, are:

- Pelagic fauna (plankton, fish, marine mammals).
- Migratory birds and seabirds such as albatrosses, petrels and the Orange-bellied Parrot potentially affected by airborne noise helicopter sound.

The ecological receptors identified above are values of the following within the EMBA:

- Conservation values and sensitivities.
- Traditional Owners with cultural connection to these waters.

Socio-economic receptors and marine users within the EMBA

- Commercial and recreational fishing vessels and fishers.
- Commercial shipping.
- Local marine users for tourism and recreational purposes.

7.5.3 Jurisdiction of Hazard

The jurisdictions for this hazard are outlined below.

Commonwealth waters	Victorian waters
YES	YES
The platform is located in Commonwealth waters. Vessels engaged in IMR activities will generate noise and vibration while working alongside the platform or RGP in Commonwealth waters.	Vessels engaged in IMR activities will generate noise and vibration while working alongside the RGP in Victorian waters.

7.5.4 Evaluation of Environmental Impacts

The severity of environmental effects depends primarily on the distance from the noise or vibration source, as well as the sensitivity of individual species.

When assessing potential impacts on key marine groups, it is important to recognise that behavioural responses and stress caused by noise can decrease as animals habituate to it. As a result, some animals may approach or remain near a noise source, such as an operating facility, even if noise levels surpass those known to trigger behavioural changes, provided there is no accompanying threat.

Referencing Section 7.5.2, the evaluation of potential impacts primarily focuses on vessel operations. Current evidence suggests that both airborne (helipcopter sound) and underwater noise emissions from the Yolla Platform are unlikely to cause significant behavioural disruption, hearing damage, or habitat avoidance among marine mammals or seabird populations.

Cetaceans, pinnipeds, and fish are identified as the primary groups at risk from noise exposure related to vessel operations.

7.5.4.1 Cetaceans

Cetaceans are widely regarded as being the most sensitive marine animals to noise, given that they use sound to communicate between individuals and locate their prey. As described in Section 5.6.5, the key cetaceans identified as sensitive receptors in the operational area (i.e., those that are listed as ‘threatened’ under the EPBC Act and have BIAs in the region) are southern right whales and pygmy blue whales.

The National Recovery Plan for the Southern Right Whale was published in 2024 and brings significant updates compared to the superseded Conservation Management Plan for the Southern Right Whale. The National Recovery Plan has mandatory alignment for offshore energy projects regulated by NOPSEMA. There are specific guidelines for anthropogenic underwater noise. The recovery plan emphasises the limited understanding of migratory paths connecting foraging grounds to coastal breeding grounds and the risk offshore developments pose to potential migratory pathways (DCCEEW 2024). Southern right whales demonstrate strong fidelity to calving grounds.

The National Recovery Plan for the Blue Whale was published in 2015 and expired in October 2025, however, is still the most relevant recovery plan for the species. The recovery plan lists anthropogenic noise as a threat to the blue whale populations and specifically includes gas processing and shipping as a source of noise interference (DoE, 201)

Marine mammal species share basic hearing anatomy and physiology with their terrestrial ancestors. Marine mammals, however, have broader hearing frequency ranges due to the much higher sound speed underwater compared to in air. Odontocetes (toothed whales and dolphins) hear best at higher frequencies, generally in the ultrasonic range (>20,000 Hz), with no responsive hearing below 500 Hz (0.5 kHz). Mysticetes (baleen whales, such as humpbacks and southern right whales) hear better at lower frequencies (Wartzok & Ketten, 1999; Mooney et al., 2012), generally at infrasonic frequencies as low as 10-15 Hz (APPEA, 2004). The optimal hearing frequency range for baleen whales is between ~20 and 1,000 Hz (McCauley et al., 1994).

Sound is very important to whales and dolphins for effective hunting, navigation and communication. Mysticetes communicate at low frequencies (20 Hz to approximately 5 kHz) using predominantly tonal type calls.

Odontocetes communicate using both tonal signals (up to approximately 30 kHz) and echolocation clicks (peak frequencies range from approximately 40 – 130 kHz), which they also use for hunting and navigation (Au et al., 2000).

The type and scale of the effect on cetaceans from underwater sound generated depends on a number of factors including the level of exposure, the physical environment, the location of the animal in relation to the sound source, how long the animal is exposed to the sound, the exposure history, how often the sound repeats (repetition period) and the ambient sound level. The context of the exposure plays a critical and complex role in the way an animal might respond (Gomez et al., 2016; Southall et al., 2016).

High levels of anthropogenic underwater noise can have potential effects on cetaceans ranging from changes in their acoustic communication, behavioural disturbances and in more severe cases physical injury or mortality (Richardson et al., 1995), as described herein.

Physiological impacts

Physiological impacts such as physical damage to the auditory apparatus (e.g., loss of hair cells or permanently fatigued hair cell receptors), can occur in marine mammals when they are exposed to intense or moderately intense sound levels and could cause permanent or temporary loss of hearing sensitivity. While the loss of hearing sensitivity is usually strongest in the frequency range of the emitted noise, it is not limited to the frequency bands where the noise occurs but can affect a broader hearing range. This is because animals perceive sound structured by a set of auditory bandwidth filters that proportionately increase in width with frequency. The severity of TTS is expressed as the duration of hearing impairment and the magnitude of the shift in hearing sensitivity relative to preexposure sensitivity, in dB. TTS occurs at lower exposure levels than PTS. The cumulative effects of repeated TTS, especially if the animal receives another sound exposure near or above the TTS threshold before recovering from the previous sensitivity shift, could cause PTS. If the sound is intense enough, an animal could succumb to PTS without first experiencing TTS (Weilgart, 2007).

Based on the modelling undertaken by JASCO (2025) for accumulated sound exposure, both the louder AHTS and the increased duration of operations considered in the revised scenarios contributed to increased distances to noise effect thresholds as compared with previous modelling. For the eight-hour scenario involving the AHTS vessel, the distance to the low-frequency cetacean TTS threshold was 4.26 km and for PTS was 0.20 km. This is greater than the previously modelled eight-hour scenario with the generic OSV, which resulted in predicted effect ranges of 0.57 km and 0.03 km, respectively for TTS and PTS in low-frequency cetaceans. It is noted that the modelled scenario for the AHTS vessel is intended to represent a worst-case scenario in terms of the AHTS thruster usage, and therefore, real-world operations may be significantly quieter. In addition, while larger than the previously modelled footprint, the area potentially affected is small relative to significant distances covered by cetaceans. The footprint is also localised around the platform, and therefore far offshore and away from coastal areas where sensitive receptors, such as southern right whales, may be seasonally present.

Behavioural impacts

A secondary concern arising from sound generation is the potential for non-physiological effects on cetaceans, including:

- Increased stress levels.
- Disruption to underwater acoustic cues.
- Masking.
- Behavioural changes, and
- Displacement.

Behavioural responses to underwater sound are difficult to determine because animals vary widely in their response type and strength, and the same species exposed to the same sound may react differently (Nowacek et al., 2004; Gomez et al., 2016; Southall et al., 2016). An individual's response to a stimulus is influenced by the context in which the animal receives the stimulus and how relevant the individual perceives the stimulus to be. A number of biological and environmental factors can affect an animal's response, including behavioural state (e.g., foraging, travelling or socialising), reproductive state (e.g., female with or without calf, or single male), age (juvenile, sub-adult, adult), and motivational state (e.g., hunger, fear of predation, courtship) at the time of exposure as well as perceived proximity, motion and biological meaning of the sound and nature of the sound source.

Animals might temporarily avoid anthropogenic sounds but could display other behaviours such as approaching novel sound sources, increasing vigilance, hiding and/or retreating, that might decrease their foraging time (Purser & Radford, 2011).

Some cetaceans might also respond acoustically to noise in a range of ways, including by increasing the amplitude of their calls (Lombard effect), changing their spectral (frequency content) or temporal vocalisation properties, and in some cases, cease vocalising (McDonald et al., 1995; 2007; Parks et al., 2007; Di Iorio & Clark, 2010; Castellote et al., 2012; Hotchkin & Parks, 2013; Blackwell et al., 2015). Masking can also occur (Erbe et al., 2015).

There are shipping fairways to the north, south and southwest of Yolla-A. It is expected that cetaceans migrating through and foraging in this part of Bass Strait are habituated to the sound generated by the merchant ships and passenger ferries using these shipping fairways, so routine offshore BassGas operations are unlikely to represent a significant additional source of sound and vibration. However, vessels using DP for operations around the platform will likely generate more underwater noise than vessels transiting through the area. This is supported by the revised modelling undertaken by JASCO (2025), which indicated that the AHTS is considerably louder (~10 db) than the generic OSV considered in the earlier modelling report. As a result of the updated modelling, the maximum distance from the source where the marine mammal behavioural response threshold may be met was 21.9 km (for the AHTS), compared to 5.94 km (for the generic OSV). Therefore, while larger than the previously modelled footprint, the area potentially affected is small relative to significant distances covered by cetaceans. The footprint is also localised around the platform, and therefore far offshore and away from coastal areas were sensitive receptors, such as southern right whales, may be seasonally present. In addition, vessel operations associated with

maintenance and supply provision are expected to occur only infrequently, further lessening the potential for impacts on cetaceans. Considering these factors, the sound generated by support vessel activity is likely to be of **Minor (1)** consequence for cetaceans.

Any noise-related impacts to cetaceans are expected to be localised, temporary and minor, with no anticipated injury, mortality or population-level effects. The application of established controls, such as vessel speed limits, helicopter altitude restrictions, exclusion distances, and implementation of the Whale Management Procedure, means biologically important behaviours are expected to continue during activities. As a result, no long-term or irreversible impacts to cultural heritage values associated with cetaceans are anticipated, and cultural connections linked to these species would not be compromised beyond short-term, transient disturbance.

The impacts of sound generated by operations and inspection, maintenance and repair activities are assessed as a **Minor (1)** consequence for cetaceans.

7.5.4.2 Pinnipeds

Fur-seals are less sensitive to low frequency sounds (<1 kHz) than to higher frequencies (>1 kHz). Fur-seals are regularly observed swimming under and around the Yolla-A jacket. They have also occasionally been observed on the back deck of support vessels. These observations indicate that seals are unconcerned by noise and vibration generated by the platform and support vessels.

Underwater noise produced by vessel operations, including thrusters and dynamic positioning, is generally considered to pose low risk to Australian fur seals due to their behavioural tolerance and adaptive responses, especially when appropriate operational mitigation measures such as maintaining vessel distance and minimising thruster power are implemented. Furthermore, seals demonstrate some vocal plasticity and habituation to continuous or repeated noise, allowing them to cope with moderate underwater noise without sustained stress or displacement. However, it is noted that there aren't any breeding colonies in proximity to the platform. Therefore, exposure to underwater noise from vessel operations is likely to occur infrequently when considering both the anticipated extent of vessel use and the lack of nearby breeding colonies. For those pinnipeds that may visit the platform at times, short-term alertness or movement away from noise sources may occur; however, this is unlikely to translate into long-term negative impacts, given that pinnipeds are frequently observed around the platform, despite the ongoing vessel operations.

The impacts of sound generated by operations and inspection, maintenance and repair activities is considered to be of a **Minor (1)** consequence for pinnipeds.

7.5.4.3 Fish

Underwater noise levels significantly higher than ambient levels can have a negative impact on fish, ranging from physical injury or mortality to temporary effects on hearing and behavioural disturbance effects.

The effects of underwater sound on fish within the vicinity of a sound source will vary depending on the size, age, sex and condition of the receptor among other physiological aspects, and the topography of the benthos, water depth, sound intensity and sound duration. The effect of noise on a receptor may be either physiological (e.g., injury or mortality) or behavioural, as described in the following sub-sections.

Based on the information presented in JASCO (2025), and replicated in Table 7.16 , the relative risks to fish from vessel noise generally range from:

- Low, for:
    - Mortality, potential mortal injury and recoverable injury (for near, intermediate and far distances to the source)
    - TTS (for intermediate and far distances to the source)
    - Behavioural responses (for far distances to the source)
- Moderate, for:
    - TTS (for near distances to the source)
- Moderate to high for:
    - Masking (for near through to far distances to the source)
    - Behavioural responses (for near and intermediate distances to the source)

The distances for near, intermediate and far are defined as:

- Near – tens of metres
- Intermediate – hundreds of metres
- Far – thousands of metres.

Based on this assessment, the following sections focus on the 'moderate to high' relative risks (that is, masking and behavioural responses). TTS risks, which have been categorised as a moderate relative risk for near distances (tens of metres), have not been considered further, given that the water depth of 80 m around the platform indicates that overall risks would be low.

The extent of behavioural changes varies by species, individual auditory sensitivity, noise characteristics, and environmental context. Some species habituate to continuous noise over time, while intermittent, unpredictable noises tend to produce stronger avoidance responses. Fish often respond to vessel noise by altering their natural behaviours. Immediate behavioural responses include avoidance of noisy areas, increased swimming speed, disruption of schooling or foraging behaviours, and changes in vocalisation patterns. Noise can mask important acoustic signals used for mating, predator avoidance, and prey detection, which may impact reproductive success or increase predation risk. Behavioural avoidance can also lead to displacement from habitats or increased energy expenditure if fish need to relocate to quieter areas. The species at greater risk of exposure to vessel noise are those that might be site-attached or have limited motility, as they will have a lesser ability to move away from the source. Conversely, species that are not site-attached or highly motile will likely be less affected as they can move away from the source if it is causing discomfort or disruption.

When considering the depth of water in the vicinity of the platform, together with the benthic environment, which is predominantly comprised of bare substrates (refer to Section 5.6.1), it is

considered likely that the majority of the fish will be pelagic or demersal species that are not site-attached. As such, the impacts of sound generated by operations and inspection, maintenance and repair activities is considered to be of a **Minor (1)** consequence for fish, which would be further reduced given the relatively low frequency and duration of vessel use. Sound produced by all scenarios modelled did not reach levels associated with recoverable injury for fish (JASCO 2025).

7.5.4.4 Cultural values and sensitivities

The following cultural values and sensitivities have been identified as potentially affected by underwater sound and the section where potential impacts have been assessed:

- Cetaceans (Section 7.5.4.1).
- Pinnipeds (Section 7.5.4.2).
- Fish (Section 7.5.4.3).

The marine fauna listed above are connected to places associated with songlines or connected to individuals through ceremony (Section 5.7.3) The connection of marine fauna to places or individuals are considered cultural intangible values. Underwater sound has the potential to impact marine fauna that have songlines, or spiritual connection to First Nations people. It is considered that impacts to species at a population level may prevent First Nations people's obligations to maintain spiritual connections and care for culturally significant species and their habitat. If First Nations people's obligations have not been met it may reinforce a sense of powerlessness to members of First Nations groups responsible for these obligations (Holcombe 2022).

The predicted environmental impact to these receptors, assessed in the above listed sections, determined underwater sound may result in behavioural impacts to individuals however will have no affect at a population level. As a result, the consequence of impact to cultural values and sensitivities from underwater sound is assessed as **Moderate (2)** and of an acceptable level.

7.5.5 Cumulative Impact Evaluation

Routine noise and vibration emissions from BassGas operations will occur in the context of an existing offshore soundscape influenced by commercial shipping and other maritime activities in Bass Strait. While vessel operations, platform machinery, and occasional helicopter traffic will result in short-term, localised increases in airborne and underwater noise, these emissions are intermittent, spatially confined to the vicinity of the Yolla-A platform and RGP, and infrequent relative to broader regional noise sources.

There are no other oil and gas operations in close proximity to BassGas, so there is no overlap in underwater sound EMBAs from other similar activities.

Upcoming well P&A campaigns to be undertaken by Beach at Yolla-1 (with the rig over the platform, scheduled for Q3 2026), will temporarily (15-20 days) increase the duration of underwater sound around Yolla-A due to the presence of a vessel to support the rig operations.

Any vessel-based activities being undertaken by offshore wind developers in the offshore wind feasibility licences to the east of BassGas are too far away (over 130 km) to overlap the Yolla-A underwater sound EMBA. As outlined in the Star of the South Offshore Windfarm Environmental Impact Statement (Star of the South, 2026), construction of their offshore windfarm (located 135

km northeast of Yolla-A) is scheduled to commence in 2030. The underwater sound EMBAs from their noisiest activity (vessels on DP) is modelled to be 11.6 km (distance to behavioural threshold for LF cetaceans). This means there will be 131 km between the two underwater sound EMBAs, which allows a sufficient distance between the two activities for LF cetaceans (and other marine mammals) to continue their critical life functions such as migration and feeding.

With the application of industry-standard controls, cumulative underwater sound emissions will not result in injury or death to listed threatened or migratory species and will not prevent the continuation of biologically important behaviours, such as migration, foraging or resting.

7.5.6 Impact Assessment

An impact assessment for noise and vibration is presented below in Table 7.17.

Table 7.17: Impact assessment for noise and vibration

ALARP decision context		
Impact decision framework context	Type A.	
Activity	Nothing new or unusual, represents business as usual, well understood activity, good practice is well defined.	
Level of certainty of impacts	Risks are well understood, uncertainty is minimal.	
Stakeholder influence	No conflict with company values, no partner interest, no significant media interest.	
Impact Consequence(inherent)		
Operations	Minor (1)	
CoP	Minor (1)	
Preservation	Minor (1)	
Assessment of Proposed Control Measures		
Control	**Cost/benefit analysis**	**Implemented?**
Conduct activities only outside of whale migration periods *(All phases)* *(Commonwealth & Victorian State waters)*	Avoiding periods of marine fauna sensitivity (i.e., whale migration, foraging) may reduce the risk of PTS, TTS or behavioural impacts from underwater sound during environmentally sensitive periods for listed marine fauna. As platform operations are a continuous activity, there is a high cost in moving or delaying vessels or helicopters to avoid fauna activity. The risk to all listed marine fauna cannot be reduced due to variability in timing of environmentally sensitive periods and the unpredictable presence of some species. The costs associated with restricting operations to avoid periods of sensitivity for both of these species are considered grossly disproportionate given the existing control measures in place to manage potential impacts to whales undertaking biologically important behaviours. While avoidance of whale migration periods may reduce the likelihood of behavioural disturbance to cetaceans, the continuous nature of the activity means this control is not technically feasible. Instead, Beach implements operational controls through the Whale Management Procedure and	No

	ALARP decision context	
	compliance with EPBC Regulations 2025 requirements to manage potential interactions with cetaceans during biologically important periods. Given the continuous nature of platform operations and the effectiveness of existing whale management controls, the operational constraints and costs associated with avoiding all migration periods are considered grossly disproportionate to the incremental environmental benefit achieved.	
Anchoring of vessels *(All phases)* *(Commonwealth & Victorian State waters)*	This control is not feasible for the support vessels as resupply operations require the vessel to use DP to maintain position adjacent to the platform to counter wind and current conditions. While anchoring may reduce underwater noise relative to DP operations, it would not be feasible for routine platform support activities and may increase other environmental impacts such as seabed disturbance. The operational limitations and associated risks are considered disproportionate to any noise reduction benefit achieved.	No
Shut down DP thrusters on vessels operating in the operational area if whales are sighted *(All phases)* *(Commonwealth & Victorian State waters)*	This could reduce the potential for PTS, TTS and behavioural impacts to cetaceans, particularly LFC. However, shutting down thrusters would result in the vessel drifting off location, which could result in it colliding with the platform and lead to damage to the vessel and/or platform (when in the platform PSZ), or lead to subsea equipment damaging the RGP during IMR work, with associated personnel safety risks. Given the potential consequences for vessel station-keeping, asset integrity and personnel safety, the operational risks associated with implementing this control are grossly disproportionate to the potential reduction in underwater noise exposure.	No
Dedicated monitoring vessel during platform resupply and IMR activities *(All phases)* *(Commonwealth & Victorian State waters)*	An additional dedicated vessel to monitor for cetaceans during platform resupply or IMR activities is not required as monitoring can be effectively conducted from the vessels performing the work. Another vessel would introduce an increased source of underwater sound and therefore offset any benefits gained from its use. The introduction of an additional vessel would increase operational costs and underwater noise emissions while providing only limited additional monitoring capability beyond that achievable using existing vessels. The costs and environmental impacts are therefore considered disproportionate to the marginal benefit gained.	No
Undertake aerial surveillance for whales during platform resupply and IMR activities *(All phases)* *(Commonwealth & Victorian State waters)*	Aerial surveillance from aircraft or drones to monitor for cetaceans during platform resupply or IMR activities is not required as monitoring activities can be effectively conducted from the vessels performing the work. Flights in small aircraft over open water introduce significant safety risks and there is no guarantee that cetaceans will be spotted due to glare, rough seas, mist, fog and the inherent difficulty of sighting species that dive for long periods. Given the safety risks, limited detection reliability and additional operational costs, implementation of aerial	No

ALARP decision context		
	surveillance is considered grossly disproportionate to the incremental environmental benefit achieved over existing monitoring measures.	
Maintain noise and vibration generating equipment on the platform and vessels *(All phases)* *(Commonwealth & Victorian State waters)*	Ensuring the efficient operation of equipment that can generate underwater noise and vibration (e.g., gas engines, generators, compressors) can reduce noise transfer to the water column and therefore minimise the risks of behavioural impacts to sensitive species. Undertaking equipment maintenance is routine practice for offshore operations. The associated costs are not grossly disproportionate to the environmental benefit achieved through minimising unnecessary underwater noise emissions and maintaining efficient equipment performance.	Yes **(IMP05-CM01, -CM03)**
Whale Management Procedure *(All phases)* *(Commonwealth & Victorian State waters)*	Adaptive management controls aim to reduce the likelihood of PTS, TTS or behavioural impacts to whales associated with anthropogenic noise. Through the development of Beach's Whale Management Procedure, it has been determined that it is operationally feasible to implement controls to achieve this aim. The procedure can be implemented through existing operational and environmental management systems and provides a practical mechanism to minimise potential interactions with cetaceans. The associated costs are not grossly disproportionate to the environmental benefit achieved.	Yes **(IMP05-CM04)**
Vessel masters and helicopter pilots apply EPBC Regulations 2025 Part 8, Division 8.1 *(All phases)* *(Commonwealth & Victorian State waters)*	These regulations aim to minimise noise disruption to cetacean breeding, feeding and migration. Adopting the requirements of these regulations, via the controls in the Australian National Guidelines for Whale and Dolphin Watching (DoEE, 2017) is simple to implement and routine practice in the offshore industry. Implementation of these requirements forms part of routine vessel and aircraft operations and incurs minimal additional cost. The costs are not grossly disproportionate to the environmental benefit achieved through reducing the likelihood of disturbance to cetaceans.	Yes **(IMP05-CM06)**
Personnel undertake opportunistic observations and record any marine fauna interactions during vessel operations and IMR activities. *(All phases)* *(Commonwealth & Victorian State waters)*	This provides additional information regarding marine fauna presence and behaviour around the Operational Area without requiring dedicated survey effort or specialist equipment. This is feasible using existing personnel and supports adaptive management. As observations are undertaken using existing personnel during normal operations, implementation costs are negligible. The costs are not grossly disproportionate to the environmental benefit achieved through improving understanding of marine fauna presence and supporting adaptive management.	Yes **(IMP05-CM05)**
Use passive acoustic monitoring (PAM) to detect HFC and VHFC. *(All phases)*	This control measure increases the confidence that there are no deep- and long-diving cetaceans (that are difficult to visually detect) in the behavioural impact zone that could be displaced during vessel activities.	No

ALARP decision context	
(Commonwealth & Victorian State waters)	As a cetacean detection method, PAM has been used to detect HFC and VHFC that vocalise at high frequencies/intensities and, in conjunction with visual monitoring, can enhance cetacean detection effectiveness. PAM has the advantage of potentially detecting cetaceans during night hours and during periods of poor visibility when they cannot be visually detected. Although PAM can be a valuable tool in identifying the presence of cetaceans, it is most suited to HFC and VHFC, which contain species that are either absent from Bass Strait or present in much lower numbers than LFC, such as humpback and blue whales. PAM is not effective at detecting LFC vocalisations. PAM bearing accuracy and range estimation is limited and not as accurate as visual observations. Given the limitations of PAM for detecting low-frequency cetaceans, which are the species most relevant to the Activity Area, the additional cost, equipment requirements and operational complexity associated with implementation are considered grossly disproportionate to the incremental environmental benefit achieved.

Environmental Controls and Performance Measurement			
EPO	**Control measure**	**EPS**	**Measurement criteria**
IMP05-EPO01 No displacement, injury or death to listed threatened or migratory species due to noise or vibration.	**Platform (Commonwealth waters)**		
	IMP05-CM01 The platform CMMS is implemented to ensure that equipment generating noise and vibration (e.g., gas engines, generators, compressors) is operating efficiently. *(Operations phase)*	**IMP05-EPS01** Sound and vibration is limited to that necessary for the equipment to perform its function (i.e., there is no excessive noise and vibration).	**IMP05-MC01** CMMS records verify that equipment generating noise and vibration is inspected and maintained to schedule.
	Vessels (Commonwealth and Victorian state waters)		
	IMP05-CM02 Vessel speeds within the Operational Area are restricted to ≤10 knots. *(All phases)*	**IMP05-EPS02** Blue whales and SRWs continue to utilise BIAs without injury and or displacement from a foraging or migration area.	**IMP05-MC02** Vessel bridge records verify that speeds do not exceed 10 knots.
	IMP05-CM03 Vessel engines and thrusters are maintained in accordance with the PMS to ensure efficient operation. *(All phases)*	**IMP05-EPS03** Vessel engines and thrusters are maintained and operated in accordance with the PMS and manufacturer requirements to ensure efficient operation and minimise air emissions.	**IMP05-MC03** PMS records verify that engines and thrusters are maintained in accordance with the PMS.
	IMP05-CM04 The Whale Management Procedure (WMP) (CDN/ID 19063285) (**Appendix 8**) is implemented while	**IMP05-EPS04** Vessel operations meet the requirements of EPBC Regulations 2025 – Part 8,	**IMP05-MC04** Vessel bridge records verify that the WMP was implemented.

ALARP decision context		
vessels are operating in the Operational Area. Prior to a vessel activity commencing, a pre-activity survey for whale presence will be undertaken from the vessel: • Resupply and vessel-based IMR o OSV – 6 km o AHTS – 22 km. The pre-activity surveys will be undertaken for 30 minutes prior to the activity commencing. If a whale is sighted within the pre-activity survey zone, the activity will not commence until: • No whales are observed for 30 minutes within the pre-activity survey zone; or • Whales are observed leaving the pre-activity survey zone. Activities can commence at night or in low visibility conditions (i.e., when observations cannot be undertaken) if no more than three whales have been seen in the activity survey zone in the 30 minutes prior to sunset. *(All phases)*	Division 8.1 (Interacting with Cetaceans).	
IMP05-CM05 Personnel undertake opportunistic observations and record any marine fauna interactions during vessel operations and IMR activities.	**IMP05-EPS05** Marine fauna interactions observed during vessel operations are reported and recorded.	**IMP05-MC05** Marine fauna observations recorded in daily reports verify marine fauna interactions are recorded where observed.
Helicopters (operating over Commonwealth and Victorian state waters)		
IMP05-CM06 Helicopter pilots adhere to the aircraft management requirements outlined in	**IMP05-CM06** Helicopter operations meet the requirements of EPBC Regulations 2025 – Part 8,	**IMP05-MC06** Helicopter operations logs note when cetaceans were sighted

ALARP decision context			
	the *Australian National Guidelines for Whale and Dolphin Watching for Vessels* (DoEE, 2017) when working within the OA, which is incorporated into the WMP. This means applying the following rules: • Not flying lower than 1,650 ft (500 m) when within 500 m horizontal distance of a cetacean except when landing or taking off. • Not approaching a cetacean from head on. *(All phases)*	Division 8.3 (Interacting with Cetaceans).	within 500 m of the helicopter in the OA and what actions were taken to avoid disturbance.

Impact Consequence (residual)	
Operations	Minor (1)
CoP	Minor (1)
Preservation	Minor (1)

ALARP Decision Justification

With the controls outlined in this table in place, the impact consequence has been assessed as Minor (1) and is considered to be good practice (Decision Context A). This means any additional or alternative control measures do not lower the residual consequence further or would be grossly disproportionate to the residual consequence. Therefore, a Minor (1) residual impact consequence is considered to be ALARP.

Acceptability Assessment	
Defined acceptable level	Noise and vibration are assessed as having a Minor (1) consequence, which is not considered as having the potential to result in serious or irreversible environmental damage.
Internal context	The proposed management of the impact is aligned with the Beach Environment Policy. Activities will be undertaken in accordance with the Implementation Strategy (Section 8).
External context	The BassGas Offshore Operations SEP is implemented to ensure that stakeholders are aware of operations issues. Stakeholders have not raised concerns about noise and vibration.
Legislative context	The control measures outlined in this EP align with the requirements of: • EPBC Act 1999 (Cth): o Section 229, 229A – all cetaceans protected in Australian waters, and it is an offence to kill, injure or interfere with a cetacean. o EPBC Regulations 2025 (Part 8, Division 8.1) – interacting with cetaceans. o EPBC Act Policy Statement 2.1 (Interaction between offshore seismic exploration and whales) management procedures. • Wildlife (Marine Mammal) Regulations 2009 (Vic):

ALARP decision context		
	○ Vessels within Victorian State waters adhere to the minimum approach distance of 300 m for whales. ○ Helicopters flying over Victorian State waters must not fly or hover lower than 500 vertical metres of a marine mammal.	
Industry practice	The consideration and alignment of control measures with the mitigation measures outlined in the below-listed guidelines and codes of practice demonstrates that BPEM will be implemented for this activity.	
	Environmental management in the upstream oil and gas industry (IOGP-IPIECA, 2020)	The control measures listed in this table meet the relevant mitigation measures listed for offshore activities with regard to: • Acoustics (sound emissions) – offshore facilities consider engineering measures to minimise operational noise emissions, vessels ensure gradual start-up of engines and thrusters where possible to provide opportunity for species to take evasive action (**IMP05-CM01 to CM04**).
	Best Available Techniques Guidance Document on Upstream Hydrocarbon Exploration and Production (European Commission, 2019)	There are no guidelines specifically regarding underwater sound for offshore activities.
	Environmental, Health and Safety Guidelines for Offshore Oil and Gas Development (World Bank Group, 2015)	The control measures listed in this table meet the relevant mitigation measures with regard to: • Noise (item 74). Environmental parameters that determine sound propagation in the sea are site-specific, and different species of marine life have different hearing sensitivities as a function of frequency. An impact assessment should be conducted to: ○ (i) identify where and/or when anthropogenic sound has the potential to create significant impacts, and ○ (ii) determine what mitigation measures, if any, are appropriate (**Section 7.5.4**).
	Code of Environmental Practice (APPEA, 2008)	The control measures listed in this table meet the following offshore development and production objectives: • To reduce the impact of planned noise emissions to ALARP and to an acceptable level.
Environmental context	MNES	
	AMPs	No intersection or impacts.
	Ramsar wetlands	No intersection or impacts.
	NIWs	No intersection or impacts.
	TECs	No intersection or impacts.
	Nationally threatened and migratory species	Underwater sound from the activity does not have any significant impacts on threatened or migratory species.

ALARP decision context		
	Other matters	
	State marine parks	No intersection or impacts.
	Species Conservation Advice/Recovery Plans/Threat Abatement Plans	The control measures listed in this table aim to ensure that underwater noise and vibration is managed in a manner that is not inconsistent with several conservation plans, but most notably: • Conservation Management Plan for the Blue Whale (DoE, 2015). • National Recovery Plan for the Southern Right Whale (DCCEEW, 2024).
ESD principles	The EIA presented throughout this EP demonstrates that ESD principles (a), (b), (c) and (d) are met (noting that principle (e) is not relevant).	

Environmental Monitoring
Fauna interactions during platform operations and during IMR campaigns.

Record Keeping	
Platform • CMMS records. • Wildlife incident reports. Helicopter • Operations log.	Vessels • Vessel bridge records. • Vessel selection reports. • PMS records. • Whale Management Procedure. • Daily reports.

7.6 IMPACT 6: Routine Discharge – Produced Formation Water

7.6.1 Source of Aspect

PFW is composed of the natural formation water produced from gas and condensate-bearing reservoirs, and it includes condensed water vapour from the gas phase during transfer from the wellbore and processing stages on the surface. The PFW is often a complex mix containing dissolved inorganic salts, minerals and metals, in addition to dissolved and dispersed hydrocarbon components and other organic compounds. In 2024 Beach energy commenced use of the descaling formulation GLDA (chelating descalent) which is injected intermittently to clean the wells and improve production rates and is discharged via the PFW system (see Section 3.5.6). Small volumes of low toxicity process chemicals such as methanol and TEG (see Section 3.5.6) that are used may also be present within the discharged PFW. Corrosion inhibitor is injected into the gas stream for the raw gas pipeline downstream of PFW treatment and is not present in the PFW discharge. Though complex, this mixture represents a typical composition of PFW for the petroleum industry, though some variation exists between operations depending on the hydrocarbon and reservoir specifics. It is recognised that PFW from gas fields generally has a higher BTEX content than PFW from oil fields (OGP, 2002). The PFW is discharged offshore, 45 m below the mean sea level via a 750 mm diameter dump caisson (refer to Section 3.5.6).

Since the preparation of the last revision of this EP, Beach has undertaken a number of studies regarding PFW management, including those to assess the potential impacts associated with the introduction of the use of the chemical descaling agent in late 2024. These studies are:

- Yolla Produced Formation Water Plume Model Verification Study (AECOM, 2023) (**Appendix 9**) - to verify the outcomes from the hydrodynamic modelling, which informed the mixing zone boundary.

- Yolla Platform Produced Water Dispersion Modelling (RPS, 2026a) (**Appendix 10**) - to conduct a dispersion modelling study considering both the base case (200 m^3/day) and future case (300 m^3/day) discharge of PFW at a depth of 45 m below mean sea level.

- Site Specific Dilution Factor and Revised Mixing Zone Report (BassGas Operations, Yolla-A Platform) (AECOM, 2025a) (**Appendix 11**) - to determine site specific dilution factors (SSDF) to inform mixing zone dimensions for produced formation water (PFW) discharge associated with the Yolla-A platform of the BassGas Development facility.

- ALARP Assessment of Removing Calcite Scale from the Production System at BassGas (AECOM, 2025b) (**Appendix 12**) - to undertake an assessment of the proposed use of descaling chemical to demonstrate that any potential impacts to the receiving environment have been reduced to ALARP.

- Yolla Platform Produced Formation Water Ecotoxicology Assessment - to assesses the ecotoxicological effects of GLDA (descaling agent) usage on Yolla produced formation water (RPS, 2026b) (**Appendix 13**) - by assessing baseline, during descaling events and 3 days post-descaling event, resulting in an amendment to the SSDF as determined by AECOM (2025a) and has resulted in an update to the mixing zones as modelled in the RPS (2026a) dispersion modelling report.

These assessments have been utilised to inform the PFW discharge risk assessment.

As outlined in Table 3.11, PFW is generated and discharged only during the operations phase when wells are producing. As production cease during the CoP phase and remains suspended throughout the preservation phase, this aspect is not relevant to those phases. Accordingly, this aspect is only applicable to the operations phase, as summarised below:

Hazard	Source	Operations	CoP	Preservation
Platform	Discharge of PFW	✓	×	×

7.6.1.1 Methodology for Determining the Mixing Zone

The method for determining the extent of the PFW mixing zone was informed by the accepted approaches for assessing wastewater discharges to the marine environment. The method determines the likely impacts at a mixing zone boundary, and the point at which there is 'no effect' by determining a suitable dilution factor.

The mixing zone boundary is an area beyond which environmental impacts are considered acceptable.

ANZG (2018) notes that "mixing zones are regulated at the state or territory level in Australia". While it is recognised that, given its location, the discharge of PFW from Yolla-A is not in waters that are regulated by the State of Victoria, it is considered relevant to adopt the approach to determining mixing zones that is recommended by the Environment Protection Authority Victoria (EPA, 2010) to which ANZG (2018) refers.

The EPA Victoria (2010) guidance includes the following:

> *The levels of chemical, physical and biological stressors determined for the mixing zone are used to assess impacts to water body values. This includes the level and spatial extent of impact to values from individual stressors (where they operate separately) or combined stressors (where they operate synergistically or have an additive effect on beneficial uses and values).*

To account for the potential synergistic or additive effects from the various chemical components within the PFW discharge from Yolla-A, it is necessary to consider the level of toxicity of the whole effluent (as determined from whole effluent toxicity (WET) testing), rather than considering the level of toxicity of each component chemical in isolation. This is the approach that has been adopted by Beach to determine the PFW mixing zone around Yolla-A. Specific key analytes are also identified for their concentrations against ANZG thresholds at the mixing zone boundary.

To inform the revision of the Australian & New Zealand Guidelines for Fresh and Marine Water Quality, van Dam and Chapman (2001) compiled a review of the use of Direct Toxicity Assessment (DTA), a synonym for WET testing. They considered the major benefit of DTA to be that it can be used to "assess the toxicity of waters, in which the number of unidentified components may number thousands, and their behaviour, or interactions cannot be predicted". Through this, it "enables a greater understanding of potential impacts to aquatic environments, which in turn aids in the development of environmental protection measures".

Van Dam and Chapman (2001) highlight that single-chemical toxicity testing is not representative of the situation in the natural environment as organisms are rarely exposed to just one toxicant. Rather, a particular chemical is typically present in combination with many other chemicals between which interactions may occur which may alter their toxicity. Subsequently, mixtures of chemicals can result in either additive toxicity, greater than additive toxicity (synergism), or less than additive toxicity (antagonism) (Rand, 1995 in van Dam & Chapman, 2001).

They note that single-chemical toxicity tests do not account for such factors, and the extrapolation of these results to the assessment of potential environmental impacts therefore has a great deal of inherent uncertainty. Holdway (1992, in van Dam & Chapman, 2001) notes that the toxicity of individual compounds can change with time and are often not fully known.

To overcome the limitations attendant to single-chemical toxicity testing, van Dam and Chapman (2001) indicate that it is necessary to implement DTA to provide an integrative measure of the aggregate/additive toxicity of chemicals within a mixture that accounts for interactions between component compounds. This allows more reliable predictions to be made of the potential for adverse impacts within the receiving environment (as per Waller et al., 1996; de Vlaming & Norberg-King, 1999 [both in van Dam & Chapman, 2001]; de Vlaming et al., 2000).

Therefore, it is considered that it can be reasonably concluded that the application of WET/DTA testing results provides a more realistic means of defining a mixing zone boundary than does the consideration of dilutions of individual constituents of the PFW discharge from Yolla-A.

The approach to assessing the impact from a discharge has been conducted as follows:

- Characterisation of the discharge in terms of constituents and their concentrations.

- Characterising the discharge regime – discharge rate, normal PFW constituents, constituents during PFW GLDA well injection.
- Characterisation of the receiving environment and potential sensitive receptors.
- Assessment of potential impacts through comparison of discharge concentrations with ANZG default standards (ANZG, 2018).
- Should the characteristics be lower than ANZG (2018), the assessment generally concludes that the discharge is acceptable.
- Should the characteristics be greater than ANZG (2018), then further assessment of impacts can be undertaken (i.e., additional WET Testing).

It should be noted that ANZG (2018) values are derived from single biological species tests and single chemical species, not necessarily Australian species, often with a safety factor. These are generally conservative criteria and as noted above are trigger for further assessment. Further discussion of this aspect is provided below.

ANZG (2018) notes that exceedance of the guidelines indicates that there is potential for an impact to occur (or to have occurred) but does not provide any certainty that an impact will occur (or has occurred). In areas where protection of aquatic ecosystems is a designated environmental value (as is the case for Yolla-A), ANZG (2018) recommend direct assessment of the biological community to assess whether ecosystem integrity is being maintained, threatened or compromised to a level that causes pollution. Biological indicators should therefore be used to complement the use of physical and chemical indicators for this environmental value. These guidelines (ANZG, 2018) describe indicators for biological assessment and give guidance for determining an acceptable level of change so that the relative condition of the ecosystem can be estimated. This approach is also advocated in the Risk Based *Assessment of Offshore Produced Water Discharges guidelines* (IOGP, September 2020).

Decision frameworks provide guideline trigger values that refer to the concentration of the chemical available for uptake by organisms. Guideline trigger values are concentrations that, if exceeded, will indicate a potential environmental problem, and so 'trigger' further investigation. The investigation aims to both assess whether exceedance of a trigger value will result in environmental harm, and refine a guideline value by accounting for environmental factors that can modify the effect of the chemical.

In this case for PFW, WET testing will result in much more realistic goals for PFW management, although the process is lengthy and more complex and costly.

The use of an appropriate suite of test species and chronic end-points to ascertain whether toxicity is being observed is recommended. This was undertaken to develop the WET testing protocol. It is also recommended that if adverse effects are observed, then management action is initiated, and toxicity identification and evaluation is used to assist in identifying the compound(s) that are causing toxicity. ANZG (2018) provides the following guidance:

- Where a chemical is to be used in an environment of particular socio-political or ecological importance, it is better to undertake toxicity testing with that chemical on species relevant to that environment.

- When using DTA to examine toxicity of a chemical to locally important species or for pre-release effluents, to determine chronic effects at a range of concentrations of the chemical or effluent. For dilution, use the local reference dilution waters.
- Determine No Effect Concentration (NOEC) values for the chemical or effluent and use them for calculating site-specific guidelines. The method used for these calculations will depend on the number of data points, but use the statistical distribution method if the data requirements have been met (at least five species from four different taxonomic groups).
- The DTA can comprise in situ field and/or laboratory ecotoxicity tests (Chapman, 1995), preferably chronic or sub-chronic tests on appropriate species using local dilution waters, satisfying all sampling, test and analysis conditions.
- To aid interpretation of results, analyse the chemicals concurrently with biological assessment, unless there is a biological marker of toxicity.
- For already existing discharges and for chemicals that have a high potential to disturb the environment, it will be necessary to measure and assess the biological health of potentially disturbed sites.

Table 7.18 outlines the chemical analytes of samples used for WET testing. The results used samples collected between December 2017 and February 2023 and between November 2024 and January 2006.

To address the level of uncertainty around the potential for the PFW discharges from Yolla-A to impact upon the receiving environment, Beach has implemented a WET testing program. The use of the WET testing to assess the toxicity of the PFW and its impacts is in line with the ANZG (2018) method, and the Risk Based Assessment of Offshore Produced Water Discharges guidelines (IOGP, September 2020).

This program supports the assessment of potential additive or synergistic effects that may result from the chemical constituents interacting within the PFW discharge stream that may influence stream toxicity. Specifically, the 2024 introduction of the GLDA formulation for intermittent injection into Yolla wells and its potential impact on PFW toxicity has been included in the WET testing program. The results of the WET testing program are used to inform an ALARP assessment of environmental risks associated with the discharge of PFW, including PFW containing GLDA from Yolla-A (AECOM, 2025b) (see **Appendix 13**).

Table 7.18: Chemical analytes of the samples used for WET testing

Analyte/Parameter	Range*	Mean[1]	Standard deviations
Non-GLDA PFW			
Physicochemical properties and inorganics			
Conductivity (at 25°, µS/cm)	14,000 – 36,000	22,514	3,995
pH (at 25°, pH unit)	4.5 – 6.9	6.2	0.584
Potassium	35 - 60	45.1	6.1
Total Phosphate	0.01 – 1.4	0.25	0.35
Total Nitrogen	25 – 1,900	243	450

Analyte/Parameter	Range*	Mean[1]	Standard deviations
Total Suspended Solids	5 - 53	16.8	12.9
Metals/metalloids			
Arsenic	0.001 – 0.018	0.01	0.002
Cadmium	0.002 – 0.002	0.002	0.0003
Chromium	0.001 - 28	2.2	5
Copper	0.001 – 0.01	0.001	0.001
Lead	0.001 – 1.1	0.08	0.22
Mercury	0.001 – 0.016	0.008	0.004
Nickel	0.001 - 21	1.1	3.7
Zinc	0.01 – 8.2	0.56	1.5
TRH			
$C_6 – C_{10}$	0.02 - 160	81.3	35.1
$C_{10} – C_{16}$	3.1 - 52	23.3	9.6
$C_{16} – C_{34}$	0.1 - 1	0.25	0.23
$C_{34} – C_{40}$	0.1 - 1	0.13	0.15
BTEXN			
Benzene	0.001 - 23	14.8	5.0
Toluene	0.001 - 47	25.4	10.9
Ethylbenzene	0.001 – 8.6	1.1	1.4
M&p xylene	0.001 - 15	9.2	4.5
O-xylene	0.001 – 4.2	2.7	1.3
Naphthalene	0.2 – 1.1	0.58	0.25
Glycols			
Di-Ethylene glycol	20	20	0
Ethylene glycol	20	20	0
Propylene glycol	20	20	0
Triethylene glycol	20	20	0
PAH			
Total PAH	0.2 -1.1	0.58	0.25
Phenols			
Total halogenated phenols	0.01	0.01	0
Total non-halogenated phenols	38 - 130	73	26

[1] Where a concentration was reported below the laboratory limit of reporting (LOR), the full LOR value has been adopted as a conservative measure for the purpose of calculations

*Concentrations are in mg/L unless otherwise specified

7.6.1.2 PFW Characterisation

The most recent characterisation of physical and chemical constituents of Yolla PFW discharge from 2020 to 2025 are presented in Table 7.19 with a comparison to the (2014-2019) data.

The PFW samples were collected on the platform prior to discharge. Data in these tables present PFW characterisation at the point of discharge, prior to any dilution and mixing with seawater within the dump caisson and beyond within the dispersed plume.

Table 7.19: Composition of the Yolla PFW (2020 - 2025)

Analyte/Parameter	Number of Samples	Range[1*]	Mean[1]	Standard Deviation[1]	Range (2014 – 2019)*
Physicochemical properties and inorganics					
Conductivity (at 25°, µS/cm)	40	14,000 – 36,000	21,384	3137.9	21,000 – 31,000
pH (at 25°, pH unit)	40	4.5 – 7.1	6	0.58	6.2 – 7.1
Total Phosphate	40	0.01 – 1.4	0.3	0.39	Average 0.03
Total Nitrogen	40	21 – 1,900	239.6	440.7	27 - 51
Total Suspended Solids	40	5 - 53	13.67	12.1	2 - 29
Metals					
Aluminium	26 (2025 only)	0.5 – 90	5.69	17.54	<LOR (0.05) – 3.2
Arsenic	40	0.0002 – 0.018	0.01	0.003	<LOR (0.05) – 0.002
Barium	26 (2025 only)	0.13 – 49	31.2	8.03	13 – 52
Cadmium	40	0.0002 – 0.002	0.002	0.001	<LOR (0.0002) – <LOR (0.001)
Chromium	40	0.001 – 28	1.47	4.56	<LOR (0.001) – <LOR (0.005)
Copper	40	0.001 – 0.012	0.01	0.003	<LOR (0.001) – 0.005
Iron	26 (2025 only)	0.12 – 1300	197.68	336.13	1.2 – 4.3
Lead	40	0.001 – 1.1	0.07	0.21	<LOR (0.0001) – <LOR (0.005)
Manganese	26 (2025 only)	0.013 – 32	5.24	8.41	-
Mercury	40	0.0001 – 0.038	0.01	0.01	0.0055 – 0.029
Nickel	40	0.001 – 21	0.96	3.46	<LOR (0.005) – 0.01
Potassium	40	33 – 68	46.38	7.7	66 – 74
Selenium	26 (2025 only)	0.001 – 0.01	0.01	0.002	<LOR (0.001) – 0.001
Silver	26 (2025 only)	0.005 – 0.5	0.05	0.01	-

Analyte/Parameter	Number of Samples	Range[1*]	Mean[1]	Standard Deviation[1]	Range (2014 – 2019)*
Vanadium	26 (2025 only)	0.005 – 1.6	0.27	0.41	-
Zinc	40	0.006 – 8.2	0.49	1.41	0.016 - <LOR (0.025)
BTEXN					
Benzene	40	0.8 – 23	13.51	4.71	10 – 17
Toluene	40	0.27 – 47	22.30	10.21	13 – 30
Ethylbenzene	40	0.2 – 7.6	1.11	1.5	0.45 – 1.1
Xylene (total)	40	1.4 – 25	10.86	5.91	1.6 – 3.2 (o-xylene), 5.2 – 12 (m&p xylene)
Naphthalene	40	0.049 – 0.86	0.51	0.2	0.36 – 1
PAH					
Phenanthrene	40	0.001 – 0.03	0.002	0.005	-
Pyrene	40	0.001 – 0.03	0.002	0.005	-
Total PAH	40	0.049 – 0.86	0.51	0.21	-
TRH					
C6 – C10 less BTEX	40	0.8 – 63	27.09	15.69	-
C6 – C10	40	4 – 160	74.33	34.81	-
>C10 – C16	40	3.1 – 100	31.2	20.73	-
>C16 – C16 less naphthalene	40	3.1 – 99.53	31.4	20.72	-
>C16 – C34	40	0.1 – 120	3.41	18.91	-
>C34 – C40	40	0.1 – 1	0.21	0.28	-
C6 – C40 (sum)	40	30.4 – 273	109.1	44.57	TPH (oil and petroleum, 2019) 114.2 – 127.8
Phenols					

Analyte/Parameter	Number of Samples	Range[1*]	Mean[1]	Standard Deviation[1]	Range (2014 – 2019)*
Pentachlorophenol	40	0.01 – 0.1	0.01	0.01	-
Tetrachlorophenols - Total	40	0.03 – 0.3	0.04	0.04	-
Total Halogenated Phenol	40	0.01 – 0.1	0.01	0.01	-
Total Non-Halogenated Phenol	40	5.63 – 177	68.03	32.24	-
2.4-Dimethylphenol	40	0.63 – 23	10.58	4.11	5.3 – 11
Phenol	40	1.6 – 25	12.47	4.98	8.4 – 64
Cresols					
2-Methylphenol (o-Cresol)	40	1.8 – 42	20.08	7.43	-
3&4-Methylphenol (m&p-Cresol)	40	1.6 – 25	12.47	4.98	-
Total Cresols	40	27 – 71	38.18	10.53	26 - 75
Oil in Water					
Oil in Water	290	0.1 – 75	11.3	8.06	0.8 – 11.3

[1] Where a concentration was reported below the laboratory limit of reporting (LOR), the full LOR value has been adopted as a conservative measure for the purpose of calculations

'NA' Not applicable

'-' no data

* Concentrations are in mg/L unless otherwise specified

Since October 2019 the target for PFW discharge compliance has been 127 mg/L TPH based on maximum concentrations measured from PFW sample laboratory analyses. Since that period the TPH (also reported as TRH) average is 109 mg/L. Beach is now focussing on 127 mg/L TPH as the compliance threshold for online and laboratory sample data. From 2019 to 2024, there were two recorded exceedances above 127 mg/L. Most of the last 5-year exceedances were detected in 2025, related to PFW system management issues. There was a filter overload incident 25/11/25 and a production separator incident 25/9/25 where condensate entered the dump caisson. From sampling in November 2025, the average TPH is 78 mg/L (range 68 -104 mg/L) and this is predicted to continue to be around 100 mg/L and below during normal operations. Note that recent TPH results have been skewed with higher numbers of PFW samples taken during GLDA treatments targeting worst case contaminant concentration within PFW.

7.6.1.3 PFW Volume

The original designed PFW flow rate was nominated as 100 m^3/day, however, an increase in flow rates was anticipated, and has occurred over the lifetime of the facility. Flow rate data collected between 2021 and 2025 indicates that flow rates have increased over the initial design, with increased average daily flows during 2022 and early 2023 relative to 2021, with a subsequent reduction aligned with decreased production rates in late 2023 and 2024 as shown in Figure 7.9. In 2025, daily flow rates increased slightly with increased production associated with the descaling of the wells and averaged approximately 92 m^3/day.

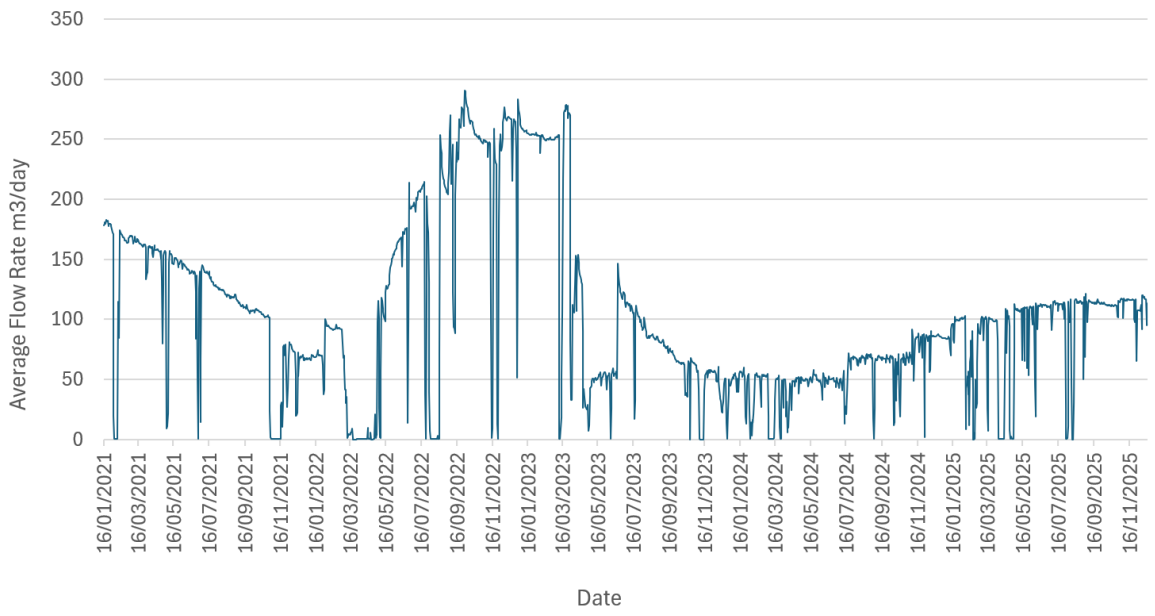


Figure 7.9: PFW discharge flow rates 2021-2025

7.6.1.4 PFW Toxicity

A WET testing program was undertaken on PFW and PFW-GLDA samples to identify changes to discharged marine toxicity as a result of the use of the GLDA descalent chemical. This toxicity data informed an understanding of how the use of GLDA may influence the toxicity of PFW discharges, and and therefore potentially extend the mixing zone boundary (RPS, 2026b; **Appendix 13**).

The following studies have been undertaken since the previous EP was prepared and have been used to evaluate how the intermittent addition of GLDA temporarily alters the toxicity of PFW discharged from Yolla:

- Chemical analysis and WET testing during normal operations from 2019 and post-descaling events from November 2024 until January 2026.
- SSDF derived in 2023 (protective of 99% of species in the marine receiving environment).
- Furter WET testing 2023 – 2026, including during and following the use of the descaling chemical GLDA.
- Review of WET testing results and Ecotoxicological Review prepared.
- Additional testing and update of SSDF and mixing zone boundary (AECOM, 2025b; RPS 2026b).

The results of these studies were incorporated in a number of studies including the ALARP report (AECOM, 2025b) and PFW Dispersion Modelling (RPS, 2026a).

WET data have been classified by AECOM as either acute or chronic based on the following definitions:

- Acute toxicity - a lethal or adverse sub-lethal effect that occurs after exposure to a chemical for a short period relative to the organism's life span.
- Chronic toxicity - a lethal or adverse sub-lethal effect that occurs after exposure to a chemical for a period of time that is a substantial portion (typically greater than 10%) of the organism's life span or an adverse effect on a sensitive early life stage.

The acute and chronic classifications are based on comparing test results against recommended exposure durations for different organisms, life stages, and endpoints. Chronic results are preferred for use when deriving water quality guidelines (or SSDF). The testing used nine bioassays across six species providing broad taxonomic coverage that included a vertebrate (fish, amphipod, echinoderm, mollusc, macroalgae, and a diatom species (as listed in

Table 7.20).

From the testing results, the lowest toxicity values for all combinations of a species and endpoints are adopted as the single toxicity value that represents the sensitivity of each species in the site-specific dilution calculations. The RPS assessment (RPS, 2026b) indicates that PFW discharged during GLDA injection exhibits increased toxicity, but that ecotoxicity had decreased to baseline levels within 3 days. These lowest toxicity values 3 days post-GLDA injection are summarised in

Table 7.20. More information regarding derivation of SSDF results for both PFW and PFW-GLDA samples including limitations are presented in the AECOM (2025a) and RPS (2026b) reports (**Appendix 10** and **Appendix 13**).

Table 7.20. 2026 SSD model input values

Bioassay	Species	Endpoint	Taxonomic group	3 days post GLDA injection SSD input concentration (% concentration)	GLDA injection SSD input concentration (% concentration)
96-hr amphipod acute toxicity test	*Allorchestes compressa*	EC10 / IC10	Amphipod	1.27*	0.03*
7-day fish imbalance and biomass toxicity test	*Lates calcarifer*	EC10 (biomass)	Fish	1.07*	0.3
72-hr macroalgal germination success test	*Hormosira banksii*	EC10 / IC10	Macroalgae	16.5	0.3
72-hr marine algal growth test	*Cylindrotheca closterium*	EC10 / IC10	Microalgae, diatom	8.5	0.3
48-hr mussel larval development test	*Mytilus galloprovincialis*	EC10 / IC10	Mussel	3.2	0.1
72-hr sea urchin larval development test	*Heliocidaris tuberculata*	EC10 / IC10	Urchin	2.4	0.1

*Acute test corrected by an acute to chronic ratio (ACR) of 10.

Source: Yolla Platform Produced Water Ecotoxicology Assessment (RPS, 2026b) (**Appendix 13**).

The combined toxicity concentration thresholds were statistically analysed to determine 99% and 95% species protection levels with the results presented in Table 7.21 below, which shows that 99% species protection for PFW is obtained by a 1:483 dilution, and similarly for GLDA-PFW a 1:6,667 dilution (RPS, 2026b). In order to achieve 95% species protection, dilution thresholds decreased to 1:157 and 1:3,030, respectively. These SSDFs have been used in the determination of the extent of the mixing zone from the PFW discharge point for those two generalised scenarios by undertaking stochastic dispersion modelling.

Table 7.21: SSDFs for PFW and GLDA-PFW – 99% spp. and 95% spp.

Species Protection Level (%)	PFW	GLDA-PFW
99% Species Protection Level		
Concentration (%)	0.207	0.015
Lower 95% Confidence Interval	0.012 – 1.716	0.002 – 0.090
Site-Specific Dilution Factor	1:483	1:6,667
95% Species Protection Level		
Concentration (%)	0.638	0.033
Lower 95% Confidence Interval	0.099 – 2.386	0.010 – 0.123
Site-Specific Dilution Factor	1:157	1:3,030

Source: Yolla Platform Produced Water Ecotoxicology Assessment (RPS, 2026b) (**Appendix 13**).

In summary, based on the assessments undertaken on PFW toxicity from WET testing and changes from descaling activities, RPS (2026b) conclude that PFW discharged during GLDA injection exhibited increased ecotoxicity, but that ecotoxicity had decreased to baseline levels within 3 days. An increased dilution is required following GLDA injection to meet species protection values, resulting in a larger mixing zone.

7.6.1.5 PFW Discharge Plume Modelling

The discharge of PFW from the dump caisson window at 45 m below sea level (and 35 m above the seabed) results in the PFW mixing in the water column. The degree of mixing depends on the sea currents (speed and direction of movement) at the time and relative densities and temperatures of the PFW and seawater. A mixing zone is an accepted mechanism for delineating the area of impact to the marine environment from a point source discharge which create a plume of diluted PFW in the water column.

In order to assess the extent of the plume and the dilution of PFW, hydrodynamic modelling is undertaken. Modelling uses conservative scenarios and assumptions such as maximum discharge rates and is therefore considered to be a conservative prediction of the plume dispersion. A mixing zone is an accepted mechanism for describing the extent of a plume through its impact on the marine environment. The boundary of the Yolla PFW mixing zone is defined by the use of ANZG DGV's at the species protection levels described in Section 7.6.1 - PFW Toxicity above where there is a 99% protection level. For the Yolla PFW plume dispersion modelling, a range has been determined based on the WET testing rather than single constituents with the PFW stream.

Therefore, the purpose of the plume modelling is to define the impact and the plume through establishing locations and the associated dilutions of PFW that are occurring. Because modelling is a predictive tool, Beach has also undertaken an in-situ PFW plume monitoring field survey to verify and confirm the plume modelling results.

Origin (the then operator of the BassGas Development) commissioned RPS to undertaken PFW plume modelling in 2017. This modelling has been repeated in 2020 to account for up to 5,400 dilutions of TRH and again to support this EP update to include the WET testing data corresponding to the introduction of GLDA (RPS, 2026a). The following description of the plume modelling methodology was extracted from the RPS updated stochastic plume modelling, which included a far-field assessment relevant to the latest WET testing data.

7.6.1.6 Yolla-A Mixing Zone Modelling Results

RPS was commissioned to conduct a dispersion modelling study considering both the base case (200 m^3/day) and future case (300 m^3/day) discharge of PFW at a depth of 45 m below mean sea level. To accurately determine the dilution of the PFW discharge and the total potential area of influence the effect of initial mixing generated by the discharge jet and buoyancy effects (near-field mixing) must be considered first. Subsequent dispersion of the remnant plume by ambient currents and turbulent forces in the water column (far-field dispersion) must then be considered where near-field mixing is inadequate to meet required dilutions. Different modelling approaches are required for calculating near-field and far-field dilutions due to the differing time and space scales that are involved. Rates of both near-field mixing and far-field dispersion will vary with prevailing currents. Hence, calculations must assess for variability in prevailing currents around the discharge site. The potential area that may be influenced by the PFW discharge stream was assessed on an annual basis. The following details summarise the findings of this study.

Near-Field Modelling

The near-field modelling results were used to characterise initial plume behaviour and inform the setup of the far-field model, the result of which represent the operational mixing zone.

- Under strong currents - the distance where the lower dilution threshold of 157 was reached ranged from 18 m to 23 m across the different seasons and flow rates, while the higher dilution threshold (6,667) was reached within 375 m to 450 m.
- Under moderate currents - the distance where the lower dilution threshold of 157 was reached ranged from 10 m to 12 m across the different seasons and flow rates, while the higher dilution threshold (6,667) was reached within 190 m to 490 m.
- Under low currents - the distance where the lower dilution threshold of 157 was reached within 5 m across the different seasons and flow rates, while the higher dilution threshold (6,667) was reached within 62 m to 63 m.

Far-Field Modelling

In the 24-hour moving average evaluation, the two lower thresholds (157 and 483) were not observed.

The model indicated 3,303 dilutions at distances of 10 m and 13 m for the Base Case and Future Case, respectively.

The model recorded 6,667 dilutions at 19 m for the Base Case and 25 m for the Future Case.

In the 1-hour moving average evaluation, the three lower thresholds (16, 48 and 303) were not observed.

The model indicated 666 dilutions at distances of 7 m for the Base Case and 10 m for the Future Case.

Therefore, using the worst-case extent of the PFW plume, the standard PFW discharge mixing zone boundary is <5 m and the intermittent PFW plume from GLDA well injections has a worst case mixing zone boundary of 25 m. The mixing zone boundaries are shown in Figure 7.10.

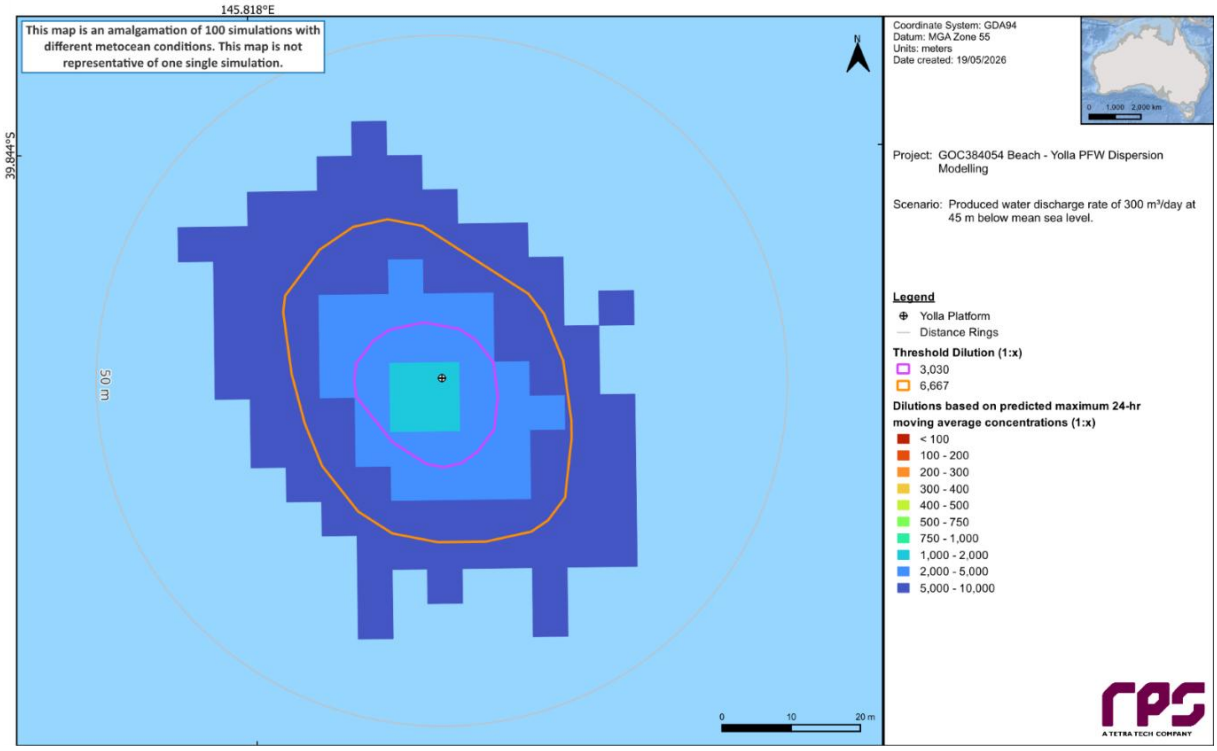


Figure 7.10: Minimum 24-hr moving average dilution for a PFW discharge at 300 m3/d (results refer to annual conditions)

Field Monitoring of Modelled Dispersion Factors

In 2023, Beach initiated a field-based plume model verification study for Yolla-A to verify the outcomes from the hydrodynamic modelling, which informs the mixing zone boundary. AECOM was engaged to undertake a PFW plume model study to verify the predictions made in the near field and far field modelling with respect to the number of dilutions the plume undergoes in the receiving environment over horizontal distance from the point of discharge.

The field survey was completed on 8-11 October 2022, with ERIAS executing the field component based on the sampling design by AECOM, with remote support from AECOM (AECOM, 2023) (study report **Appendix 9**). The field study targeted neap tides as current speed and water movement is less than during spring tides, thus increasing the likelihood of detecting the plume in the receiving environment. It was also expected that the plume would likely dilute slower during neap tides, thus providing a conservative assessment of the dilution rate of the PFW.

To aid in the detection of the PFW plume in the receiving environment, and to act as a 'tracer', the study involved injection of rhodamine WT dye (RWT) into the PFW stream prior do discharge from the platform. Two injection events were completed, one on October 9 and a second on October 10.

To assess the dilution factors of the plume in the receiving environment, the concentration of tracer dye was measured using an ROV mounted fluorometer, supplemented with discrete water samples which were analysed for RWT and a range of contaminants on completion of the survey. The data collected allowed comparison of the modelled plume dilutions with the tracer dye concentrations measured during the field survey.

The PFW flow rate across the two sampling days ranged between 230 and 280 m^3 per day. Therefore, the field data were compared against the 200 m^3 and 300 m^3 per day model scenarios.

The field study data revealed both the near and far field models under predict the dilution of the plume across horizontal distance from the point of discharge. Under high current conditions the near field model predicted fewer dilutions for both the 200 m^3 and 300 m^3 per day scenarios compared to the field data, while under low current conditions it predicted similar or fewer dilutions than the 300 m^3 per day scenario. The far field model predicted fewer dilutions for both the 200 m^3 and 300 m^3 per day scenarios.

The models applied to predicting the PFW discharge mixing zone boundary were shown to be conservative in their predictions of dilutions. Adding to this, the conditions under which the field survey was undertaken were considered to provide further conservatism due to the weak ambient currents during the neap tide phase. The field study results therefore indicate that the modelling completed for the Yolla-A PFW discharge is suitably conservative in predicting the rate of PFW dispersion and dilution and is a suitable basis upon which the mixing zone boundary can be determined.

Utilising the worst-case dilution factor of 1:485 with a mixing zone boundary of <5 m, the estimated dilution distance required for PFW constituents to reach ANZG (2018) DGVs was calculated with the results presented in Table 7.22. The method for calculation included incorporating the average value of constituents for the November 2024 sample events (a total of 8 samples), selected due to the addition of GLDA to the wells during this time and therefore discharged PFW likely representing the water quality during descaling events for the next 5 years. It should be noted that calculations do not take into consideration any chemical or physical reaction of constituents during or after discharge.

Table 7.22: Estimated dilution distances required to achieve ANZG 2018 Default Guideline Values for 99% Species Protection PFW discharge

Analyte	Mean Nov 2025 (mg/L)	DGV (99% SPL) (mg/L)[3]	Dilutions required to reach guideline	Distance from discharge point to reach guideline (m)	Within mixing zone boundary (5 m)
Metals/metalloids					
Aluminium	3.25	0.009	361	3.737	Yes
Cadmium	0.002	0.0007	2.86	0.030	Yes
Chromium	4.33	0.00014[4]	30,940	320.290	No
Cobalt	0.048	0.000005	9,600[1]	99.379[1]	No[1]
Copper	0.01	0.0002	50	0.518	Yes
Manganese	6.27	0.08	78.4	0.812	Yes
Mercury	0.0092	0.0001	91.6	0.948	Yes
Nickel	3.33	0.007	475.2	4.919	Yes
Silver	0.05	0.0008	62.5	0.647	Yes
Vanadium	0.296	0.05	5.92	0.061	Yes
BTEXN					
Benzene	13.37	0.5	26.75	0.277	Yes
Toluene	18.62	0.11	169.32	1.753	Yes
Ethylbenzene	0.466	0.05	9.32	0.096	Yes

Analyte	Mean Nov 2025 (mg/L)	DGV (99% SPL) (mg/L)[3]	Dilutions required to reach guideline	Distance from discharge point to reach guideline (m)	Within mixing zone boundary (5 m)
Xylene (total)	5.57	0.05[2]	111.5	1.154	Yes
Naphthalene	0.48	0.05	9.62	0.100	Yes
PAH					
Phenanthrene	0.00175	0.0006	2.92	0.030	Yes
Phenols					
Pentachlorophenol	0.01	0.011	0.91	0.009	Yes
Phenol	13.25	0.27	49.1	0.508	Yes

* The RPS model estimated a distance of less than 5 m for achieving a dilution of 1:483. For this assessment, a conservative distance of 5 m has been adopted.

[1] Note that for cobalt 4 of the 8 samples reported concentrations below LOR (0.01 mg/L) however were treated as 0.01 for purposes of calculations, therefore both values for number of dilutions required and corresponding distance to reach guideline are conservative and are unlikely to reflect actual conditions.
[2] DGV for m-xylene, DGV not available for p- or o-xylene
[3] DGV published on ANZG 2018 website at the time of reporting
[4] DGV is for Cr(VI) whereas reported concentrations are for total chromium. Treating the reported concentration as Cr(VI) is conservative.

7.6.2 Known and Potential Environmental Impacts

The known and potential environmental impacts of Yolla-A PFW discharges are:

- No toxicity (99% probability) to sensitive biota at the mixing zone boundaries for the two discharge scenarios (PFW and PFW-GLDA).
- Potential temporary decrease in water quality around the discharge point for the two discharge scenarios (PFW and PFW-GLDA).
- Potential changes to seabed sediment quality around the facility.

7.6.3 EMBA

The EMBA for routine PFW discharge is defined by the mixing zone which has been determined by modelling to be <5 m for the standard PFW discharge and 25 m for the intermittent PFW-GLDA discharge (based on WET testing).

7.6.4 Jurisdiction of Hazard

The jurisdictions for this hazard are outlined below.

Commonwealth waters	Victorian waters
YES	NO
PFW discharge only occurs from the platform, which is located in Commonwealth waters.	The PFW EMBA does not extend into Victorian waters.

7.6.5 Evaluation of Environmental Impacts

PFW is a chemically complex mixture, and the potential toxicants that it contains (e.g., PAHs) have been the subject of significant scientific study. The need for the assessment of potential environmental impacts from PFW is summarised by Lee et al (2005). Where marine species have been exposed to low concentrations of PFW, chronic and acute toxicity responses and sub-lethal deleterious effects have been observed, including:

- Evidence of bioaccumulation showed that PAHs, trace metals and radium were taken up by oysters (*Crassostrea virginiea*) near PFW discharge points (Neff et al., 1992).
- Chronic toxic responses have been observed in clams (*Donax faba*) exposed to PFW concentrations as low as 0.08 ppm (Din & Abu, 1992).
- Detrimental effects from exposure to PFW on the reproductive success and development of early life stages has been observed in sea urchins (Krause et al., 1992; Krause, 1994) and fish larvae/juvenile stages (Brown et al., 1998; Hinkle-Conn et al., 1998), and
- The distribution and abundance of benthic infauna communities has also been observed to change with distance from the release point of PFW discharges (Rabalais et al., 1992; Osenberg et al., 1992).

The potential for these effects varies according to multiple factors, including PFW composition, discharge volume, plume dilution/dispersion rate, bioavailability of constituents, duration of exposure to biota and marine species physiology and behaviour.

Therefore, for the Yolla PFW discharge stream, such impacts may occur for fauna within the mixing zone but would require marine species to remain in that area for an extended amount of time (at least 96 hours for acute impacts and up to 7 days for chronic effects, depending on species). WET testing and stochastic dispersion modelling described in Section 7.6.1 indicate that at the mixing zone boundaries the effects are acceptable.

7.6.5.1 Impacts to Water Quality

Impacts to ocean water quality from PFW discharges are generally limited because PFW weathers rapidly upon discharge into well-mixed oceanic waters (OGP, 2002; 2005). The most important weathering changes that affect the fate and therefore the effects of the elements within PFW are dilution, evaporation/volatilisation, adsorption/ precipitation, biodegradation and photooxidation (OGP, 2005). These processes reduce the concentrations of PFW compounds in the ocean and thereby reduce their toxicity to marine organisms (OGP, 2005). Oxygen demand of PFW is generally not a concern (OGP, 2005), and the salt concentration of PFW is generally within the same range as seawater (Neff et al., 2011).

The recent Yolla PFW characterisation testing provides the following updated results for physical indicators:

- Conductivity (at 25 °C) - ranges between 14,000 and 36,000 mS/cm.
    - This compares with a global ocean average of 33,100 +/- 2,300 mS/cm. This means that the conductivity (salinity) of the PFW discharge varies between brackish and the same as the ocean; indicating a negligible potential for impacts on marine species within the mixing

zone. The 483 worst case dilution at the mixing zone boundary means conductivity at the mixing zone boundary will equalise with the ocean baseline.

- pH (at 25°C) - ranges between 4.5 and 7.1 (with 7 being a neutral pH).
    - This compares to typical seawater pH of 8.2, meaning the PFW discharge is slightly more acidic than the surrounding seawater. Ocean acidification may impact on marine species such as molluscs that make hard shells and skeletons by combining calcium and carbonate from seawater (the increased pH reduces the ability of carbonate in the water to combine with hydrogen in the water to form calcium carbonate structures, such as shells) (NOAA, 2020). Some fish species may have a reduced ability to detect predators or find habitat in waters with a low pH, which may in turn affect the rest of the food web (NOAA, 2020). The pH of the seawater around Yolla-A is likely to rapidly return to background levels given the well mixed nature of the receiving waters. The 483 worst case dilution at the mixing zone boundary means pH at the mixing zone boundary will equalise with the ocean baseline.
- Total phosphate – ranges 0.01 to 1.4 mg/L, averages 0.3.
    - This is elevated compared to an average of 0.01 mg/L in seawater. This means that the nutrient level in the PFW discharge plume is higher than the surrounding seawater. In still, unmixed waters, this can result in eutrophication (reduction of dissolved oxygen through the promotion of growth of oxygen-consuming algae) and the death of marine life trapped in the low oxygen plume. In the well mixed waters around Yolla-A, such impacts do not occur, with turbulent mixing within the discharge caisson, and water currents in the receiving waters rapidly oxygenating the discharge. The 1,961 worst case dilution at the mixing zone boundary means phosphate at the mixing zone boundary will equalise with the ocean baseline.
- Total nitrogen - ranges between 27 to 1,900 mg/L.
    - This means that the nutrient level in the PFW discharge plume is substantially higher than the surrounding seawater, with the potential effects of this similar to that of elevated phosphate. Turbulent mixing and water currents will rapidly oxygenate the discharge and prevent eutrophication from occurring. The 483 worst case dilution at the mixing zone boundary means nitrogen at the mixing zone boundary will likely equalise with the ocean baseline.
- Total suspended solids (TSS) - range between 5 and 53 mg/L. This compares with TSS concentrations ranging from 0.8 to 13 mg/L in Australian waters.
    - The TSS concentrations of the PFW discharge are within, and sometimes higher than the general range of natural oceanic TSS concentrations. TSS concentrations between 10 and 1,830 mg/L are considered a 'low exposure' level (sub-lethal effects on pelagic fauna) for the purposes of modelling the dispersion and fate of drill cuttings and muds (Nelson et al., 2016). Concentrations above 1,830 mg/L are used to define high exposure that would result in mortality of pelagic fauna (IOGP, 2016).
    - Such increases in suspended solids could potentially impair the ability of marine fauna to find prey or detect predators, and clog fish gills, but is in the lower range of the low exposure level (noted above). In the well mixed waters around Yolla-A, suspended solids are

rapidly dispersed and diluted into the water column, meaning such impacts are highly unlikely to occur.

This data indicates that the concentrations of chemical and TSS components in Yolla PFW rapidly dilute and disperse on discharge, and it is expected that changes to water quality within the mixing zone would have negligible potential to affect fauna moving in and out of the PFW plume. At the mixing zone boundaries water quality equalises to ocean water quality. As a result, the impacts to water quality from the PFW discharge are assessed as having a **Minor (1)** consequence.

7.6.5.2 Impacts to Marine Life

Neff et al (2011) states the following with regard to the effects of PFW discharges in the water column:

- Harmful biological effects to biological communities in the water-column in the open ocean are expected to be minimal and localised because of the rapid dilution, dispersion, and transformation rates of most chemicals in the PFW.
- Some produced waters contain chemicals that are highly toxic to sensitive marine species, even at low concentrations.
- When the PFW discharge is of a low-density in an area with low water turbulence and current speeds, concentrations of PFW chemicals may remain high for long enough to cause ecological harm (noting this is not the case for the Yolla-A location).
- The chemicals of greatest environmental concern in produced water, because their concentrations may be high enough to cause bioaccumulation and toxicity include aromatic hydrocarbons (including BTEX), some alkylphenols, and a few metals.
- Most metals and naturally occurring radionuclides are present in PFW in chemically reactive dissolved forms at concentrations similar to or only slightly higher than concentrations in seawater and, therefore, are unlikely to cause adverse effects in the receiving water environment.
- Inorganic ions (e.g., sodium, potassium, calcium, and chloride) are not of concern in PFW discharges to the ocean.
- There is a limited potential for acute toxicity to marine life beyond the immediate vicinity of PFW discharges, though continual chronic exposure may cause sub-lethal changes in populations and communities.

Most concern about impacts to marine life from PFW discharges are related to the impacts of petroleum hydrocarbons (BTEX and PAHs) and trace metals, which are discussed in general here.

BTEX

The most abundant hydrocarbons in PFW are the low molecular weight mono-aromatic hydrocarbons benzene, toluene, ethylbenzene, and xylenes (collectively referred to as BTEX) and low molecular weight saturated hydrocarbons (Neff et al., 2011). BTEX are extremely volatile and are lost rapidly during initial mixing of the plume in the ocean ((Terrens and Tait, 1996), OGP (2005))

states that BTEX do not persist in ocean water and are not accumulated to any degree by marine organisms. AECOM (2019) report the following impacts for the individual BTEX constituents:

- Benzene – The potential for benzene to bioconcentrate in aquatic organisms (intake and retention of a substance in an organism entirely by respiration from water) is considered to be low. It also has a low tendency to bioaccumulate, so it is not considered likely to biomagnify though food chains. It has high volatility and relatively low water solubility and is rapidly lost to the atmosphere from water. Biodegradation varies with season but is considered by ANZG (2018) to be rapid.

- Ethylbenzene – the acute toxicity of ethylbenzene to marine algae, invertebrates and fish is rated as 'moderate' by Toxnet (2017); there are no data reported for chronic toxicity. The potential for bioconcentration in aquatic organisms is considered low and ethylbenzene is considered to be volatile and inherently biodegradable in water under aerobic conditions.

- Toluene – algae seem to be more resistant to the acute effects of toluene than fish and crustaceans. Bioaccumulation in marine organisms has been found to be low, and depuration rates high. Bioconcentration in aquatic organisms is considered to be low to moderate. Toluene has high volatility and relatively low water solubility and is rapidly lost to the atmosphere from water (ANZG, 2018). Complete degradation has been observed over periods of four days (summer) and 22 days (spring) in a marine mesocosm (outdoor controlled experiment).

- Xylenes – meta-, para- and ortho-xylenes are chemical isomers, with similar physicochemical properties and moderate to low toxicity. They are inherently biodegradable under aerobic conditions and their bioaccumulation and bioconcentration potentials are considered to be relatively low (OECD, 2003; Ogata et al., 1984).

Within the mixing zone, the points noted above indicate that BTEX will biodegrade rapidly and therefore present a negligible risk of toxic impacts to marine life, especially because there is limited resident/site-attached fauna in the mixing zone, with species such as fish and seals typically moving in and out of the plume and an absence of specialised habitat (such as canyons, rocky reefs, volcanic mounts, kelp forests, etc) that would act as specialised habitat for marine fauna. Impacts to various fauna groups are discussed in more detail in the following sections.

Total BTEX concentrations reported between 2020 and 2026 have ranged from 0.056 mg/L to above 163 mg/L, with an average of 65 mg/L during this time. The ANZG (2018) DGVs for marine waters for BTEX constituents are presented in Table 7.23**Error! Reference source not found.**. Using the 6,667 worst case dilution factor, and average BTEX concentrations for the November 2025 sampling period, BTEX concentrations are estimated to reach DGVs within the 25 m mixing zone boundary.

Polycyclic Aromatic Hydrocarbons

PAHs comprise a large group of compounds (with two or more fused aromatic rings) that are relatively insoluble, with the potential for bioaccumulation increasing with molecular weight (OGP, 2005). Naphthalene and phenanthrene are generally the key PAH compounds (with naphthalene being the highest concentration PAH component of the Yolla PFW stream). The two benzene ring naphthalenes are characterised by moderate aqueous solubility and lower bioaccumulation potential than PAHs with three rings or more. As such, they represent a low risk of effects in the

environment (OGP, 2005). Fish can metabolise PAH rapidly (OGP, 2005), further reducing the potential for impacts to marine life.

Table 7.23: Estimated dilution distances required to achieve ANZG 2018 Default Guideline Values for 99% Species Protection for PFW-GLDA discharge.

Analyte	Mean Nov 2024 sample (mg/L)	DGV (99% SPL) (mg/L)[3]	Dilutions required to reach guideline	Distance from discharge point to reach guideline (m)	Within mixing zone boundary (25 m)
Metals/metalloids					
Cadmium	0.0020	0.0007	2.86	0.011	Yes
Chromium	1.7000	0.00014[4]	12,143	45.534	Yes
Copper	0.0100	0.0002	50	0.187	Yes
Nickel	0.6500	0.007	92.86	0.348	Yes
Mercury	0.0023	0.0001	23	0.086	Yes
BTEXN					
Benzene	11	0.5	22	0.082	Yes
Toluene	21	0.11	190.9	0.716	Yes
Ethylbenzene	0.8	0.05	16	0.060	Yes
Xylene (total)	11.1	0.05	224	0.840	Yes
Naphthalene	0.73	0.05	14.6	0.055	Yes

Marine biota can take up PAHs via a number of routes, including dermal absorption, inhalation and consumption of contaminated prey or sediment. However, the persistence of these compounds in tissues and body fluids of exposed marine organisms varies depending upon the rates of uptake, metabolism and elimination (AECOM, 2020). Fish exposed to PAHs may exhibit an array of toxic effects including genetic damage, morphological deformities, altered growth and development, decreased body size, inhibited swimming abilities and mortality (AECOM, 2020). Vertebrates, such as fish and marine mammals, quickly metabolise PAH into more polar forms that are then excreted into urine or secreted into bile for rapid elimination via faeces (AECOM, 2020).

OGP (2002) reports that a number of toxicity mechanisms have been linked to PAH, including non-polar narcosis, phototoxicity, biochemical activation that, in turn, may result in mutagenicity, carcinogenicity and teratogenicity. Some PAHs may also have influence on hormone regulation (endocrine disruption). OGP (2002) states that the extent of exposure to PAH and potential toxicity resulting from this exposure is considered low based on studies of fish and shellfish living in their natural environment near PFW discharges that did not accumulate PAH to an environmentally significant extent.

Naphthalene concentrations reported between 2020 – 2025 have ranged from 0.05 to 0.86 mg/L, with an average of 0.51 mg/L. The ANZG (2018) DGV for naphthalene in marine waters is 0.05 mg/Lusing the 6,667 worst case dilution factor.

Metals

The Yolla reservoir fluids contain mercury and some of this is entrained within the PFW. A filter removes suspended mercury compounds from the water discharged to the ocean. The filter substrate is periodically changed and the waste material collected is brought onshore for disposal by a licensed waste management contractor. No particulate mercury is discharged to sea.

Mercury preferentially remains in either the gas or condensate streams. Dissolved mercury may however also be present in the PFW at levels up to saturation (50 µg/L) at process operating conditions. Saturation levels of mercury increase with increasing temperature. Actual recorded mercury levels between 2020 and 2025 were between below the LOR of 0.0001 mg/L to 0.038 mg/L, with an average of 0.01 mg/L, which is lower than the ANZG (2018) 99% species protection level if there are no data to allow for adjustment for bioaccumulation at the specific site. OGP (2005) reports that although trace metal concentrations in PFW are significantly higher than concentrations in seawater, these concentrations rapidly attenuate in the ocean by dilution and other physiochemical reactions such that they pose little risk to the receiving environment. ANZG (2018) notes that mercury in marine waters is not as toxic as some other metals and that mercury concentrations in most surface waters are too low to cause any direct toxic effects to adult fish or sensitive juvenile fish.

The AECOM ALARP report (AECOM, 2025b) indicated the possibility that the GLDA descaling formulation injected into wells may release metals into the PFW during normal operations. The PFW-GLDA characterisation data, presented earlier in Table 7.21 shows the metals range in concentration from below LOR (arsenic, cadmium and copper) to 1.7 mg/L (total chromium), and in increase in metal concentrations caused by GLDA well injection for chromium, lead, nickel and zinc.

Table 7.23 presents the concentrations from the November 2024 PFW-GLDA sample in comparison to ANZG (2018) DGVs for 99% species protection level, where available. The table also includes the number of dilutions required for each constituent to reach the DGV, and the distance from discharge point using the worst case 6,667 dilution factor for PFW-GLDA.

The 6,667 worst case dilution at the PFW-GLDA discharge mixing zone boundary means these constituent concentrations will likely equalise with the ocean baseline within the stipulated 25 m mixing zone boundary. These concentrations are below the ANZG threshold values for these metals.

Sediment sampling was undertaken in February 2021 within the PFW mixing zone and the level of mercury in the seabed sediments was below the ANZG DGV threshold. Results from the sampling program were fed into the AMF (

Table 7.28). Sediment sampling will be repeated in 2026.

Based on this information, the potential impacts to marine life from the PFW discharge are assessed as having a **Minor (1)** consequence.

7.6.5.3 Potential toxicity to fish

Impacts of hydrocarbons to fish are principally via movement of water across the gills and ingestion of prey species who have been similarly exposed.

Research. Meier et al (2010) exposed Atlantic cod (*Gadus morhua*) to PFW in in the North Sea during the embryonic, early larval or early juvenile stage (embryonic to 6 months of age). The study found that alkylphenols bioconcentrated in fish tissue based on dose and developmental stage during PFW exposure. PFW exposure had no effect on embryo survival or hatching process. However, a 1% PFW concentration (but not 0.1% or 0.01%) interfered with development of normal larval pigmentation. Post-hatching, most larvae exposed to 1% PFW developed jaw deformities and failed to begin feeding and subsequently died of starvation. Cod exposed to 1% PFW concentrations had significantly higher levels of the biomarkers vitellagenin and CYP1A in plasma and liver respectively.

Although the Meier et al (2010) study exposed early life stage fish to PFW from a North Sea oil platform (as opposed to an Australian gas/condensate platform), it does demonstrate the potentially deleterious impact of the complex mixture on the early life stages of fish. More recently, using the same fish species, observations by Hansen et al (2019) on the exposure of Atlantic cod embryos to PFW are similar to those described above. After conducting a four-day exposure to PFW extracts equivalent to 1:50, 1:500 and 1:5,000 times dilution, no significant reduction in survival or hatching success was observed, however hatching was initiated earlier for exposed embryos in a concentration-dependent manner. During recovery, cod embryos were observed with significantly reduced heart rates (a sign of cardiotoxicity). The exposed embryos were smaller and displayed signs of craniofacial and jaw deformations. The developing heart is considered a primary target for toxicity of crude oil compounds to early life stages of fish, whereas most other aspects are likely secondary effects caused by loss of circulation (Incardona, 2016; Grøsvik 2010).

Across controlled laboratory studies, the groups of fish exposed to the highest concentration of PFW generally exhibit the most deleterious responses in comparison to groups treated against lower concentrations in the same study. The exposed fish are typically exposed for a much longer time than would be expected in the field (e.g., four-day exposure, 76-day exposure, etc.).

Studying the effects of PFW exposure on fish species on the Australian North West Shelf, Gagnon (2011) detected elevated levels of stress proteins (HSP70) in fish species at all study locations as a proxy for exposure to PFW. However, Gagnon concluded that while the chemical characteristics of PFW are important in determining potential impacts to biota, consideration of the loading of PFW (e.g., concentration x volume) exposure is crucial in assessing environmental effects and risks of PFW discharge.

Implications for Yolla-A

Based on the WET testing toxicity laboratory analysis, any fish swimming through the PFW mixing zone for extended periods (e.g., 96 hours) would be expected to experience acute toxicity (mortality) through uptake of hydrocarbons across their gills (dissolved components) or through ingestion of hydrocarbon droplets (dispersed components). Chronic toxicity (e.g., impaired growth,

imbalance) may be experienced for fish exposed to the mixing zone for a continuous period of 7 days.

Fish may experience mortality or sub-lethal effects, but only if there are no physico-chemical (as opposed to toxicant) properties of the PFW plume (such as temperature, salinity or TSS) that may discourage fish from spending prolonged periods within it. It is reasonable to assume that the proportion of the regional population of any fish species that may be adversely affected by the PFW plume will be sufficiently low as to not pose a risk of significant impacts to overall regional productivity or ecosystem function.

As seen in Plate 7.1, there is minimal fouling on the platform jacket legs in the vicinity of the caisson discharge point to attract a resident fish population (by providing a source of food and shelter). This means that fish present in the mixing zone are more likely to be wide ranging pelagic species rather than site-attached fish, meaning they are more likely to swim through the mixing zone than reside within it or spend substantial time feeding within it. Given the highly mobile nature of pelagic fish species in central Bass Strait and the very small PFW mixing zone, it is therefore expected that exposure to the mixing zone is limited to brief periods where fish move in and out of the plume. Acute and chronic toxicity impacts are not likely to arise in species whose presence in the plume is of a transitory nature and not related to foraging.



Plate 7.1: Fouling on the platform legs

Section 5.6.7 of the EP lists and describes the threatened fish species that are known to be or may be present in the operational area and spill EMBA. Based on habitat preferences, the species likely

to occur in the EMBA by PFW are the following oceanic species; great white shark (vulnerable), shortfin mako shark (migratory) and the porbeagle (migratory).

Fish that are commercial fisheries targets may have the potential to be impacted by the PFW discharge. Noting that no commercial fishing can take place within the PSZ (500-m radius) of the Yolla-A platform (which covers the PFW mixing zone), the commercial fisheries known to operate in the region (see Section 5.9.5 of the EP) that may target species that move through the PFW mixing zone are:

- Commonwealth-managed;
    - SESS (Shark Gillnet and Shark Hook sector) - targets mostly gummy shark, school shark, sawshark and elephant fish.
    - Southern squid jig – targets arrow squid (noting this is a cephalopod rather than a fish species).
- Victorian-managed;
    - Ocean purse seine – targets Australian salmon, sandy sprat and anchovy in nearshore waters.

The target species in these fisheries have wide oceanic habitat ranges and are not restricted to waters occupied by the PFW plume. While these species may briefly move through the plume, they do not permanently reside within it, meaning that they will not be subject to acute or chronic toxicity impacts from exposure to the PFW. As noted previously, PAH are likely to be quickly metabolised and excreted, meaning that bioaccumulation is not likely to occur (which also means these species are safe for human consumption).

Similarly, prey species for these commercial fishing targets are diverse (benthic, demersal and pelagic) and wide- ranging and not restricted to the area occupied by the PFW plume, so it is not likely that the target fisheries species would consume enough PFW-affected prey to result in bioaccumulation impacts.

Based on this information, the impacts to fish from the PFW discharge are assessed as having a **Minor (1)** consequence.

7.6.5.4 Potential toxicity to fouling species

Marine biota living within a PFW plume may bioaccumulate hydrocarbons and other components from the water or their prey living within the plume (or from seabed sediments e.g., when the plume extends to the seabed intermittently).

Research. Indicators of bioaccumulation were studied by Neff et al (2011) by measuring four metals (arsenic, barium, cadmium, and mercury), BTEX, phenol and PAH in two species of bivalve molluscs from platform legs and five species of fish collected within 100 m of PFW-discharging and non-discharging platforms in the Gulf of Mexico. The study found that there was no difference in concentrations of any of the metals, phenols or BTEX in tissues of bivalves and fish from discharging and non-discharging platforms. However, total PAH concentrations were significantly higher in tissues of one or both species of bivalve tissues than in fish tissues (likely because of the high activity of PAH-metabolising enzymes in fish). PAH concentrations were significantly higher in

one or both species of bivalve compared to the reference (non-discharging) platforms. This study demonstrates the ability of some bivalve species associated with the biofouling community of submerged structures on PFW- discharging platforms to bioaccumulate PAHs but not metals, phenol or BTEX following exposure to PFW. OGP (2002) reports that due to the rapid time (i.e., a few minutes) required for PFW discharges to dilute 1,000;1, the exposure time to aromatic hydrocarbons (BTEX) is short. This limited time for exposure to acute or chronic toxicity levels of aromatic hydrocarbons limits the potential for exposure of organisms living near the discharge (e.g., fouling species). This is supported by observations that shellfish (and fish) living near PFW discharges have not been found to accumulate aromatic compounds (OGP, 2002).

Implications for Yolla-A

Based on the WET testing toxicity laboratory analysis, fouling species such as algae and mussels may experience chronic toxicity (e.g., impaired germination or development) if exposed to the PFW plume for a continuous period of 48-72 hours (2-3 days). However, it is noted that the plume is dynamic in nature, and its distribution varies in response to oceanographic conditions (swells, wind and/or tidally-driven currents, etc). Hence the only fouling biota that could potentially be exposed to the plume for a continuous period of 2-3 days would be those on the caisson itself, where other conditions (e.g., the velocity of seawater flow across the surface of the caisson and the depth of the discharge window at 45 m) may prevent their establishment.

Fouling species living in the Yolla-A PFW plume may accumulate PAHs. Plate 7.1 indicates there is a sparse fouling community (e.g., bryozoans, hydrozoans, limpets, barnacles) that has grown on the platform jacket's cross- beams near the caisson discharge point, and these may periodically be within the Yolla-A PFW plume. Given the sparse abundance of such fouling species on the jacket cross beams, it is unlikely that higher order predators (e.g., pelagic fish) consuming this food source would consume enough to induce any toxicity impacts at their own trophic level or those higher (e.g., seals, sharks).

Based on this information, the impacts to fouling species (or to higher trophic species that may prey upon them) from the PFW discharge are assessed as having a **Minor (1)** consequence.

7.6.5.5 Potential toxicity to plankton

Section 5.6.1 describes the planktonic assemblages known for Bass Strait.

Based on the WET testing toxicity laboratory analysis and using the amphipod *Allorchestes compressa* as a proxy for zooplankton, plankton may experience acute toxicity if they remain exposed to the PFW plume for a continuous period of 96 hours (4 days). Using urchin larvae as a proxy for zooplankton, plankton may experience chronic toxicity (e.g., impaired development) if exposed to the PFW plume for a continuous period of 72 hours (3 days).

Plankton is generally most abundant in the upper layers of the water column (Volkman et al., 2004). Plankton floating through the PFW plume with the currents are exposed to OIW and TPH concentrations that may result in lethal and sub-lethal effects. At Yolla-A, this potential is very low, given the small size of the PFW mixing zone, the fact that the discharge and the plume is largely confined to the mid-water column (where plankton is less abundant), the open ocean environment, and that currents are constantly moving through the region (current speed around Yolla-A is predicted to range between 0.16 and 0.22 m/s, as described in Section 5.3.1). Based on the lowest predicted current (0.16 m/s) and the size of the mixing zone, individual plankton would be exposed

to the plume for less than one minute. Such brief exposure to the PFW plume will therefore pose a negligible risk of acute or chronic toxicity impacts to plankton.

In this highly dispersive open ocean environment, the relative size of the potential impact area is insignificant compared to surrounding waters and any impacts to plankton on a population level are expected to have a **Minor (1)** consequence.

7.6.5.6 Potential toxicity to seals

As noted in Section 5.6.6, fur-seals are frequent visitors to Yolla-A, often observed resting and playing at the sea surface around the platform jacket (there is no sea deck for the seals to haul on to). They often number up to a dozen but may sometimes be several dozen individuals. This indicates that the infrastructure may support suitable foraging habitat or may provide perceived safety from predators.

Research. Thie Bass Strait region is considered to be of low primary productivity (Gibbs, 1992), therefore the presence of subsea infrastructure can potentially provide valuable foraging habitat. A study conducted by Arnould et al (2015) concluded that offshore infrastructure in the Bass Strait was potentially important foraging habitat for Australian fur-seals, due to creation of fish habitat, however the study indicated that pipelines and cable routes appeared to be the most influential structures (over wells and shipwrecks), potentially providing habitat connectivity for prey species.

Stimmelmayr et al (2018) note that PAHs are metabolised efficiently by vertebrates and usually found at low concentrations in the tissues of these animals. In experiments undertaken on visibly oiled seals in Alaska (Phoca hispida and P. largha), low levels of PAHs (<50 ng/g, wet weight) were measured in the tissues of oiled seals, validating other studies indicating the same finding in fish (the PAHs are rapidly metabolised, transferred to bile and then eliminated). This study found that tissues of oiled seals with higher percentages of lipids (e.g., blubber, skin) had higher concentrations of PAHs compared to tissues with low lipid content (e.g., muscles, kidney, liver with 10% lipid content). By extension, there is, theoretically, the potential for transfer of PAHs to nursing seal pups through their mothers' lipid-rich milk, though a study by Frost and Lowry (1994) of seals impacted by the Exxon Valdez spill found only low concentrations of PAHs in mammary tissue and mother's milk.

Lactational transfer of other fat-soluble persistent organic pollutants (e.g., PCBs) from mother seals to pups has been recorded in numerous northern hemisphere studies (e.g., Wolkers et al., 2004; Hickie et al., 2005; Frouin et al., 2012; Vanden Berghe et al., 2012; Shaw et al., 2014) and in the southern hemisphere (e.g., Filho et al., 2009). The transfer of organic halogenated contaminants (e.g., organochlorine pesticides, PCBs) from mother seals to foetuses has also been recorded (Wang et al., 2012; Brown et al., 2015). However, no research has been identified into lactational transfer, or mother-to-foetus transfer of PAHs. This may be due to the limited bioaccumulation potential of PAHs relative to PCBs (Noël, 2013), which is likely to be a result of the rapid metabolism and renal elimination of PAHs by seals (Engelhart, 1983; Stimmelmayr et al., 2018).

Stimmelmayr et al (2018) also report that lung lesions were observed in one of the three seals, which may have been the result of inhalation-related damage (inhaling volatile oil components at the air/water interface).

However, this is related to crude oil on the water rather than, as in the case with PFW discharges, highly diluted TPH.

Implications for Yolla-A.

The WET testing did not involve toxicity tests on marine mammals (such a testing regime does not exist), so the exact dilution factor required to meet the NOEC for seals is unknown. There is a potential for seals, specifically the Australian fur-seal (which feeds on pelagic species, as opposed to New Zealand fur-seals that forage on benthic fauna), to forage on fish species that have had a direct association with habitat within the PFW mixing zone (e.g., seals eat fish that may have eaten algae, crustaceans or molluscs that inhabit the PFW mixing zone). Therefore, there is a potential that bioaccumulation or bioconcentration of toxicants within fur seals may occur if enough of their prey has bioaccumulated the toxicants from the PFW discharge. The principal diet of most seals consists of cephalopod molluscs and fish. Unlike bivalves and suspension feeders (that may attach to the jacket or be present in sediments around the platform), these prey are not likely to accumulate petroleum hydrocarbons. Seals have been found to possess the necessary enzymes to metabolise some petroleum fractions, while others (e.g., anthracene, phenanthrene and naphthalene) may be deposited into fat stores (Engelhardt, 1982; Addison & Brodie, 1984; Addison et al., 1986, Hoseini et al., 2020). Geraci & St Aubin (1988) suggest that a small seal (weighing 50 kg) might need to ingest 1 litre of oil to be at risk. Given that the quantity of oil discharged in the PFW stream is about 9 litres/day (or 375 ml/hr), this would suggest that a seal (of similar weight, noting adults are expected to be much heavier than this) would need to remain around the discharge caisson exit point (mid- water column) and ingest all the discharge for three hours to be at risk. This is not a credible scenario given that they rest on the water surface or onshore (not mid-water column). Geraci & St Aubin (1988) note that seals have a good olfactory sense, and one that is keen enough to detect hydrocarbon vapours (and by extension, avoid it if it causes discomfort or injury). Given that seals are regularly sighted milling under and around the platform, this suggests that hydrocarbon vapours at the water surface are not of a sufficiently high concentration to cause discomfort, let alone inhalation-related damage. This is to be expected given the depth of the PFW discharge and the fact that by the time the PFW plume reaches the sea surface, it will be highly diluted and some distance away from the platform (rather than directly beneath it) due to the effect of water currents.

No evidence of deleterious effects related to bioaccumulation of petroleum hydrocarbons has been documented for seals (NOAA, 1992). It is therefore not likely that important biological activities such as breeding and feeding (which impact on life expectancy) will be affected by seals' occasional presence within the PFW mixing zone.

IOGP (2002) reports that the most abundant aromatic compounds in PFW, the BTEX compounds, are volatile and evaporate rapidly from PFW discharged close to the sea surface or from PFW discharge plumes reaching the surface due to density gradients. These losses, allied to dispersive mixing, result in 50,000 to 150,000-fold reduction of the benzene concentration in seawater 20 m away from the PFW discharge point (Brook et al., 1980; Rabalais et al., 1991; Terrens and Tait, 1996). The PFW discharge plume modelling used for this case (RPS, 2017; 2020) assumed no volatilisation and is therefore conservative (over predicting). The reported results support the findings of the WET testing and modelling in that the concentrations of aromatics (e.g., BTEX) will reach 99% SPL within the stipulated mixing zone boundaries for both routine PFW discharge and PFW-GLDA discharge.

Oil on the sea surface has the potential to coat the fur of seals, which can affect vital physiological functions such as body temperature regulation (i.e., the matting of fur can lead to hypothermia and death) and coating of mucous membranes (such as eyes and ears, which would make functions

such as locating prey difficult). The PFW discharge does not result in slicks of oil at the sea surface (either directly under and around Yolla-A where seals spend time resting, or further afield), so there is no risk of coating of fur by hydrocarbons within the PFW discharge. In the water column, the hydrocarbons within the PFW are diluted to such a low concentration in such a short distance from the discharge point that the coating of fur is low risk.

The dozen or several dozen individual seals that are regularly sighted milling around the platform are likely to come from the nearby breeding colonies of Rag Island, Kanowna Island, the Answer Group of Islands and the Kent Island Group. These breeding populations are known to be in the thousands (see Section 5.6.6). While toxicity impacts to seals are not likely to eventuate (from direct exposure to the PFW plume, ingestion of contaminated prey or coating of fur), if impacts did occur, the small number of seals that may be impacted does not represent a significant impact at the population level. The same applies to New Zealand fur-seals, noting that the majority of their breeding colonies are in SA and WA, but that populations at the nearest haul-out sites to Yolla-A are also in the thousands.

Section 5.6.6 of the EP lists and describes the threatened pinniped species that are known to be present in the operational area and spill EMBA. Based on observations from Yolla-A and habitat preferences, the species known to and considered likely to occur in the PFW mixing zone are the Australian and New Zealand fur-seals (both listed as marine species under the EPBC Act).

Based on this information, the impacts to seals from the PFW discharge are assessed as having a **Minor (1)** consequence.

7.6.5.7 Potential toxicity to cetaceans

As noted in Section 5.6.5, humpback whales are observed migrating past Yolla-A and dolphin pods are regularly sighted.

Observations from operators on Yolla-A indicate that individual humpback whales mill around the platform for a number of hours during their annual migration seasons, appearing inquisitive about the structure. This milling and continuous movement means they do not remain in the PFW plume for extended periods (even though they have been sighted swimming under the platform hull). As such, the duration of potential exposure to PFW means that acute or chronic toxicity effects are not likely. This applies to other large cetaceans also.

For smaller cetaceans such as dolphins, their high mobility means they are not constantly exposed to the PFW discharge. They are not observed milling under the platform hull or around the platform, which means they would not be subject to any risks of acute or chronic toxicity.

Impacts to individual cetaceans or populations (e.g., PAH bioaccumulation) are therefore not anticipated given their transient (if at all) presence around the PFW plume and the consequence is therefore assessed as **Minor (1)**.

7.6.5.8 Impacts to Seabed Sediment Quality and Benthic Communities

The Yolla-A PFW discharge caisson is located 35 m above the seabed and the PFW plume is buoyant. The PFW plume does not generally interact with the seabed (See Plate 3.3). RPS (2025) PFW dispersion modelling that shows a worst-case discharge for the maximum 300 m^3/day rate where the near-field plume may touch the seabed), so there are likely to be few impacts to the seabed immediately around the PFW plume. Neff et al (2011) state that although PFW plumes

occur mainly within surface waters, there is the potential for particles within the plume, which may comprise metal oxides and low solubility hydrocarbon droplets (such as higher molecular weight PAHs), to drop out of the plume in the far- field mixing zone.

In well-mixed offshore waters (such as Bass Strait), elevated concentrations of saturated hydrocarbons and PAH in surficial sediments are sometimes observed out to a few hundred meters from a high-volume PFW discharge. The concentration of PAH in sediments near offshore PFW discharge points is related to the volume and density of PFW discharges (Neff et al., 2011). Particulates settling onto the seabed are subject to re-suspension, bioturbation and microbial decay.

Yeung et al (2011) analysed bacterial communities within PFW and seawater from the Baud platform on the Scotian Shelf off eastern Canada. Yeung et al (2011) found that the bacterial communities in the PFW and the seawater were different and that the PFW discharge had no detectable effects on the bacterial communities in the seawater.

However, genomic analysis of the seabed revealed that the bacterial communities within the sediments varied based on distance away from the PFW discharge location. The near-field sediments contained elevated concentrations of manganese and iron, which were associated with the PFW discharge stream. The study observed that the bacterial assemblages in sediments more than 250 m away from the discharge location were different to those closer to the platform (<250 m), suggesting that PFW discharge has a detectable effect on the bacterial communities in sediments closest to the discharge point and thus potentially the higher order communities among the food web.

Precipitation of barium and dilution of the resulting barite in the PFW plume are rapid enough that dissolved barium concentrations rarely exceed acutely toxic concentrations. Results from monitoring programs generally show the natural dispersion processes appear to control the concentrations of toxic metals in the water column and sediments just slightly above natural background concentrations (Neff et al., 2011).

Sediment sampling was undertaken in February 2021 within the PFW mixing zone (Figure 7.11 below). Based on the results presented relative to the transect locations for metals compared to the 80th percentile of reference locations, there are differences in sediment quality that may be attributable to Yolla operations (AECOM, 2023). A summary of results and key findings is shown in Table 7.24. Sediment sampling will be repeated in 2026.

Based on the conclusions of Neff et al (2011) above, the results of other studies into the impacts of PFW on seabed sediments in the Gippsland region (see Section 7.6.6) and the high proportion of dissolved hydrocarbons in the Yolla PFW (rather than OIW), toxicity effects of the PFW discharge on benthic communities are expected to be **Minor (1)**.

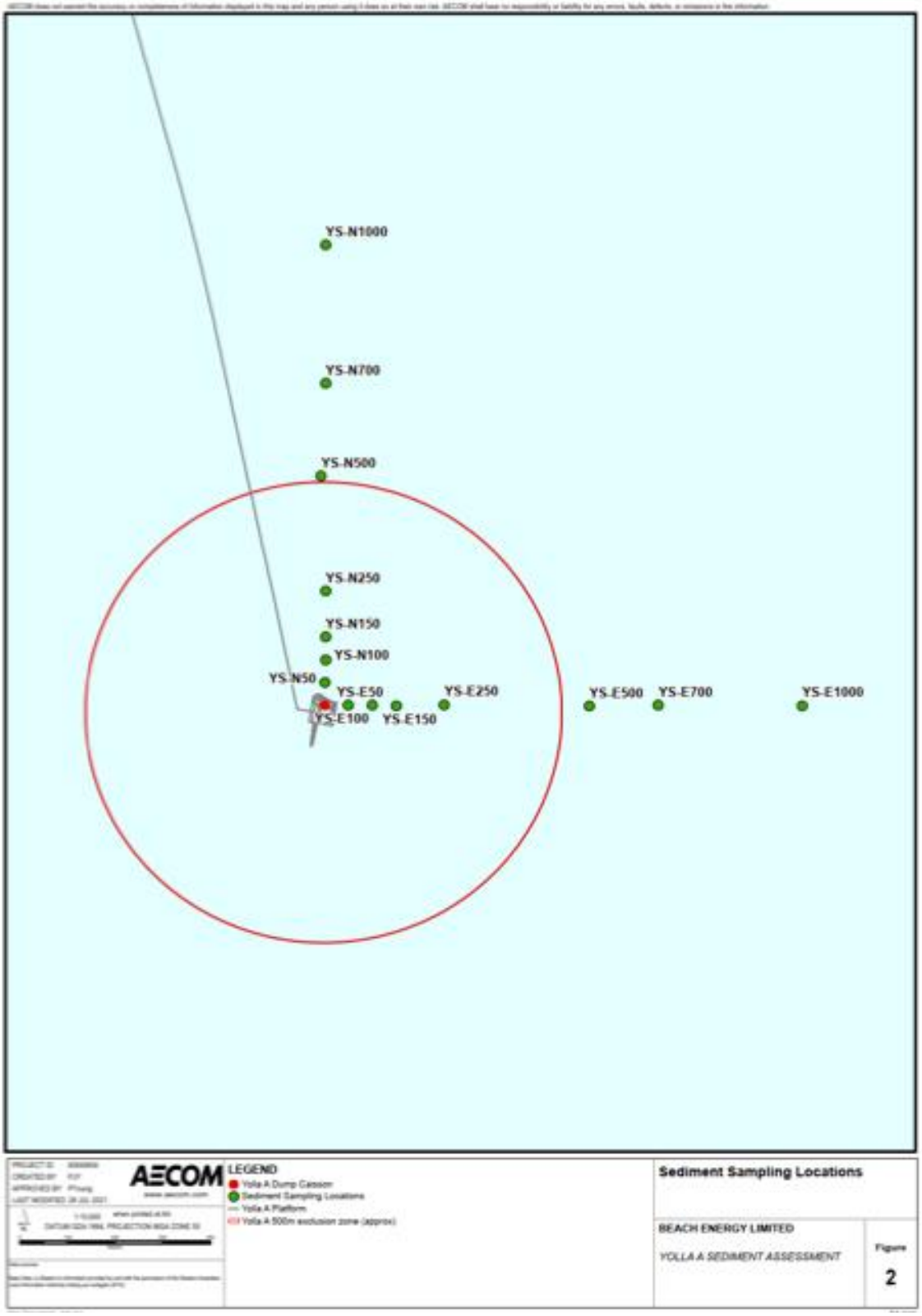


Figure 7.11: Sediment sampling locations in the vicinity of Yolla platform

Table 7.24: Summary of key findings

Factor	Summary of Results
Mercury	Mercury in sediment was detected above the ANZG DGV of 0.15 mg/kg in the primary sample (0.31 mg/kg), approximately 100 m from the platform. Subsequent re-analysis in triplicate of the sample, and analysis of a secondary sample, all reported concentrations below the DGV. Elutriate testing of the sample reported no detection of mercury above the LOR of 0.001 mg/L. Bioavailability testing of the sample via a weak acid digest analysis reported a result below LOR (0.1 mg/kg). Analysis of total mercury on the same sample by the laboratory that conducted the elutriate and bioavailability testing reported a concentration of 0.03 mg/kg. Mercury was detected above the LOR in most other transect locations, with all reported concentrations below the DGV.
Other metals	No other metals reported concentrations above their respective DGVs (where applicable). With the exception of antimony and silver, all metals concentrations were above the 80th percentile of reference location concentrations.
TRH and TPH	The concentrations of all recoverable and petroleum hydrocarbons were below their respective LORs.
Nutrients in sediments	Phosphorus concentrations were above the 80th percentile (390 mg/kg) of all reference location concentrations at 50, 100 and 150 m distances away from the platform along the eastern transect, and only at 100 m from the platform along the northern transect. The results for TKN and Total Nitrogen concentrations from all transect locations were below the 80th percentile (1300 mg/kg) of all reference location concentrations. Nitrate and nitrite (as N) concentrations were reported below the LOR for all locations.
BTEXN	BTEXN concentrations were below the LOR within all samples.
PAH	PAHs were only detected above the LOR at the northern reference location. This was likely due to low level contamination during the sample collection process.
PSD	PSD analysis indicated sediments across all sites largely consisted of sand with a smaller percentage of silt and clay material.

7.6.5.9 Impact of descaling activities

The use of the chemical descaling agent and resultant discharge and the descalent and the products of the descaling with PFW from the Yolla platform is an intermittent activity that may occur up to 14 times per year (depending upon observed production impairment from each of the Yolla wells). As identified earlier in this section, this results in a worst case increase in the mixing zone from <5 m to 25m from the discharge point. The duration of this increase in the mixing zone has been demonstrated through WET testing to be less than 3 days, however data from the PFW analysers on the platform suggest that the duration of elevated toxicity that has been established as a worst case may be considerably less. Figure 7.12 provides analyser outputs for TPH and density measurement deviations from baselines associated with descaling events indicating a range of 6-40 hours for return to baseline. Further, Figure 7.13 provides an OIW and density response curve for the November 2024 descaling event on Yolla-4 demonstrating that the 'peak' of deviation from baseline conditions is reached within 3 hours of the commencement of discharge, followed by a rapid decline. This suggests that the duration of peak or worst case toxicity is limited to hours rather than days.

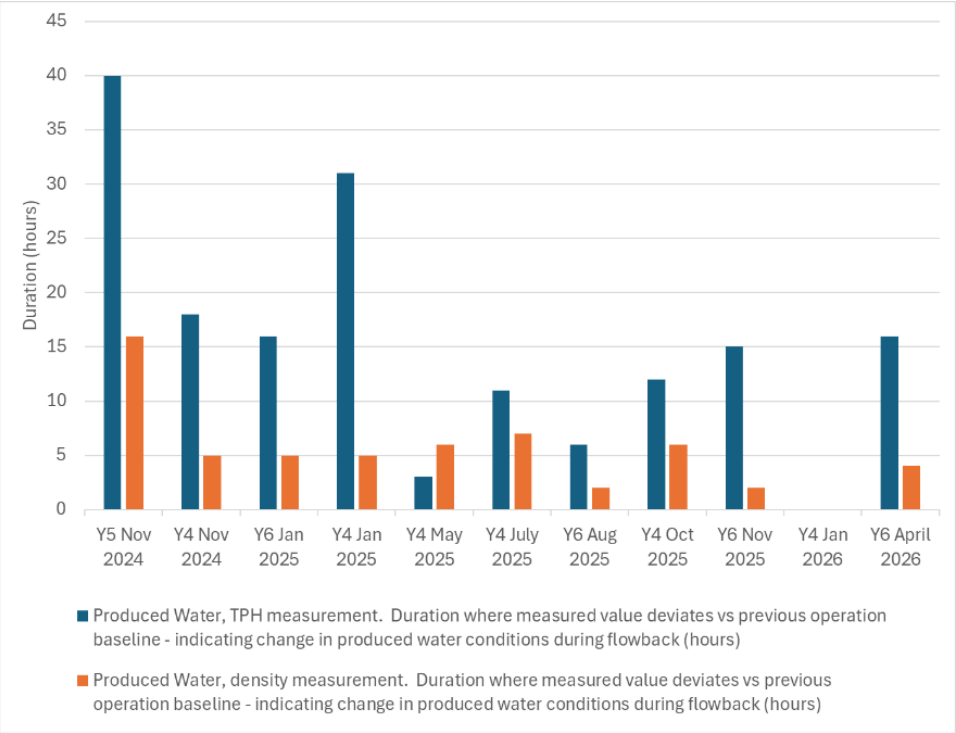


Figure 7.12: Analyser TPH and density measurement time for return to baseline for descaling events November 2024-April 2026

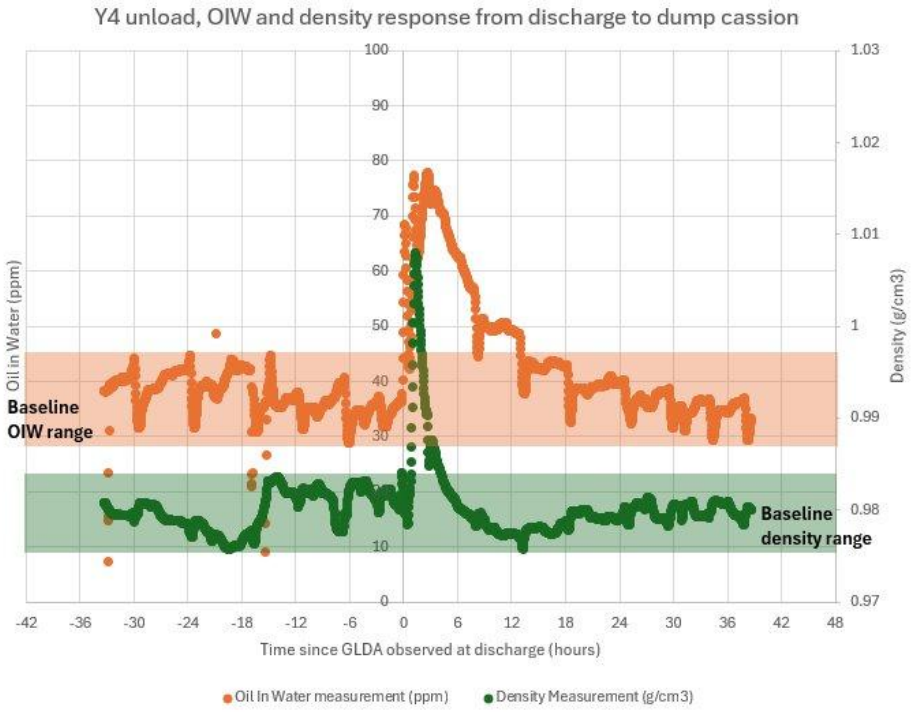


Figure 7.13: Analyser TPH and density measurement curve – November 2024 Yolla-4 descaling event

An assessment of the effects of the discharge of PFW containing descalent (AECOM, 2025b) has concluded that the risk of the discharge to the environment is assessed as having a **Moderate (2)** consequence.

7.6.5.10 Cultural values and sensitivities

Impacts to First Nations values and sensitivities such as intangible spiritual connection or responsibility to whales, dolphins, seals, fish, and eels are not predicted. The presence of planned marine discharge plumes in the water column will be temporary and localised which prevents any potential injury or mortality to marine fauna from long-term exposure to concentrations of chemicals and suspended sediments.

The consequence Is assessed as **Minor (1)** and is of an acceptable level.

7.6.6 Studies of PFW Discharges from Comparable Facilities in Gippsland

The eastern part of the offshore Gippsland Basin has been subject to PFW discharges from oil and gas platforms since 1978. Until approximately 5 year ago Esso Australia Ltd (EAL) operated nine facilities in eastern Bass Strait located 30 – 70 km offshore in waters ranging from 55 – 93 m, with a combined, average of 33 ML/day (or 33,000 m^3/day) of PFW discharged to the ocean (127 times that of Yolla-A's PFW average daily discharge volume). The Esso PFW was treated prior to discharge to ensure an OIW concentration <30 mg/L. These oil facilities have now been shut down in preparation for decommissioning.

Given the combined discharge of 33 ML/day across nine facilities, EAL may have be discharging about 3,600 m^3/day on average from a single platform (assuming equal discharge between nine facilities). This is approximately 14 times the discharge volume for Yolla-A.

In the 1990s, hydrocarbon production from EAL's facilities in the Gippsland Basin peaked and PFW discharge rates from the combined facilities were ~90 ML/day (or 90,000 m^3/day). A study during this time by Terrens and Tait (1994) found that PFW discharged into the Bass Strait presented a very low risk to marine organisms. Terrens and Tait (1996) completed a second study using field measurements of aromatic hydrocarbon concentrations to calculate dispersion of PFW in the Bass Strait. They found that at 20 m from the discharge point, PFW concentrations were reduced 20,000-fold compared with initial concentrations. Despite these significant rates of dilution between PFW constituents and seawater from the receiving environment, it was determined that marine biota may be exposed to some toxic constituents from PFW discharges in the water column and in sediments, resulting from deposition and accumulation of various constituents over time (Neff, 2002; Phillips, 2004).

In order to quantify the impacts of PFW discharges on the marine environment of Bass Strait and update the Terrens and Tait (1996) results, EAL commissioned Cardno to undertake a detailed study to investigate the potential effects of PFW discharges from two platforms (Tuna and West Kingfish) on the receiving environment (Barnes et al., 2019). These platforms were selected because they were assessed as presenting the highest risk to marine biota based on PFW concentrations relative to the Australian and New Zealand Environment Conservation Council (ANZECC) guidelines (ANZECC, 2000, now superseded by ANZG, 2018). The study aimed to characterise PFW dilution in comparison to existing models, measure PFW analyte concentrations in the receiving marine environment, measure PFW analyte concentrations in sediments and to describe and compare the benthic infauna assemblages adjacent to the platforms against suitable reference locations.

The similarity of oceanographic and ecological conditions between Yolla-A and the EAL facilities in this study (water currents, water temperature, seabed composition and fish and benthic species composition) make the Barnes et al (2019) study a highly suitable proxy for the impacts of PFW

discharges from the Yolla-A facility. It is noted, however, that PFW produced from treating crude oil and gas do differ; PFW from gas production has a higher content of BTEX compared to PFW resulting from oil production and therefore becomes more readily bioavailable to fauna (as noted in Section 3.5.6), though the total amount of PFW produced from gas fields is generally much smaller than from oil fields (OGP, 2002). Table 7.25 provides a comparison between the Yolla-A facility and the Tuna (producing gas) and West Kingfish (producing oil) platforms for the purpose of comparisons between the assets.

Table 7.25: Comparison between the Beach and EAL PFW-discharging facilities

Parameter	Beach – Yolla-A	Esso – Tuna	Esso – West Kingfish
Primary hydrocarbon production target	Gas	Gas	Oil
Average OIW discharge concentration	<5 mg/L (dispersed oil)	5 – 15 mg/L	
Average PFW volume discharged per day	160 m^3/day (current) 300 m^3/day (maximum)	3,600 m^3/day (average of nine platforms discharging 33ML/day combined)	
Water depth at platform	80 m	59 m	76 m
Distance from Yolla-A	N/A	292 km NW	240 km NW
Discharge depth of PFW	45 m below sea surface	30 m below sea surface	
Local seabed substrate type	Soft sediments		

7.6.6.1 Water Column Toxicity

Using a dye solution injected into the PFW stream prior to discharge at the Tuna platform, the study successfully tracked the discharge plume and estimated the rate of dilution within the receiving environment. The study found that the modelled dispersion of the PFW plume and the actual dye-assisted plume tracking differed. The modelled dilutions by RPS-APASA (2018) predicted that average dilution of PFW constituents at ~100 m and 1,000 m from the outlet would be 1,000-fold and 2,500-fold respectively, whereas plume tracking at Tuna indicated average dilutions at the same distances were 3,000-fold and 10,500-fold, respectively. These results show a similar trend to the field verification undertaken at Yolla (Section *Field Monitoring of Modelled Dispersion Factors*) where the modelling dilution results were also conservative.

In the receiving waters around the Tuna platform (>59 m away), most of the analytes in the discharged PFW were not detected above background concentrations or the limit of reporting (LOR) in the plume measurements. For the analytes that were detected above the LOR, the concentrations satisfied the respective 80% species protection trigger values (in ANZG, 2018) regardless of source.

7.6.6.2 Seabed Sediment Toxicity

Barnes et al (2019) found that in the majority of sediment samples collected around the Tuna and West Kingfish platforms, the concentrations of PFW analytes were below the ANZG (2018) SQG. When compared to concentrations reported in close proximity to other oil and gas facilities around

the world, the concentrations encountered by this study are substantially lower (Schifter et al., 2015; Kennicutt, 2017).

A diverse assemblage of benthic Infauna was collected during the study via sediment sampling at locations adjacent Tuna and West Kingfish and at reference locations. As is consistent with previous works, this study observed decreased infauna abundance and species richness closer to the platforms for some taxa while also observing enhanced species richness, abundance and biomass of other certain species close to the platforms. Where a significant relationship exists between species abundance and distance from the platform (whether it be decreasing to or increasing from), the maximum distance modelled to reach reference location levels was 1,250 m. This suggests that the impacts of PFW discharge on benthic infauna assemblage is localised to areas of approximately 1-1.25 km immediately surrounding the platform and is highly unlikely to impact species composition at a bioregional level. Given that soft sediments dominate the seabed of Bass Strait, this disruption is not likely to impact benthic infauna species at a population level.

Barnes et al (2019) conclude that because of the rapid dilution of PFW discharges, evidence of analyte concentrations below deleterious levels and the presence of benthic infauna assemblages similar to other areas within Bass Strait, it is likely that the PFW discharges from Tuna and West Kingfish represent a low risk to the receiving environment.

Given that this study has been conducted within relative proximity to the Yolla operations occupies a highly similar bioregion (i.e., seabed composition, benthic infauna assemblages, oceanographic condition) and is operationally similar to Yolla-A (e.g., water depth and PFW discharge depth), it is reasonable to suggest that the results of this study also apply to the BassGas operations. However, due principally to the far lower PFW discharge volumes from Yolla-A, any impacts to seabed sediments are expected to be over a much smaller area and result in lower concentrations of analytes in sediments than those in this study, meaning the potential for overall toxicity impacts to benthic epifauna and infauna is considered minor (i.e., the distance to achieve marine assemblages typical of reference locations is likely to be very short). Note that the sediment sampling program near Yolla in 2021 showed metals, PAH, BTEXN and TPH levels were below ANZG 2018 thresholds. The 2021 study confirmed the following:

- Sediments consisted of predominantly sand (63 µm – 2 mm) and silty clay sediments (<63 µm). The sediment composition generally comprised of silt and clay sediments, both close to and further away from the platform. Some samples also contained substantial shells and shell grit. Sediments were predominantly olive green with black frequent black streaks closer to the platform while sediment collected further way were mostly dark grey and green, also with frequent black streaks. Most samples contained polychaetes, including tube worms and bristle worms.

- The concentrations of all recoverable and petroleum hydrocarbons (TRH and TPH) TRH were below their respective LORs.

- BTEXN concentrations were below the LOR within all samples.

- Total metals (aluminium, arsenic, barium, cadmium, chromium, copper, iron, lead, mercury, nickel and zinc) were analysed. Mercury was detected above the LOR in most other transect locations, with all reported concentrations below the DGV. No other metals reported concentrations above their respective DGVs where they exist. With the exception of antimony

and silver, all metals concentrations were above the 80th percentile of reference location concentrations.

- PAHs were only detected above the LOR at the northern reference location. This was likely due to low level contamination during the sample collections process.
- Phosphorus concentrations were reported above the 80th percentile (390 mg/kg) of all reference location concentrations, at 50, 100 and 150 m distances away from the platform along the eastern transect; and only at 100 m from the platform along the northern transect.
- The results for total Kjeldahl nitrogen and total nitrogen concentrations from all transect locations were below the 80th percentile (1300 mg/kg) of all reference location concentrations. Nitrate and nitrite (as N) concentrations were reported below the LOR for all locations.
- The results for Total Organic Carbon (TOC) concentrations from all transect locations were below the 80th percentile (6.6 mg/kg) of all reference location concentrations.

7.6.7 Adaptive Management Framework (AMF)

The PFW AMF comprises routine monitoring (Table 7.26, Table 7.27 and

Table 7.28) and non-routine monitoring (Table 7.29) that may be triggered as a result of PFW monitoring results.

The AMF is in place to ensure that procedures are in place and implemented to ensure that verification, assessment or monitoring actions can be undertaken to prevent and respond to exceeding the PFW TPH discharge limit and the discharge compliance regime.

The AMF provides a clearly defined process for management of the PFW discharges in accordance with the EPOs relevant to PFW in this EP. The AMF also takes into consideration:

- Cause-effect pathways for the discharge.
- State of knowledge on the impacts of the discharge.
- Scope of routine and non-routine monitoring/verification studies and risk re-assessment, and
- Trigger values for non-routine monitoring/verification or discharge renewed risk assessments.

The AMF is based on a decision-making process to determine whether additional non-routine monitoring or verification is required, either due to planned or unplanned changes to the PFW discharge characteristics, as a result of abnormal results or an alarm being triggered from the routine monitoring.

Figure 7.14 demonstrates what actions are taken if any of the routine monitoring limits are exceeded and who has monitoring responsibilities.

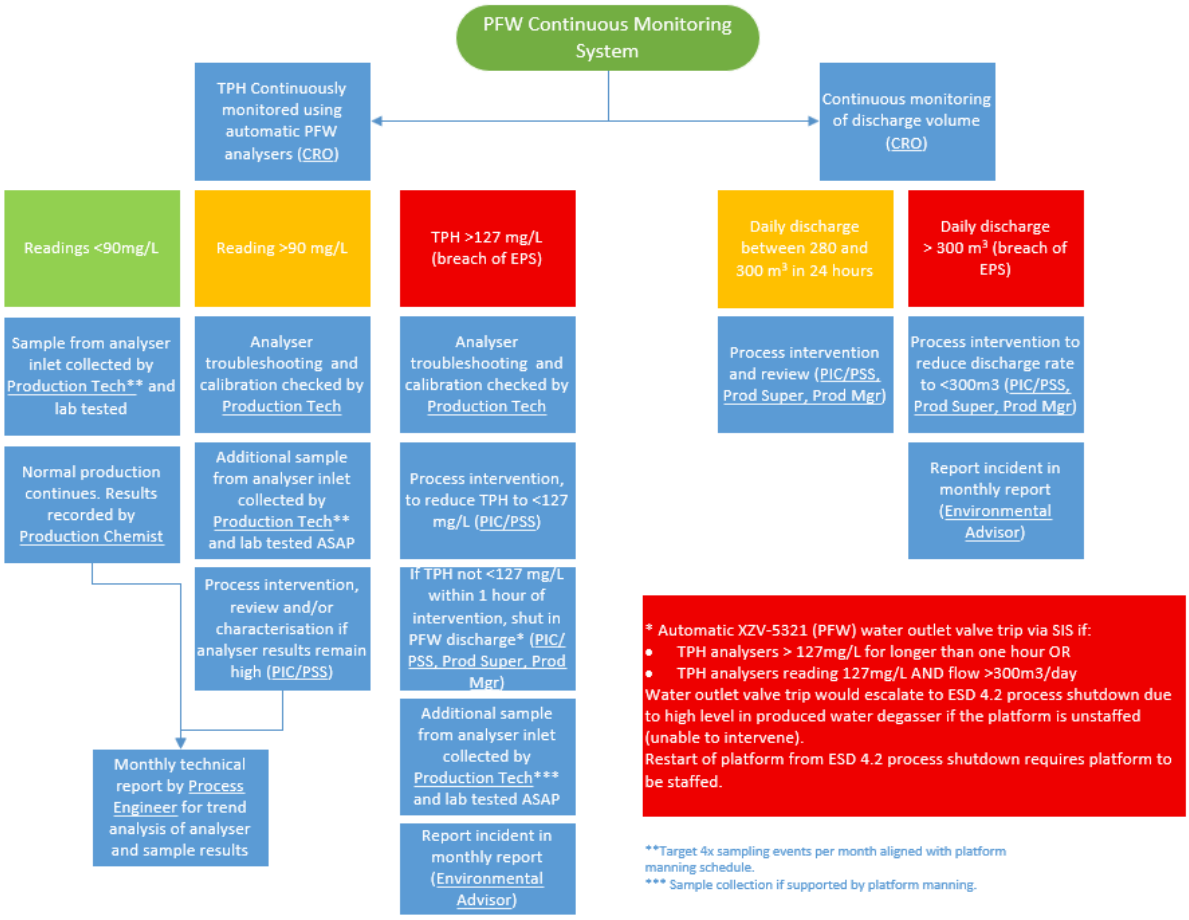


Figure 7.14: PFW monitoring – decision framework

Threshold Definition

A threshold limit concentration of 127 mg/L is in place for PFW discharge.

- This is based on the highest TPH concentration from the three PFW samples used in the 2019 WET testing, as well as a review of the TPH data collected since then to December 2025.
- The average TPH over the 5-years to December 2025 is 109 mg/L. Longer-term, there is potential for the concentrations to rise as the field matures and water volumes from the wells increase. The platform's PFW system is currently operating at less than full capacity with average PFW discharge rate this year of 92 m^3/day. The wells will water out as they continue to deplete and will increase the PFW production rate closer to the maximum 300 m^3/day. This has the potential to increase the TPH levels due to the reduction in the PFW residence time in the treatment. As such, it is appropriate to maintain the 127 mg/L TPH limit. The AMF will continuously monitor for changes in TPH levels and allow for appropriate action to be taken to prevent limits being breached.
- A trigger level of 90 mg/L TPH has been set at the point at which operational conditions are reviewed (see Figure 7.9) to ensure that TPH concentrations do not exceed the threshold. This is based on normal operating processes; it is expected that there may be fluctuations in the TPH concentrations due to routine operations such as pumping of water from the flare drum to the production separator for processing and disposal. During this operation, there is usually a temporary fluctuation of TPH readings. The higher TPH trigger allows for these temporary increased concentrations to ensure safe operation of the platform, while also maintaining production. These fluctuations shall be reviewed and managed in accordance with the AMF and will be managed to keep short-term fluctuations between 90 and 127 mg/L.

The assurance activities are outline in Section 8.9.3 and Table 8.4 describes the routine and non-routine monitoring program that is in place as part of the AMF that ensure the limits are not breached.

Table 7.26: AMF Decision Tree – TPH

TPH limit (90 mg/L) triggered	Detailed steps	By who	Result	Consequence*
Review of operational conditions	Undertake investigation into operating conditions for TPH readings >90 mg/L or >127 mg/L If it is a slow, gradual increase in TPH concentrations and the process is steady with TPH analyser calibration checks completed, change out the PWF elements. The Control Room Operator (CRO) requests the elements to be changed out when the alarm is active. If there is a spike in Analyser readings, check the following: • Is the flare KO drum pump online? • Is there excess water entering the production separator and not allowing sufficient residence time in separator or degasser? • Shut down the flare KO drum pump and monitor TPH readings from the analysers. • Is a new well being brought online? • Close in on choke and monitor analyser TPH. Obtain PFW sample for laboratory testing. The investigation and actions will be dependent on the rate of increase in TPH. Whether or not the increase in TPH is slow or rapid, the controls will be the same in that the asset will do everything it can to ensure the TPH limit of 127 mg/L is not exceeded, and the implementation of new trips will ensure this. If the benchmark of 90 mg/L is consistently exceeded, additional measures to control include: • Check process operations for abnormal operating conditions and rectify as appropriate. • Check that the PFW system is operating as normal and as expected, if not rectify as appropriate.	PIC/CRO	• Investigation completed – process condition known, with causes understood and readings have returned to between normal operating limits (40 to 80 mg/L TPH)	• Note on LIMS spreadsheet reason for lower limit breach. • Notify SEA. • No further action. Continue normal operations.
			• Investigation incomplete or causes are not known. • TPH readings continue to be between 90 and 127 mg/L.	• Continue investigation until completed with causes known (as per 'detailed steps' column). • Reduce flowrates/ production rates if results remain high.
			• Investigation complete with cause unknown or cause known but requires technical long lead intervention, and TPH readings over 127 mg/L.	• Reduce PFW flowrates to control TPH and keep below 127 mg/L. • Reduce production rates to control TPH and keep below 127 mg/L. • PFW will be automatically shut in if TPH exceeds 127 mg/L AND PFW flow rate reaches 300 m^3/day. • PFW will be automatically shut in if TPH exceeds 127 mg/L for a period of 60 minutes. • Normal production cannot commence until causes known and resolved or alternative treatment technologies introduced to reduced TPH levels. EP revision may be required if issue cannot be resolved.

TPH limit (90 mg/L) triggered	Detailed steps	By who	Result	Consequence*
	• Check analysers to ensure correct readings and rectify/calibrate as necessary. • Obtain additional PFW water samples for testing and verification to validate higher readings. • If caused by pumping from flare KO drum, reduce or cease pumping rate to ensure TPH will not exceed 127 mg/L. • Reduce PFW flowrates to control TPH and keep below 127 mg/L. • Reduce production rates to control TPH and keep below 127 mg/L.			• WET testing will be triggered (see below).
WET testing and/or characterisation to be undertaken	Testing undertaken by suitably qualified environmental science consultancy: • Scoping, contracting, logistics and report review – SEA. • PFW sampling, preservation and laboratory management – Production Technician. Should triggers associated with PFW toxicity be detected through WET testing, sampling of biological indicators will be undertaken to ascertain whether contaminants are bioaccumulating within the tissues of biota growing on or occurring in the vicinity of Yolla-A. The objective of this component of the assessment will be to determine the likelihood of contaminants being passed from biota in the lower trophic levels to higher order predators (such as seals) at levels that may impact the health of the latter. The assessment will comprise two potential stages:	SEA	• Results are commensurate with existing WET testing results and indicate no increase in toxicity levels. • TPH readings have returned to <90 mg/L.	• No further action. • If process investigation is complete, normal operations continue.
			• Results indicate slight elevation of TPH levels but <127 mg/L. • TPH concentrations either <90 mg/L or between 90 and 127 mg/L.	• Continue to monitor. • May commence further WET testing. With consideration of scope of testing to include biological monitoring as per the 'detailed steps' column. • Continue investigation in alignment with above process intervention. • Consider and prepare to cease production if required.

TPH limit (90 mg/L) triggered	Detailed steps	By who	Result	Consequence*
	• Stage 1 – Baseline assessment; and • Stage 2 – Triggered assessment. The baseline assessment will be implemented to provide a baseline against which results of any subsequent surveys may be compared. A triggered sampling event would take place when a trigger is exceeded in the results of WET testing of the PFW stream. The results of the triggered assessment would be compared to the baseline results to ascertain if the levels of toxicants taken up by biota have increased. The target Indicator species comprise two sessile invertebrate filter feeder species and at least one fish species. A bivalve mollusc will be selected as an indicator species (likely Mytilus edulis) to be deployed in a caged rack at the platform. The second filter feeder species will be selected and sampled opportunistically from the platform structure itself. The species to be sampled will be determined during ROV inspection at the time of sampling. The fish species targeted will also be identified at the time of sampling depending on the species present and thought to be likely prey species for seals. Where contaminants in fish are found to be bioaccumulating, the following measures will be implemented and results reported within 3-6 months: 1. Undertake a risk assessment to assess potential implications to fisheries and to determine whether risks are ALARP (and therefore, that the EPO has been achieved). This risk assessment would consider factors such as:		• TPH concentrations > 127 mg/L.	• Reduce flow rates to keep TPH <127 mg/L or cease production if TPH cannot be reduced below this limit. • EP revision or MoC may be required. • Normal production cannot commence until causes known and resolved or alternative treatment technologies introduced to reduced TPH levels.

TPH limit (90 mg/L) triggered	Detailed steps	By who	Result	Consequence*
	a. Active fisheries present in the region and the proximity to Yolla- A in which they operate. b. Contaminant levels in the fish and biota tested. c. Likelihood of fish occurring within the immediate vicinity of Yolla-A, or higher order predator species in this area, being potential target species for fisheries. 2. Undertake study to assess risk to higher order predators (e.g., seals) that considers the contaminant concentrations detected within the biota tested and the likely consumption required to pose a risk to their health. If it can be demonstrated that the risk is ALARP, then it is considered that the EPO will have been achieved.			[redacted]

Table 7.27: AMF – plume verification study

Steps	By whom	Result	Consequence*
Undertake plume verification study utilising suitably qualified environmental consultancy: • Scoping, contracting, logistics and report review – SEA. • Program design and implementation – specialist consultant.	SEA	Plume verification study completed with results showing plume dispersion modelling is accurate and in line with modelled mixing zone range.	• No further action. • Continue to monitor and apply AMF. • Continue to re-check plume monitoring on 5- yearly basis. • Normal operations continue.
		Plume verification study completed with results showing modelling is inaccurate (i.e., under predicting the extent of the low confidence single constituent mixing zone).	• Reduce PFW flow rates to 50% of current production to reduce plume extent to within the modelled range i.e., less than the 25m Mixing Zone for the intermittent PFW-GLDA discharges and less than the 37m MZ for the routine PFW discharge (low confidence single constituent mixing zone) or cease production. • Undertake plume verification modelling based on most recent WET testing results to determine the new mixing zone range. • Undertake additional vessel-based plume monitoring to verify that the conditions at the boundary of the mixing zone are being met. • EP revision or MoC required.

*Colour coding follows the 'traffic light' system (green = proceed as normal, amber = caution/take action, red = stop/take action).

Table 7.28: AMF – seabed sediment sampling study

Steps	By who	Result	Consequence*
1. Undertake seabed sediment sampling utilising suitably qualified environmental science consultancy: 2. Scoping, contracting, logistics and report review – SEA. 3. Program design and implementation – specialist consultant. 4. Results to be compared to ANZG (2018) DGVs and NAGD Screening Levels 5. Undertake an attributability assessment considering any unplanned releases and/or in-field operations that have the potential to affect sediment quality. 6. Sediment sampling points will be based on PFW plume modelling.	SEA	• Study completed with results showing sediment quality is in line with ANZG (2018) DGVs and NAGD Screening Levels.	• No further action. • Continuously monitor and apply AMF. • Continue to undertake 5-yearly sediment sampling. • Normal operations continue.
		• Study completed with results showing sediment quality is outside ANZG (2018) DGVs and NAGD Screening Levels. • Assessment determines exceedances in criteria are attributable to a non- PFW discharge source.	• Undertake sediment remediation study as part of future Yolla decommissioning program.
		• Study completed with results showing sediment quality is outside ANZG (2018) DGVs and NAGD Screening Levels with impacts linked to PFW discharge.	• Undertake bioavailability assessment and, where results suggest bioavailability exceeds ANZG (2018) or NAGD criteria, implement additional targeted seabed sediment sampling (within 3-6 months of bioavailability results) to ascertain the extent of elevated toxicant concentrations to inform future sediment quality monitoring events. • Undertake sediment remediation study.

*Colour coding follows the 'traffic light' system (green = proceed as normal, amber = caution/take action, red = stop/take action).

Table 7.29: Triggers for non-routine PFW monitoring

Trigger	Indicative verification monitoring
Change in process chemicals in PFW stream	• A change in process chemicals will be planned in advance and approved according to the Chemical Selection and Management Procedure and MoC procedure. • If the chemical approval process identifies the potential for increased risk, further desktop studies will be undertaken to ensure the NOEC for that chemical can be achieved within the approved mixing zone prior to any change being implemented. • Increased risk would be associated with factors such as the addition of large batch volumes of chemicals (>100 litres/day) for high toxicity chemicals (e.g., non-OCNS 'Gold'/'Silver' or 'D'/'E' rated).
Increase in process chemical concentration in PFW stream discharge	• Increases in process chemical concentration will be planned in advance. • Prior to approval, a desktop study will be undertaken (e.g., dilution assessment) to assess changes in risk, and impact to existing compliance. • If desktop analyses indicate potential for a compliance breach, further toxicity assessments will be undertaken to determine whether compliance is achievable.
Increase in average TPH concentration output	• This is monitored via the monthly technical monitoring report. If there is a significant increasing trend, further action will be undertaken to investigate the reason. This will consist of process intervention, consideration of characterisation and potential further WET testing. • A significant increase would be considered to be a large change (e.g., 10 mg/L) over a short period (e.g., three months) or a moderate change (e.g., 5 mg/L) over a longer period (e.g., six months).
Increase in TPH	• This is monitored continuously through the analysers. • Trends are also monitored through weekly laboratory verification tests and via the Monthly Technical Monitoring Report. If there is any increasing trend, further action will be undertaken to investigate the reason. This will consist of process intervention, consideration of characterisation and potential further WET testing. • The benchmark trigger for process intervention is 90 mg/L given that normal operating conditions are between 40-80 mg/L.
Change to process assumptions such as new wells	• Any change such as bringing on new wells will trigger a requirement for revising modelling assumptions, flowrates, concentrations etc. If it is concluded that current limits may be exceeded, this may result in an EP revision. This will be evaluated prior to any changes as part of the MoC Process.

7.6.8 Cumulative Impact Evaluation

As assessed throughout Section 7.6 temporary, localised reductions in marine water quality occur as a result of PFW discharges, but these are expected to rapidly return to ambient conditions upon mixing. Cumulative impacts to seawater from PFW discharges are not expected to occur. As noted in Section 7.6.5.8, impacts to seabed sediments in the vicinity of Yolla-A are minor after 20 years of PFW discharge. It is unlikely that this will change over the life of this EP.

7.6.9 Impact Assessment

An impact assessment for produced formation water discharges is presented below in Table 7.30.

Table 7.30: Impact assessment for PFW discharges

ALARP decision context	
Impact decision framework context	Type A
Activity	Nothing new or unusual, represents business as usual, well understood activity, good practice is well defined.
Level of certainty of impacts	Risks are well understood, uncertainty is minimal.
Stakeholder influence	No conflict with company values, no partner interest, no significant media interest.

Impact Consequence (inherent)	
Operations	Moderate (2)
CoP	Not applicable
Preservation	Not applicable

Assessment of Proposed Control Measures		
Control	**Cost/benefit analysis**	**Implemented?**
Only low-toxicity OCNS-rated process chemicals are discharged via the PFW stream. *(Operations)* *(Commonwealth waters)*	Use of process chemicals is required to support safe and effective operation of the PFW system while meeting environmental protection requirements. Chemical selection is restricted to substances with the lowest practicable environmental toxicity in accordance with the OCNS, ensuring operational needs are met while minimising potential impacts to marine receptors from PFW discharges. Selection of lower toxicity chemicals can be achieved through existing chemical assessment and procurement processes and is consistent with standard offshore industry practice. The costs associated with implementing this control are not grossly disproportionate to the environmental benefit achieved through reducing potential impacts to marine receptors.	Yes **(IMP06-CM01)**
The PFW handling system is operated by trained and competent personnel. *(Operations)* *(Commonwealth waters)*	Operation of the PFW handling system is required to support safe and compliant production operations, The system is operated by trained and competent personnel, with competency achieved through completion of the Offshore Operations Technicians Level 1 training and managed through internal training and competency management systems. This ensures operational requirements are met while minimising the likelihood of abnormal conditions or unplanned discharges. Training and competency assurance are established operational requirements and are implemented through existing management systems. The costs associated with maintaining workforce competency are not grossly disproportionate to the environmental benefit achieved through reducing the likelihood of abnormal operating conditions and unplanned discharges.	Yes **(IMP06-CM02)**

ALARP decision context		
Operational planning and procedural controls are implemented to manage routine descaling activities, including scheduling, approval, and record-keeping to limit the frequency of descaling events. *(Operations)* *(Commonwealth waters)*	Management of routine descaling activities through operational planning and procedural controls minimises the potential for increased contaminant loading associated with descaling events, thereby reducing impacts to marine receptors. This approach relies on scheduling, approval processes, and record-keeping systems that are already embedded within standard operational workflows, making it practical and cost-effective to implement. By limiting the frequency of descaling events, the control reduces environmental risk at the source without requiring additional treatment systems. These controls utilise existing planning, approval and record-keeping systems and can be implemented with minimal additional operational burden. The costs are not grossly disproportionate to the environmental benefit achieved through reducing contaminant loading and limiting the frequency of descaling events.	Yes **(IMP06-CM03)**
PFW discharge quality, volume and composition are monitored and controlled in accordance with the PFW monitoring program and AMF. *(Operations)* *(Commonwealth waters)*	Continuous monitoring and verification of PFW discharge quality, volume and composition with links to automated process shutdowns in the event of criteria exceedances provides a comprehensive and proactive approach to environmental risk management. The combination of real-time analyser data, manual verification, volume control, and periodic characterisation testing ensures that discharge conditions remain aligned with modelled assumption and environmental impact assessments. These controls are embedded within existing operational systems and monitoring frameworks, making them practical and cost-effective to implement. The approach reflects industry standard practice and enables early detection and response to deviations, reducing the likelihood of environmental harm without requiring additional treatment infrastructure or significant capital investment The monitoring and control systems are incorporated within existing operational and environmental management frameworks and represent standard industry practice. The associated costs are not grossly disproportionate to the environmental benefit achieved through early detection of deviations and ongoing verification of environmental performance.	Yes **(IMP06-CM04, -CM05, -CM10)**
A comprehensive PFW sampling and verification program is implemented under the AMF. *(Operations)* *(Commonwealth waters)*	A risk-based sampling and verification program is implemented to confirm PFW discharge quality, toxicity and environmental behaviour, ensuring impacts remain within predicted and acceptable limits. This integrated approach combines routine laboratory verification, WET testing and periodic plume dispersion validation under the AMF to provide multiple lines of evidence supporting environmental performance. The program is aligned with operational activities and adaptive triggers, ensuring monitoring effort is targeted and responsive rather than excessive. While requiring planned sampling and analysis, these activities are technically feasible and consistent with industry practice, providing a high level of assurance that	Yes **(IMP06-CM06, -CM07, -CM08, -CM09)**

ALARP decision context		
	discharge impacts remain minor. This delivers strong environmental verification and regulatory confidence while delivering targeted monitoring value without unnecessary operational burden. While sampling and laboratory analysis require ongoing resourcing, the program provides a high level of assurance regarding discharge quality and environmental performance. The costs associated with implementation are not grossly disproportionate to the environmental benefit achieved through verification of impact predictions and adaptive management of discharges.	
Advanced oxidation treatment of PFW prior to discharge. *(Operations)* *(Commonwealth waters)*	While these systems may reduce dissolved organic compounds, they require significant power, equipment footprint and maintenance requirements that are not feasible on the existing platform, particularly at this stage of the facility's life. Given the mature stage of the facility, platform space constraints and substantial power and maintenance requirements, the costs and operational complexity associated with implementation are considered grossly disproportionate to the marginal environmental benefit that would be achieved.	No
Storage and re-treatment of off-specification PFW prior to overboard discharge. *(Operations)* *(Commonwealth waters)*	The storage and reprocessing of PFW is intended to avoid occasional off-specification discharges, however, on a platform with high water production rates, such as 10ML/day, a standard platform vessel would reach capacity in approximately 2 - 3 minutes given inflow rates of around 7 m^3/minute and typical vessel volumes of approximately 15m^3. To accommodate this, a significantly larger vessel would be required, likely necessitating additional venting systems. These modifications would require substantial space, which is unavailable on the current platform. The operational complexity of implementing such infrastructure is grossly disproportionate to the marginal environmental benefit of avoiding occasional off-specification PFW discharge.	No
Reinjection of PFW to the reservoir. *(Operations)* *(Commonwealth waters)*	All four wells on Yolla are required for production. Therefore, a new well would need to be drilled once a sub-surface structure that could accept the PFW was evaluated and identified. A new well would cost roughly several tens of millions of dollars (excluding rig mobilisation/demobilisation cost, injection pumps and xmas tree). A reinjection well would mean additional space is required on the platform, another conductor, hydraulic control system and so forth. While PFW discharges to sea would be avoided, this option requires additional energy to construct and install the well and operate the reinjection pump/s and the use of additional chemicals. The costs of this measure are grossly disproportionate to the minor residual impact consequence.	No

ALARP decision context		
Disposal of PFW onshore via pipelines. *(Operations)* *(Commonwealth waters)*	This option involves no separation of PFW on the platform, but discharge to the LLGP. There would be the need for substantial chemical injection (MEG) and corrosion inhibitors through the pipeline. The supply of MEG to the platform would require either a pipeline or regular delivery by vessel. The PFW would be separated at the LLGP and would require the construction of evaporation ponds. It would be necessary to obtain an EPA works approval as well as other approvals. While PFW discharges to sea would be avoided, this option moves treatment to an onshore solution (with associated impacts), additional energy to construct and install the pipeline and operate the pumps, and the saline nature of the PFW means that it cannot be reused or recycled (e.g., land irrigation) without substantial treatment facilities. This option was rejected in a 2009 study due to the high capital and operating cost (noting the following dollar values are for 2009): • MEG pipeline - $116 million capital cost and $0.2 million annual operating cost. • MEG vessel delivery - $55 million capital cost and $9.5 million annual operating cost. The significant capital expenditure, ongoing operating costs, additional chemical requirements and transfer of impacts to an onshore environment are considered grossly disproportionate to the environmental benefit achieved through avoiding offshore discharge.	No
PFW stripping. *(Operations)* *(Commonwealth waters)*	PFW stripping – two stripping options have been identified and considered, as described below. These options do not avoid discharges but do recover some hydrocarbons. • The gas stripper utilises the fuel gas produced in the platform to strip volatiles from the PFW. This system was used on Yolla-A from 2006-2009 but was removed due to its inefficiency at removing BTEX. This option was therefore not considered further in this assessment, but the installed cost would be about $7.9 million. • The steam stripper comprises of a demineralised water package, a steam stripper and associated pumps, tie-ins and demolition of some elements on the platform. The screening level estimated capital cost is $18.2 million, and the operating cost has not been estimated. The power consumption estimate is equivalent to 400 kW using fuel gas. This option requires additional energy to produce and pump steam. Given the limited treatment effectiveness, substantial capital costs, additional energy requirements and mature asset status, the costs associated with implementing PFW stripping are considered grossly disproportionate to the environmental benefit achieved.	No
Macro Porous Polymer Extraction (MPPE). *(Operations)*	MPPE comprises of a demineralised water package and ion exchange beds, pumps, the MPPE unit, tie ins and demolition. The screening level estimated capital cost is $15.4 million and the operating cost has not been	No

ALARP decision context		
(Commonwealth waters)	estimated. The power consumption estimate is 75 kW. These options do not avoid discharges but do recover some hydrocarbons, albeit requiring additional energy for steam production and pumping. While MPPE may provide some additional hydrocarbon recovery, the capital cost, operational requirements and additional energy demand are considered grossly disproportionate to the incremental environmental benefit achieved given the minor residual consequence associated with the discharge.	
PFW containing GLDA treated using RO filtration. *(Operations)* *(Commonwealth waters)*	This option creates large amounts of supernatant that cannot be viably transferred to shore, hence would require discharge at sea, which negates all benefits of the treatment. The limited space on Yolla-A inhibits installation and safe use of an RO plant. The space constraints, operational limitations and inability to eliminate discharge of treatment by-products mean that the costs and operational burden associated with implementation are grossly disproportionate to the environmental benefit that could be achieved.	No
Use alternative chemical to GLDA. *(Operations)* *(Commonwealth waters)*	This control may reduce ecotoxicity impacts. Chemical treatments with harsh acids (i.e. hydrochloric acid) are less desirable due to the increased risk to personnel (exposure), increased risk of corrosion of wells and facilities (with an associated increased potential for a LoC) and increased potential for environmental impact. Given the increased operational, asset integrity and personnel safety risks associated with alternative treatment chemicals, the potential environmental benefit is limited and does not justify the additional risks introduced. Adoption of alternative chemicals is therefore not considered reasonably practicable.	No
Reduction of GLDA concentration applied to the lowest effective level. *(Operations)* *(Commonwealth waters)*	This option assists in minimising ecotoxity impact. The use of the Beach PFW adaptive management framework, including assessment of well performance after treatment and PFW toxicity profiles from existing screening procedures, is in place and feasible. This control can be implemented through existing chemical management and adaptive management processes with minimal additional cost. The costs are not grossly disproportionate to the environmental benefit achieved through reducing the ecotoxicity profile of the PFW stream.	Yes **(IMP06-CM07)**
Reduction of GLDA and well cleaning products in PFW stream through re-engineering equipment. *(Operations)* *(Commonwealth waters)*	This option may assist in minimising ecotoxity impact. The costs associated with re-engineering of equipment would be grossly disproportionate to the environmental benefit potentially gained.	No

ALARP decision context		
Dissolved gas/induced gas flotation. *(Operations)* *(Commonwealth waters)*	This technology is used to remove dispersed hydrocarbons through flotation, but is more relevant to treating dispersed oil rather than dissolved oil. The floated hydrocarbons are a waste stream to be managed. The systems are not useful in removing dissolved hydrocarbons (i.e., BTEX). The flotation unit would be in an enclosed vessel about 2 m in diameter and 1-2 m high and require integration (including compression) into the existing production system. Given this system is not useful at removing BTEX and that dispersed hydrocarbons in the PFW stream are already very low, this treatment system is not suitable for use on Yolla-A. Given the limited effectiveness of this technology for treating dissolved hydrocarbons and the already low dispersed hydrocarbon concentrations in the PFW stream, the costs and operational requirements associated with implementation are grossly disproportionate to the environmental benefit achieved.	No
Adsorption filters. *(Operations)* *(Commonwealth waters)*	Adsorption filters remove dispersed hydrocarbons through filtration and are not useful in removing dissolved hydrocarbons (i.e., BTEX). This system generates a contaminated filter waste stream that requires management and disposal. The size of the unit could be in the order of 1-2 m high and 1-2 m width depending on the configuration of the filters. Given this system is not useful at removing BTEX and that dispersed hydrocarbons in the PFW stream are already very low, this treatment system is not suitable for use on Yolla-A. Given the limited treatment effectiveness for dissolved hydrocarbons, generation of additional waste streams and infrastructure requirements, implementation costs are considered grossly disproportionate to the environmental benefit achieved.	No
Daily TPH sampling and laboratory analysis *(Operations)* *(Commonwealth waters)*	This option would allow Beach to more accurately monitor TPH concentrations and identify issues early. The cost of sending PFW samples to shore daily for TPH analysis using the helicopter service would add over $3 million/yr to the current monitoring regime. The costs associated with undertaking this monitoring regime are considered grossly disproportionate to the minor residual consequence associated with PFW discharge and the incremental environmental benefit that would be achieved.	No
Using a laboratory on the platform for TPH monitoring *(Operations)* *(Commonwealth waters)*	The cost of installing and maintaining a laboratory on the platform has been investigated. This is not a feasible option because it would require a dedicated room on the platform for the laboratory and to accommodate a full-time laboratory technician, which is not available (the platform was initially designed as an unmanned facility prior to the MLE upgrade). If this additional space needs to be installed, this would cost in the tens of millions of	No

ALARP decision context			
	dollars. If theoretically there was the room currently available for a laboratory and associated personnel on the platform, the cost of buying, installing and commissioning the equipment would be in the order of several hundred thousand dollars, plus the associated cost of equipment servicing, calibrations and so forth. Such a laboratory would be unlikely to be NATA-accredited, meaning that samples would still need to be sent ashore for correlation with the laboratory test results. These costs are considered grossly disproportionate to the minor residual consequence associated with PFW discharge and the limited additional environmental benefit that would be achieved relative to the existing monitoring framework.		

Environmental Controls and Performance Measurement			
EPO	**Control measure**	**EPS**	**Measurement criteria**
Platform only (Commonwealth waters, Operations phase)			
IMP06-EPO01 Achieve a 99% species protection level at the end of the PFW mixing zone – 5 m for regular operations and 25 m for descaling events.	**IMP06-CM01** Chemicals planned for discharge via the water handling system are limited to low toxicity OCNS-rated process chemicals: • PLONOR • 'D/E' (non-CHARM) • 'Gold/Silver' (CHARM).	**IMP06-EPS01** All chemicals discharged with the PFW stream meet the low toxicity requirements of the Chemical Assessment Records and Chemical Inventories.	**IMP06-MC01.1** Chemical Assessment Records verify that only low toxicity chemicals are discharged with PFW. **IMP06-MC01.2** Chemical Inventories verify that only low toxicity chemicals are approved for discharge via the PFW stream. **IMP06-MC01.3** MOC records confirm that the introduction of new process chemicals is assessed and approved in accordance with OEMS MOC requirements prior to use or discharge.
	IMP06-CM02 Operators gain competency to operate the PFW system through completion of the Offshore Operations Technician Level 1 competency.	**IMP06-EPS02** The PFW system is only operated by trained and competent personnel.	**IMP06-MC02** Training records demonstrate competency in Offshore Operations Technicians Level 1.
	IMP06-CM03 Operational planning and procedural controls are implemented to manage routine descaling activities, including scheduling,	**IMP06-EPS03** Routine descaling events are managed in accordance with the Chemical Descalant Injection into Yolla Wells using WHSP procedure (CDN/ID 19061625) and:	**IMP06-MC03** Descaling records verify: • The frequency of routine descaling events does not exceed 14 events in any 12-month period

ALARP decision context		
approval, and record-keeping to limit the frequency of descaling events.	• do not exceed 14 events in any 12-month period • utilise a downhole descaling concentration of 40% ±5%.	• Descaling concentrations remain within the approved operating range.
IMP06-CM04 Continuous monitoring and control of PFW discharge quality is implemented in accordance with the PFW Monitoring Program, with TPH concentrations continuously monitored using automatic analysers, supported by routine manual verification and defined operations response actions, including shut down, to ensure discharge limits are not exceeded.	**IMP06-EPS04** PFW discharge quality is continuously monitored and managed such that: • Instantaneous TPH concentrations do not exceed 127 mg/L at any time • 24-hour average TPH concentrations do not exceed 90 mg/L • An automatic process shut-in occurs following a sustained exceedance of 127 mg/L for one hour • Continuous automatic PFW analysers remain operational during discharge • Analyser readings are manually verified and recorded at least twice daily.	**IMP06-MC04** Production database records, PFW sample logs and PMS records verify: • TPH discharge limits are met. • Automatic analysers remain operational during discharge • Analyser readings are manually logged at least twice daily • Automatic shut-in functions activate when shutdown criteria are met.
IMP06-CM05 Total PFW discharge volume is monitored, controlled and recorded to ensure volumes remain within modelled limits, with alarms and operational shutdown responses implemented to prevent exceedance.	**IMP06-EPS05** Total PFW discharge volume is continuously monitored and maintained at or below 300 m^3/day, with alarms set at this threshold and discharge cessation implemented if the limit is exceeded.	**IMP06-MC05.1** Production database records confirm daily discharge volumes recorded and do not exceed 300 m^3/day. **IMP06-MC05.2** LIMS Records demonstrate daily monitoring and tracking of PFW discharge volumes against the defined limit. **IMP06-MC05.3** CMMS records verify that PFW discharge is shut in when discharge rates exceed 300 m^3/day.
IMP06-CM06 PFW samples are collected four (4) times per month (in line with platform manning) and analysed for TPH and BTEX at an independent NATA-accredited laboratory to verify accuracy of the continuous	**IMP06-EPS06** TPH and BTEX concentrations remain within acceptable limits, as defined in the AMF (TPH).	**IMP06-MC06.1** LIMS records and laboratory results confirm: • TPH verification sampling and results consistent with continuous analyser data • BTEX analytical results from routine sampling. **IMP06-MC06.2**

ALARP decision context		
automatic PFW analyser readings.		Sampling records demonstrate alignment with the target sampling frequency. **IMP06-MC06.3** Characterisation reports confirm review by an environmental specialist and verify that constituent concentrations remain within acceptable limits.
IMP06-CM07 The PFW AMF is implemented, which includes WET testing to verify discharge toxicity, with: • Annual WET testing as a minimum requirement • Additional WET testing triggered in accordance with the AMF • Targeted testing following operational changes (e.g., introduction of descaling activity), including representative sampling during both normal operations and post-event conditions. Review of results to determine whether testing frequency can return to baseline levels.	**IMP06-EPS07** PFW discharge toxicity remains within acceptable environmental limits, with WET testing undertaken at defined frequencies and adaptive management responses applied where monitoring indicates deviations from expected discharge quality or following relevant operational changes.	**IMP06-MC07.1** WET testing records database confirms that sampling and analysis ate undertaken at least annually, with additional testing conducted where triggered by the AMF. **IMP06-MC07.2** Monitoring records confirm target testing is completed following relevant operational changes (e.g., descaling events). **IMP06-MC07.3** Review records demonstrate that WET testing results are assessed by an environmental specialist. **IMP06-MC07.4** AMF or corrective action records verify that deviations from expected discharge quality are evaluated, and any required changes to monitoring frequency or management controls are documented and implemented.
IMP06-CM08 PFW plume dispersion verification monitoring is undertaken every 5 years, or as triggered through the AMF, to ensure that inputs used to define the mixing zone remain current and representative.	**IMP06-EPS08** Plume dispersion verification monitoring is conducted to confirm that predicted mixing zone behaviour remains valid and that environmental exposure and impacts are consistent with approved assumptions.	**IMP06-MC08.1** PFW plume dispersion modelling and verification reports demonstrate that monitoring is undertaken at a minimum frequency of every 5 years, or as triggered by the AMF, and are maintained within the document management system.

ALARP decision context		
		MP06-MC08.2 Documented review by an environmental specialist confirms that model assumptions and outcomes remain valid, with any required corrective actions identified, implemented and managed to closure.
IMP06-CM09 Sediment sampling is designed and executed in accordance with the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG, 2018) Default Guideline Values (DGVs) supported by National Assessment Guidelines for Dredging (NAGD, 2009) and undertaken every 5 years to characterise sediment quality and assess potential impacts attributable to PFW discharge.	**IMP06-EPS09** Sediment sampling results verify that potential impacts from PFW discharges are consistent with historical baseline conditions and remain within acceptable environmental thresholds.	**IMP06-MC09.1** Sediment sampling reports verify that sampling is undertaken at a minimum frequency of every 5 years and maintained within the document management system. **IMP06-MC09.2** Documented review by an environmental specialist confirms that observed impacts are consistent with previous results, with any required responsive actions documented and managed to closure.
IMP06-CM10 PFW characterisation monitoring is implemented at a minimum frequency of six-monthly to confirm discharge composition remains consistent over time, with routine testing and review undertaken in accordance with the AMF.	**IMP06-EPS10** Constituent concentrations meet ANZECC/ANZ guideline values at the mixing zone boundary (based on modelled dilutions). Targeted additional characterisation testing is undertaken following operational changes (e.g., descaling), with testing frequency reviewed and adjusted based on results in accordance with the AMF.	**IMP06-MC10.1** LIMS spreadsheet confirms six-monthly testing frequency and record constituent results. **IMP06-MC10.2** Characterisation reports demonstrate review by an environmental specialist, confirming no significant change in composition and compliance with ANZECC/ANZ guideline values at the mixing zone boundary. **IMP06-MC10.3** Corrective action records demonstrate exceedances, trends or uncertainties are assessed, with required actions or adjustments to monitoring frequency

ALARP decision context		
		documented and implemented.
IMP06-CM11 Platform-based personnel report exceedances of PFW discharge limits, including: • TPH concentrations >127 mg/L at any one time • Daily average TPH concentrations >90 mg/L • Total PFW discharge volume >300 m^3/day.	**IMP06-EPS11** PFW discharge exceedances are identified, reported and managed in accordance with Incident Management Procedure (CDN/ID 18985406) and Adaptive Management Framework (AMF).	**IMP06-MC11** Incident reports, regulatory reports and corrective action records verify: • Exceedances are reported in accordance with applicable requirements • Incidents are recorded in the Incident Management System • Corrective actions are implemented and tracked to closure.

Impact Consequence (residual)	
Operations	Minor (1)
CoP	Not applicable
Preservation	Not applicable

ALARP Decision Justification
With the controls outlined in this table in place, the impact consequence is rated as Minor (1) and is considered to be good practice (Decision Context: Type A). This means any additional or alternative control measures do not lower the residual consequence further or would be grossly disproportionate to the residual consequence. Therefore, a Minor (1) residual impact consequence is considered to be ALARP.

Acceptability Assessment	
Defined acceptable level	PFW discharge has been assessed as having a Minor (1) consequence, which is not considered as having the potential to result in serious or irreversible environmental damage.
Internal context	The proposed management of the impact is aligned with the Beach Environment Policy. Activities will be undertaken in accordance with the Implementation Strategy (Section 8).
External context	The BassGas Offshore Operations SEP is implemented to ensure that stakeholders are aware of operations issues. No objections or claims were raised by stakeholders, including commercial fishers, in relation to PFW discharges. During ongoing consultation any concern from stakeholder will be managed to close, for the life of asset.
Legislative context	The controls outlined in this table align with the requirements of:

ALARP decision context		
	• *Protection of the Sea (Prevention of Pollution by Ships) Act 1983* (Cth): ▪ Part II (Prevention of Pollution by Oil). ○ AMSA Marine Orders Part 91 (Oil Pollution), enacting MARPOL Annex I.	
Industry practice	The consideration and alignment of control measures outlined in the below-listed guidelines and codes of practice demonstrates that BPEM is implemented for this activity.	
	Environmental management in the upstream oil and gas industry (IOGP-IPIECA, 2020)	The control measures listed in this table meet the relevant mitigation measures listed for offshore activities with regard to: • Evaluate options for treatment and disposal **(Assessment of proposed control measures)**. • Where offshore discharge is the selected disposal option, establish mitigation targets **(IMP06-EPO01)**.
	Best Available Techniques Guidance Document on Upstream Hydrocarbon Exploration and Production (European Commission, 2019)	The control measures listed in this table meet these guidelines for offshore activities with regard to: • Produced water handling and management (Item 23) - The BAT are met for BassGas operations **(all CMs)**.
	Environmental, Health and Safety Guidelines for Offshore Oil and Gas Development (World Bank Group, 2015)	Guidelines with regard to PFW management items 30, 32, 33, 34, 35 and 36, were met in the planning phase of the development.
	Code of Environmental Practice (APPEA, 2008)	The control measures listed in this table meet the following offshore development and production objectives: • To reduce the impact of PFW on the marine environment to ALARP and to an acceptable level. • To reduce the impact of routine waste discharges on the marine environment to ALARP and to an acceptable level.
	PFW-specific guidance	
	Risk Based Assessment of Offshore Produced Water Discharges (IOGP, 2020)	This guideline provides direction on the assessment and management of potential toxic risks to the marine environment associated with PFW. It aims to improve consistency in the application of assumptions, levels of conservatism and the selection of risk endpoints. The risk-based assessment framework described in Section 2.3 of the guidelines is applied to the management of PFW discharges.
	OSPAR Recommendation 2001/1 for the Management of	The purpose of the OSPAR Recommendation is to prevent and eliminate pollution from oil and other substances caused by discharges of PFW into the marine environment. All of the

ALARP decision context		
	Produced Water from Offshore Installations	control measures outlined in this table aim to meet this recommendation.
	OSPAR Reference Method for Analysis for the Determination of the Dispersed Oil Content in Produced Water (Agreement 2005/15)	The OSPAR Agreement 2005/15 provides guidance on the methodology used to determine dispersed OIW concentrations. For BassGas operations, measuring TPH has been determined to be the more suitable measure given that accredited OIW analysis is not available.
	OSPAR Recommendation 2012/5 for the Risk Based Approach to the Management of Produced Water Discharges from Offshore Installations	The purpose of the OSPAR Recommendation 2012/5 is to provide general guidance for conducting PFW environmental risk assessments, based on the determination of the no-observed-effect concentration (NOEC). The AMF outlined in Section 7.6.7 outlines the risk-based approach for managing PFW discharges.
Environmental context	MNES	
	AMPs	The South-east Marine Parks Network Management Plan 2025 (DNP, 2025) identifies pollution by oil or noxious substances as a pressure to the AMP network. The PFW mixing zone does not extend to any AMPs.
	Ramsar wetlands	No intersection or impacts.
	NIWs	No intersection or impacts.
	TECs	No intersection or impacts.
	Nationally threatened and migratory species	The PFW mixing zone is spatially limited, such that any reduction in water quality does not result in significant impacts to populations of threatened or migratory fauna.
	Other matters	
	State marine parks	No intersection or impacts.
	Species Conservation Advice/Recovery Plans/Threat Abatement Plans	Various species-specific plans (particularly for whales and sharks) list habitat degradation (including pollution from toxic pollutants) as a threat. The control measures listed in this table, combined with the fact that these species are mobile and transitory in the area (i.e., they do not reside in the PFW mixing zone nor do not spend extended periods of time in it), ensure that PFW discharges are managed in a manner that is not inconsistent with these conservation plans.
ESD principles	The EIA presented throughout this EP demonstrates that ESD principles (a), (b), (c) and (d) are met (noting that principle (e) is not relevant).	
Environmental Monitoring		

ALARP decision context
• PFW sampling and testing (see **IMP06-CM04, -CM05, -CM06**). • WET testing (see **IMP06-CM07**). • PFW plume verification monitoring (see **IMP06-CM08**). • Sediment sampling (see **IMP06-CM09**).

Record Keeping	
• Chemical assessment records. • Chemical inventories. • MoC records. • Training records. • Descaling records. • Production database records. • PMS records. • LIMS records. • CMMS records. • PFW Sample Log.	• PFW LIMS spreadsheet. • PFW laboratory test results. • Sampling data records. • Characterisation reports. • WET testing data and reports. • AMF or corrective action records. • Plume dispersion modelling verification data and reports. • Sediment sampling data and reports. • Monthly recordable incident reports.

7.7 IMPACT 7: Routine Discharges - Putrescible Waste

7.7.1 Source of Aspect

The generation of food waste, also known as putrescible waste, from the platform and vessel galleys leads to the discharge of this waste overboard. On Yolla-A, a macerator discharges food scraps through the sewage caisson located 7 meters below sea level.

The average volume of putrescible waste discharged overboard is influenced by the number of personnel on board (POB) and the types of meals prepared. On average, a person generates about 1.5 to 2.5 kg of total waste per day (DCCEEW, 2025). However, at Yolla, the amount of waste produced is expected to be lower, with approximately 10 to 15 litres of putrescible waste generated daily by the onsite personnel (noting that the platform is staffed intermittently during operations, see Section 3.1).

As outlined in Table 3.11, activities undertaken during the operations, CoP and preservation phases involve the presence of personnel on the platform and onboard support vessels. As a result, food waste may be generated throughout all project phases. Accordingly, this aspect is relevant to the operations, CoP and preservation phases, as summarised below:

Hazard	Source	Operations	CoP	Preservation
Platform	Discharge of food waste	✓	✓	✓
Support vessels	Discharge of food waste	✓	✓	✓

7.7.2 Known and Potential Environmental Impacts

The known and potential environmental impacts of discharging putrescible waste include:

- A temporary and localised increase in nutrient enrichment and oxygen depletion (decomposing organic matter consumes oxygen) up to 100 m horizontally and 10 m vertically in the waters surrounding the discharge point.

- An associated rise in the scavenging behaviour of marine animals and seabirds, either at the water's surface or within the water column.

7.7.3 EMBA

The potential impacts from putrescible waste discharges will be restricted the Operational Area and are likely to be localised and temporary, with rapid dispersion and dilution occurring over minutes to hours after maceration.

Discharge of food waste into the marine environment has the potential to attract some opportunistic marine fauna including fish and seabirds to the area in response to the increased food availability or, indirectly because of attraction of prey species. However, given the small quantities of food waste to be disposed, any attraction is likely to be minor, temporary and localised.

In addition to impacting the quality of the receiving waters, receptors that may occur within this EMBA, either as residents or migrants, are:

- Pelagic fauna (plankton, fish, cetaceans, pinnipeds).

- Avifauna

No impacts on valued species or habitats within the operational areas or planning areas is expected.

First Nations cultural values and sensitivities may be impacted by the activities within the EMBA including routine marine discharges.

7.7.4 Jurisdiction of Hazard

The jurisdictions for this hazard are outlined below.

Commonwealth waters	Victorian waters
YES	NO
The platform is located in Commonwealth waters and discharges putrescible waste. Vessels engaged in IMR activities working alongside the platform or RGP in Commonwealth waters may also discharge putrescible waste.	Vessels engaged in IMR activities along the RGP are not permitted to discharge putrescible waste in Victorian waters.

7.7.5 Evaluation of Environmental Impacts

7.7.5.1 Water quality and ecological receptors

The discharge of macerated food waste into the water can lead to a temporary and localised increase in nutrient levels in near-surface waters. This rise in nutrients often serves as a food source for scavenging marine animals and seabirds, which may see a temporary spike in their populations as a result. The quick consumption of this perishable waste by scavengers, along with its physical and microbial breakdown, helps ensure that the impacts of such discharges are minimal. Overall, the effects

of discharging perishable waste on the physical and biological environment are expected to be negligible due to the following reasons:

- Small discharge volumes.
- Intermittent nature of the discharge.
- Maceration of the waste prior to discharge.
- High dilution and dispersal factor in open waters.
- Long distance from shore.
- Rapid consumption by fauna.
- High biodegradability and low persistence of the waste.
- The absence of sensitive habitats in the activity area.

7.7.5.2 Cultural values and sensitivities

The following cultural values and sensitivities have been identified as potentially affected by planned marine discharges from the platforms and vessels:

- Fish (including eels)
- Cetaceans
- Pinnipeds.

The marine fauna listed above are connected to places associated with songlines or connected to individuals through ceremony (Section 5.7.3). The connection of marine fauna to places or individuals are considered cultural intangible values. Platform and vessel discharges have the potential to impact marine fauna that have songlines, or spiritual connection to First Nations people.

It is considered that any impacts to species at a population level may prevent First Nations people's obligations to maintain spiritual connections and care for culturally significant species and their habitat. If First Nations people's obligations have not been met it may reinforce a sense of powerlessness to members of First Nations groups responsible for these obligations (Holcombe 2022)

The platform and vessel discharges will be intermittent, low toxicity and of a low volume with the discharges predicted to mix rapidly with the surrounding waters returning to a pre-impacted state without any long-term impacts to water quality. Section 7.7.5.1 details the predicted environmental impacts to these receptors and concluded that for platform and vessel discharges the consequence is assessed as **Minor (1)** to water quality and ecological receptors and therefore is assessed as **Minor (1)** and of an acceptable level for associated cultural values and sensitivities.

7.7.6 Cumulative Impact Evaluation

There is a low potential for cumulative impacts resulting from the discharges of putrescible waste from the Yolla-A platform and associated vessels (macerated or unmacerated) when combined with other routine marine discharges from the activity or other maritime activities in Bass Strait. When considered

cumulatively, these discharges are infrequent, short-term and result in localised increases in organic material and scavenger attraction within the immediate vicinity of the discharge point. Discharge volumes are small, highly biodegradable, and rapidly dispersed in open offshore waters, limiting the potential for accumulation or broader water quality effects.

There are no other oil and gas operations in close proximity to BassGas, so there is no overlap in EMBAs for this hazard from other similar activities. Similarly, vessel-based activities being undertaken by offshore wind developers in the offshore wind feasibility licences to the east of BassGas are too far away (over 130 km) for cumulative impacts from putrescible wastes to occur.

7.7.7 Impact Assessment

An impact assessment for putrescible waste discharges is presented in Table 7.31.

Table 7.31: Impact assessment for putrescible waste discharges

ALARP decision context		
Impact decision framework context	Type A.	
Activity	Nothing new or unusual, represents business as usual, well understood activity, good practice is well defined.	
Level of certainty of impacts	Risks are well understood, uncertainty is minimal.	
Stakeholder influence	No conflict with company values, no partner interest, no significant media interest.	
Impact Consequence (inherent)		
Operations	Minor (1)	
CoP	Minor (1)	
Preservation	Minor (1)	
Assessment of Proposed Control Measures		
Control	**Cost/benefit analysis**	**Implemented?**
Collect and transfer all putrescible wastes to shore for disposal. *(All phases)* *(Commonwealth & Victorian State waters)*	Eliminates impacts to water quality and marine fauna. Implementing this control measure is not warranted given that offshore putrescible waste discharges are permitted by legislation. This control would also increase vessel storage requirements, vessel handling activities and personnel exposure to organic waste streams. Offshore discharges conducted in accordance with MARPOL requirements are permitted under Australian legislation and result in only localised and temporary water quality effects. The environmental benefit is considered grossly disproportionate to the increased operational, logistical and safety risks.	No
Putrescible waste is macerated per MARPOL Annex V requirements prior to overboard discharge.	This control is legislated under the *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* (Section 26F) and AMSA Marine Order 95 (Marine pollution prevention – garbage) when vessels are >3 nm and <12 nm from the	Yes **(IMP07-CM01, -CM02)**

ALARP decision context	
(All phases) *(Commonwealth waters)*	shore). It reduces negative impacts on water quality and marine fauna. This control is readily implemented using existing vessel and platform waste management systems and represents standard offshore industry practice. The costs associated with implementing and maintaining the control are not grossly disproportionate to the environmental benefit achieved through reducing potential impacts to water quality and marine fauna.

Environmental Controls and Performance Measurement			
EPO	**Control measure**	**EPS**	**Measurement criteria**
IMP07-EPO01 Putrescible waste discharges do not reduce water quality beyond the discharge point or disrupt biologically important behaviours of fauna beyond transient, localised attraction responses.	**Platform (Commonwealth waters)**		
	IMP07-CM01 Beach's Waste Management Plan – Otway and Bass Strait Offshore (S4000AD719914) is implemented to ensure that waste is eliminated, reduced, recycled and/or reused as far as reasonably practicable and includes requirements for the appropriate disposal, recycling, reuse, tracking and reporting of all wastes. This includes the requirement for: • Macerating putrescible waste to a particle size ≤25 mm (operations phase only). • Records of waste disposal are maintained in a Garbage Record Book. • Waste management requirement are communicated to personnel. *(All phases)*	**IMP07-EPS01** Putrescible waste discharges comply with the *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* (Section 26F) and AMSA Marine Order 95 (Marine pollution prevention – garbage).	**IMP07-MC01.1** Platform Waste Management Plan (CDN/ID 3974553) is readily available. **IMP07-MC01.2** Waste manifest (Garbage Record Book) is in place and verifies that waste management meets legislative requirements. **IMP07-MC01.3** CMMS records verify that the macerator is functional and maintained or replaced as required. **IMP07-MC01.4** Personnel induction records verify they are inducted into putrescible waste management requirements.
	Vessels (Commonwealth and Victorian state waters)		
	IMP07-CM02 The Beach Marine Assurance is implemented to ensure that vessels meet legislative putrescible waste discharge rules. This means: • Macerated putrescible waste (≤25 mm) is only discharged overboard when the vessel is >3 nm from the shoreline.	As per **IMP07-EPS01**	**IMP07-MC02** A Garbage Record Book for vessels is in place and verifies waste discharge locations and volumes.

ALARP decision context	
	• Un-macerated putrescible waste is only discharged overboard when the vessel is >12 nm from the shoreline and outside the Yolla-A PSZ. • For vessels without a macerator and for non-putrescible galley waste, waste is returned to shore for disposal. *(All phases)*
Impact Consequence (residual)	
Operations	Minor (1)
CoP	Minor (1)
Preservation	Minor (1)
ALARP Decision Justification	
With the controls outlined in this table in place, the impact consequence has been assessed as Minor (1) and is considered to be good practice (Decision Context A). This means any additional or alternative control measures do not lower the residual consequence further or would be grossly disproportionate to the residual consequence. Therefore, a Minor (1) residual impact consequence is considered to be ALARP.	
Acceptability Assessment	
Defined acceptable level	Putrescible waste discharges are assessed as having a Minor (1) consequence, which is not considered as having the potential to result in serious or irreversible environmental damage.
Internal context	The proposed management of the risk is aligned with the Beach Environment Policy. Activities will be undertaken in accordance with the Implementation Strategy (Section 8).
External context	The BassGas Offshore Operations SEP is implemented to ensure that stakeholders are aware of operations issues. Stakeholders have not raised concerns about putrescible waste.
Legislative context	The control measures outlined in this EP align with the requirements of: • *Navigation Act 2012* (Cth): ○ Chapter 4 (Prevention of Pollution). ○ AMSA Marine Order 95 (Marine Pollution Prevention - garbage). • *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* (Cth): ○ Section 26F (which implements MARPOL Annex V). • POWBONS Act 1986 (Vic): ○ Section 23B (Prevention of pollution by garbage).
Industry practice	The control measures outlined in the below-listed guidelines and codes of practice demonstrate that BPEM will be implemented for this activity.
	Environmental management in the upstream oil and gas industry (IOGP-IPIECA, 2020) — The control measures listed in this table meet the relevant mitigation measures listed for offshore activities with regard to:

ALARP decision context		
		• Food waste – ensure food waste is macerated to MARPOL standards prior to overboard discharge **(IMP07-CM01, -CM02)**.
	Best Available Techniques Guidance Document on Upstream Hydrocarbon Exploration and Production (European Commission, 2019)	The control measures listed in this table meet these guidelines for offshore activities with regard to: • Environmental monitoring (item 26). The BAT are met for Yolla-A operations with regard to monitoring waste streams **(IMP07-CM01)**.
	Environmental, Health and Safety Guidelines for Offshore Oil and Gas Development (World Bank Group, 2015)	The control measures listed in this table meet these guidelines for offshore activities with regard to: • Other waste waters (item 44). Food waste from the kitchen should, at a minimum, be macerated to acceptable levels and discharged to sea, in compliance with MARPOL requirements **(IMP07-CM01, -CM02)**.
	Code of Environmental Practice (APPEA, 2008)	The control measures listed in this table meet the following offshore development and production objectives: • To reduce the volume of wastes produced to ALARP and to an acceptable level.
Environmental context	MNES	
	AMPs	No intersection or impacts.
	Ramsar wetlands	No intersection or impacts.
	NIWs	No intersection or impacts.
	TECs	No intersection or impacts.
	Nationally threatened and migratory species	This hazard does not have any impacts on threatened or migratory species.
	Other matters	
	State marine parks	This hazard does not have any impacts on state marine parks.
	Species Conservation Advice/Recovery Plans/Threat Abatement Plans	The discharge of putrescible waste does not compromise the specific objectives or actions (regarding marine pollution) of the Albatross and Giant Petrels Recovery Plan (DSEWPC, 2011) or any of the other species Recovery Plans, Conservation Management Plans or Conservation Advice referenced in this EP.
ESD principles	The EIA presented throughout this EP demonstrates that ESD principles (a), (b), (c) and (d) are met (noting that principle (e) is not relevant).	
Environmental Monitoring		
Volume/weight of non-macerated waste sent ashore for disposal.		
Record Keeping		

ALARP decision context	
Platform • Volume/weight of non-macerated waste sent ashore. • Waste Management Plan. • Waste manifest. • CMMS records. • Crew induction records.	Vessels • Volume/weight of non-macerated waste sent ashore. • Procurement records. • Garbage record books.

7.8 IMPACT 8: Routine Discharges - Sewage and Grey Water

7.8.1 Source of Aspect

The use of ablution facilities on the platform and vessels results in the discharge of sewage, and the use of laundries, showers, kitchens and hand basins results in the discharge of 'grey water' to the ocean. The method of treatment and discharge is as follows:

- Platform;
  - Sewage - macerated but not treated (to a tertiary level) prior to overboard discharge. Yolla-A usually accommodates between five to eight (5-8) POB. Sewage is discharged via the sewage caisson 7 m below sea level. During the CoP phase, sewage will be discharged directly to the ocean (as permitted under MARPOL).
  - Grey water – discharged directly to the sewage cassion passes through a STP sized for a maximum of 44 POB and is discharged via the sewage caisson. During the CoP phase, grey water will be discharged directly to the ocean (as permitted under MARPOL).
- Vessels;
  - Sewage – macerated and treated in a sewage treatment plant (STP) prior to overboard discharge.
  - Grey water – passes through the STP prior to overboard discharge.

The composition of sewage and grey water (particularly when untreated) may include:

- Particulate matter – such as solids composed of floating, settleable, colloidal and dissolved matter, substances that affect aspects of aesthetics such as ambient water colour, the presence of surface slicks/sheens and odour.
- Chemicals – including:
  - Nutrients (e.g., ammonia, nitrite, nitrate and orthophosphate).
  - Organics (e.g., volatile and semi-volatile organic compounds, oil and grease, phenols, endocrine disrupting compounds).

- Inorganics (e.g., hydrogen sulphide, metals and metalloids, surfactants, phthalates, residual chlorine).

- Biological pathogens – including bacteria, viruses, protozoa and parasites.

As outlined in Table 3.11, activities undertaken during the operations, CoP and preservation phases involve the presence of personnel on the platform and onboard support vessels. As a result, sewage and grey water may be generated throughout all project phases. Accordingly, this aspect is relevant to the operations, CoP and preservation phases, as summarised below:

Hazard	Source	Operations	CoP	Preservation
Platform	Discharge of sewage and grey water	✓	✓	✓
Support vessels	Discharge of sewage and grey water	✓	✓	✓

7.8.2 Known and Potential Environmental Impacts

Treated and untreated sewage and grey water discharges from the platform and support vessels is spatially localised, limited to a short duration (i.e., scheduled activities at the platform and IMR campaigns along the RGP) and rapidly dilute in the water column when discharged.

The release of sewage and greywater may result in minor increases in nutrients and oxygen demand, with these changes limited to up to 50 m horizontally and 10 m vertically from the discharge point, dispersed by the variable currents within Bass Strait. As such, the consequence is assessed to be **Minor (1)**.

7.8.3 EMBA

Given the buoyant nature of sewage and grey water discharges, the EMBA is likely to be the top 10 m of the water column and a 50 m radius from the discharge point within the Operational Area. This is based on modelling of continuous wastewater discharges (including treated sewage and greywater) undertaken by Woodside 2008) which found:

- Rapid horizontal dispersion of discharges occurs due to wind-driven surface water currents.

- Vertical discharge is limited to about the top 10 m of the water column due to the neutrally buoyant nature of the discharge.

- A concentration of a component within the discharge stream is reduced to 1% of its original concentration at no less than 50 m from the discharge point under any condition.

In addition to impacting the quality of the receiving waters, receptors that may occur within this EMBA, either as residents or migrants, are:

- Pelagic fauna (plankton, fish, cetaceans, pinnipeds).

- Avifauna

No impacts on valued species or habitats within the operational areas or planning areas is expected.

First Nations cultural values and sensitivities may be impacted by the activities within the EMBA including routine marine discharges.

7.8.4 Jurisdiction of Hazard

The jurisdictions for this hazard are outlined below.

Commonwealth waters	Victorian waters
YES	NO
The platform is located in Commonwealth waters and discharges treated sewage and grey water. Vessels engaged in IMR activities working alongside the platform or RGP in Commonwealth waters may also discharge sewage and grey water.	Vessels engaged in maintenance activities along the RGP are not permitted to discharge treated or untreated sewage and grey water in Victorian waters.

7.8.5 Evaluation of Environmental Impacts

7.8.5.1 Water quality

Nutrients found in sewage, such as phosphorus and nitrogen, can contribute to the eutrophication of receiving waters, particularly in still, calm, inland areas rather than in offshore waters. This process can lead to algal blooms, which degrade aquatic habitats by reducing light levels and producing certain toxins that can be harmful to marine life and humans. However, due to tidal movements and currents in open ocean waters, eutrophication is unlikely to occur. Sewage will be treated to a tertiary level through sewage treatment plants (STPs), eliminating any impacts from the release of chemicals or pathogens that would be present in untreated wastewater.

Grey water can contain a variety of pollutants in varying concentrations, including oil and other organic compounds, hydrocarbons, detergents, grease, metals, suspended solids, chemical nutrients, food waste, coliform bacteria, and some medical waste. The STP (platform and vessels) effectively treats grey water, significantly removing these pollutants before discharge.

Due to the localised nature of discharge, receptors with the largest potential to be impacted are those in the immediate vicinity of the discharge area (NERA, 2017). Given that sewage discharges are at or near the surface, and remain buoyant, the receptors with the potential to be impacted are also those within or on surface waters, i.e. plankton, fish and other marine fauna. Treated sewage and grey water discharges will be quickly diluted in the surface layers of the water and dispersed by currents. The biological oxygen demand of the treated effluent is not expected to cause oxygen depletion in the receiving waters (Black et al., 1994), as it will be treated before release. Upon discharge, surface water currents will help oxygenate the effluent. As result the potential impacts are expected to be negligible and have therefore been assessed as **Minor (1)** consequence.

7.8.5.2 Biological receptors

Plankton are microscopic organisms that drift in the water columns of oceans, rivers, and lakes, playing a crucial role in aquatic ecosystems. They are classified into two main groups: phytoplankton, which are plant-like organisms capable of photosynthesis, and zooplankton, which are small animals that feed on phytoplankton and each other. Together, these tiny creatures form the foundation of the marine food web, supporting a wide range of marine life, from small fish to large whales. Beyond their ecological importance, plankton also contribute significantly to global carbon cycling and oxygen

production, making them essential for sustaining life on Earth. Their abundance and diversity reflect the health of aquatic environments and studying them provides valuable insights into the impacts of climate change and pollution on our oceans.

Any potential change in plankton diversity, abundance and composition as a result of treated sewage and grey water discharges is expected to be very low (given the waste stream is treated) and localised (as outlined in the EMBA) and is likely to return to background conditions within tens to a few hundred metres of the discharge location, accordingly, impacts higher up the food chain (e.g., fish, reptiles, birds and cetaceans) are expected to be negligible and have therefore been assessed as **Minor (1)** consequence.

7.8.5.3 Social impacts

Treated sewage and grey water discharges will not have any impacts on social activities in or around the activity area because of the long distance between recreational beaches (swimming and fishing) and Yolla-A (and most vessel- related activities) and because there are no recognised dive sites (e.g., shipwrecks, reefs) around the platform and pipeline.

The impacts of treated sewage and grey water discharges to the physical, biological and social environment are expected to have negligible impact and have therefore been assessed as **Minor (1)** consequence because of the:

- Low discharge volumes.
- Intermittent nature of the discharge.
- Treatment of the waste stream prior to discharge.
- High dilution and dispersal factor in open waters.
- Distance from shore.
- High biodegradability and low persistence of the waste.
- Absence of sensitive habitats in the activity area.

7.8.5.4 Cultural values and sensitivities

The impact of routine discharges (excluding PFW) are discussed in Section 7.7.5.2.

7.8.6 Cumulative Impact Evaluation

There is a low potential for cumulative impacts resulting from the discharges of sewage and grey water from the Yolla-A platform and associated vessels (treated or untreated) when combined with other routine marine discharges from the activity or other maritime activities in Bass Strait. When considered cumulatively, these discharges are infrequent, short-term and result in localised increases in organic material within the immediate vicinity of the discharge point. Discharge volumes are small, highly biodegradable, and rapidly dispersed in open offshore waters, limiting the potential for accumulation or broader water quality effects.

There are no other oil and gas operations in close proximity to BassGas, so there is no overlap in EMBAs for this hazard from other similar activities. Similarly, vessel-based activities being undertaken by offshore wind developers in the offshore wind feasibility licences to the east of BassGas are too far away (over 130 km) for cumulative impacts from sewage and grey water discharges to occur.

7.8.7 Impact Assessment

An impact assessment for sewage and grey water discharges is presented below in Table 7.32.

Table 7.32: Impact assessment for sewage and grey water discharges

ALARP decision context		
Impact decision framework context	Type A.	
Activity	Nothing new or unusual, represents business as usual, well understood activity, good practice is well defined.	
Level of certainty of impacts	Risks are well understood, uncertainty is minimal.	
Stakeholder influence	No conflict with company values, no partner interest, no significant media interest.	
Impact Consequence (inherent)		
Operations	Minor (1)	
CoP	Minor (1)	
Preservation	Minor (1)	
Assessment of Proposed Control Measures		
Control	**Cost/benefit analysis**	**Implemented?**
Do not discharge sewage and grey water in waters >12 nm from shore. *(All phases)* *(Commonwealth waters)*	Eliminates a biodegradable waste stream that can result in decreased water quality and scavenging behaviour by marine fauna. Offshore discharges conducted in accordance with MARPOL requirements are permitted under Australian legislation and result in only localised and temporary water quality effects. Given the minor residual impact and rapid dilution of these biodegradable waste streams, the environmental benefit achieved by eliminating offshore discharge is considered grossly disproportionate to the increased operational, logistical and safety risks associated with storage, handling and transport to shore.	No
Do not discharge sewage and grey water in waters <3 nm from shore. *(All phases)* *(Victorian State waters)*	Prevents biodegradable waste streams entering shallower waters with (often) a greater presence of sensitive benthic habitats (such as reefs, seagrass meadows and sponges) than deeper waters. It also prevents the potential of such discharges impacting on human recreational activities that are concentrated close to the shoreline. It is feasible to implement this control because vessel-based activities close to the shoreline mean there is a	Yes **(IMP07-CM03)**

	shorter distance to ports (than working further offshore), making the option of port waste transfers feasible. The control can be implemented through existing vessel waste management arrangements and is operationally feasible given the proximity to shore during relevant activities. The associated costs are not grossly disproportionate to the environmental benefit achieved through protecting nearshore environmental values and reducing potential impacts to recreational users.	
Sewage and grey water discharges are managed in accordance with MARPOL Annex V. *(All phases)* *(Commonwealth & Victorian State waters)*	MARPOL Annex IV is given effect in Australia under the *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* (Cth). Implementing this control measure is routine offshore practice. During CoP, sewage and greywater generated on the platform will not be treated prior to overboard discharge. This is because power (supplied by solar panels and batteries) to the facility will be limited to essential equipment only, such as navigation lighting and radio communications. Untreated sewage discharges are permitted by MARPOL Annex IV because the platform is located >12 nm from shore. Compliance with MARPOL requirements is standard offshore industry practice and can be achieved using existing infrastructure and management systems. The costs associated with implementing this control are not grossly disproportionate to the environmental benefit achieved through minimising environmental impacts while maintaining safe and practical offshore operations.	Yes **(IMP07-CM01, -CM02, -CM03)**
Collect and dispose of platform and vessel sewage and greywater onshore *(All phases)* *(Commonwealth & Victorian State waters)*	Presents increased health and safety risks associated with storing and handling organic waste streams onboard and during transport to shore. While eliminating sewage and greywater discharges would prevent localised reductions in water quality and reduce the potential for temporary attraction of marine fauna, the environmental benefit is limited given the small and intermittent nature of these discharges in the Operational Area and the rapid dilution of these biodegradable waste streams. The additional operational, logistical and safety costs are grossly disproportionate to the reduction in environmental impact.	No
Treatment or disinfection of platform sewage prior to discharge *(All phases)* *(Commonwealth waters)*	During the operations phase, sewage volumes generated on the platform are generally low, reflecting the relatively small offshore workforce. The platform is located in offshore Commonwealth waters more than 12 nm from land, where dispersion and dilution processes are high and there are no known sensitive receptors to human pathogens in the immediate vicinity of the discharge location. The potential environmental impact associated with sewage discharge is therefore limited and highly localised. Installation of additional sewage treatment, further treatment or disinfection systems would require additional infrastructure, power consumption, maintenance activities, consumables and chemical dosing resulting in increased operational complexity and	No

	associated safety and environmental risks. Given the low volume of sewage generated, the offshore location, high assimilative capacity of the receiving environment and that untreated sewage discharge is permitted under applicable legislation, the environmental benefit of implementing additional treatment measures is considered grossly disproportionate to the associated environmental, safety and operational costs. During CoP and preservation phases, power supplies on the platform are restricted to essential systems (e.g., navigation lighting). Installation and operation of dedicated sewage treatment systems would require additional infrastructure, chemical dosing, increased resource consumption, maintenance and operational support. Additional treatment would also create a risk of introducing treatment chemicals into the marine environment. Given that the platform is located more than 12 nm from shore and untreated sewage discharge is permitted under applicable legislation and there are no known sensitive receptors to human pathogens in the vicinity of the discharge location. The environmental benefit achieved through additional treatment is considered grossly disproportionate to the associated environmental, safety and operational costs and complexity required for implementation.		
Environmental Controls and Performance Measurement			
EPO	**Control measure**	**EPS**	**Measurement criteria**
IMP08-EPO01 Sewage and grey water discharges do not reduce water quality more than 50 m beyond the discharge point or disrupt biologically important behaviours of fauna beyond transient, localised responses.	**Platform only (Commonwealth waters)**		
	IMP08-CM01 Beach's Waste Management Plan – Otway and Bass Strait Offshore (S4000AD719914) is implemented to ensure that waste is eliminated, reduced, recycled and/or reused as far as reasonably practicable and includes requirements for the appropriate disposal, recycling, reuse, tracking and reporting of all wastes. This includes the requirement for: • Macerating sewage to a particle size ≤25 mm prior to overboard discharge. *(All phases)*	**IMP08-EPS01** Sewage disposal complies with the *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* (Section 26D).	**IMP08-MC01.1** Platform Waste Management Plan (CDN/ID 3974553) is readily available. **IMP08-MC01.2** CMMS records verify that the sewage macerator is functional and maintained or replaced as required.
	IMP08-CM02 For personnel visits during the CoP and preservation phases, sewage and grey water is discharged	**IMP08-EPS02** Sewage and grey water generated during personnel visits in the preservation phase are	**IMP08-MC02** Platform logs verify sewage and grey water

overboard without treatment. *(CoP and Preservation phases)*	discharged in accordance with the requirements of the *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* and associated operational procedures.	are discharged overboard only during preservation-phase personnel visits.
Vessels (Commonwealth and Victorian state waters)		
IMP08-CM03 The Beach Marine Assurance is implemented to ensure that vessels meet legislative sewage discharge rules. This includes: • Valid ISPP certification (or equivalent) where required by vessel class and size. • Sewage treatment systems are operated and maintained in accordance with manufacturer specifications. • Sewage is only discharged overboard when the vessel is >3 nm from the shoreline (no discharge of treated or untreated sewage within Victorian state waters) and outside the Yolla PSZ. • Sewage originating in holding tanks is discharged at a moderate rate while the vessel is proceeding en-route at a speed not less than 4 knots. • Un-treated sewage is only discharged overboard when the vessel is >12 nm from the shoreline and outside the Yolla-A PSZ.	**IMP08-EPS03** Vessels comply with the *Protection of the Sea (Prevention of Pollution from Ships) Act 1983 (Cth)* (Section 26D) and the POWBONS Act 1986 (Vic) (Section 23G).	**IMP08-EPS03.1** Procurement documents verify that vessels meet legislative requirements. **IMP08-EPS03.2** Vessel discharge records verify the location of sewage discharges and whether it is treated or untreated. **IMP08-EPS03.2** Vessel sewage treatment systems are maintained in accordance with planned maintenance requirements.

(All phases)

Impact Consequence (residual)	
Operations	Minor (1)
CoP	Minor (1)
Preservation	Minor (1)

ALARP Decision Justification

With the controls outlined in this table in place, the impact consequence has been assessed as Minor (1) and is considered to be good practice (Decision Context A). This means any additional or alternative control measures do not lower the residual consequence further or would be grossly disproportionate to the residual consequence. Therefore, a Minor (1) residual impact consequence is considered to be ALARP.

Acceptability Assessment		
Defined acceptable level	Sewage and grey water discharges are assessed as having a Minor (1) consequence, which is not considered as having the potential to result in serious or irreversible environmental damage.	
Internal context	The proposed management of the risk is aligned with the Beach Environment Policy. Activities will be undertaken in accordance with the Implementation Strategy (Section 8).	
External context	The BassGas Offshore Operations SEP is implemented to ensure that stakeholders are aware of operations issues. Stakeholders have not raised concerns about sewage and grey water discharges.	
Legislative context	The control measures outlined in this EP align with the requirements of: • *Navigation Act 2012* (Cth): ○ Chapter 4 (Prevention of Pollution). ○ AMSA Marine Order 96 (Marine Pollution Prevention - sewage). • *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* (Cth): ○ Section 26D (which implements MARPOL Annex IV). • POWBONS Act 1986 (Vic): ○ Section 23G (Prevention of pollution by sewage).	
Industry practice	The control measures outlined in the below-listed guidelines and codes of practice demonstrate that BPEM will be implemented for this activity.	
	Environmental management in the upstream oil and gas industry (IOGP-IPIECA, 2020)	The control measures listed in this table meet the relevant mitigation measures listed for offshore activities with regard to: • Sewage and grey water – ensure sewage and grey water is treated in an appropriate on-site marine sanitary treatment unit in compliance with MARPOL Annex V requirements **(IMP07-CM01, -CM03)**.

	Best Available Techniques Guidance Document on Upstream Hydrocarbon Exploration and Production (European Commission, 2019)	There are no guidelines for offshore activities with regard to managing sewage and grey water discharges.
	Environmental, Health and Safety Guidelines for Offshore Oil and Gas Development (World Bank Group, 2015)	The control measures listed in this table meet these guidelines for offshore activities with regard to: • Other waste waters (item 44). Grey and black water should be treated in an appropriate on-site marine sanitary treatment unit in compliance with MARPOL **(IMP08-CM01, -CM03)**.
	Code of Environmental Practice (APPEA, 2008)	The control measures listed in this table meet the following offshore development and production objectives: • To reduce the volume of wastes produced to ALARP and to an acceptable level.
Environmental context	MNES	
	AMPs	No intersection or impacts.
	Ramsar wetlands	No intersection or impacts.
	NIWs	No intersection or impacts.
	TECs	No intersection or impacts.
	Nationally threatened and migratory species	This hazard does not have any impacts on threatened or migratory species.
	Other matters	
	State marine parks	This hazard does not have any impacts on state marine parks.
	Species Conservation Advice/Recovery Plans/Threat Abatement Plans	The discharge of sewage and grey water discharges does not compromise the specific objectives or actions (regarding marine pollution) of the Albatross and Giant Petrels Recovery Plan (DSEWPC, 2011) or any of the other species Recovery Plans, Conservation Management Plans or Conservation Advice referenced in this EP. [reverting back to original words]
ESD principles	The EIA presented throughout this EP demonstrates that ESD principles (a), (b), (c) and (d) are met (noting that principle (e) is not relevant).	

Environmental Monitoring
Volume/weight of non-macerated waste sent ashore for disposal.

Record Keeping	
Platform	Vessels
• Waste Management Plan. • CMMS records. • Platform logs. • Waste manifest. • Crew induction records.	• Procurement records. • Vessel discharge records. • Vessel PMS records.

7.9 IMPACT 9: Routine Discharges - Cooling and Brine Water

7.9.1 Source of Aspect

Equipment on the platform is predominantly air cooled. Cooling water is also used, but is a closed loop system and not discharged overboard. Seawater serves as a heat exchange medium for cooling machinery engines on Yolla-A and various vessels. A freshwater fire pump circulates RO water (with no chemicals added).

Potable water, primarily for accommodation and associated domestic areas, is generated on the platform and vessels using a reverse osmosis (RO) plant. Discharged brine is typically 20 to 50 percent higher in salinity than the intake seawater (depending on the desalination process used) and may contain low concentrations of scale inhibitors and biocides, which are used to avoid fouling of pipework (Woodside, 2014).

At Yolla-A, the brine water is discharged from the sewage caisson at a depth of 7 meters below sea level. In contrast, vessels typically discharge this water at the ocean surface. After discharge, the water is warmer than the surrounding ambient temperature and may contain low concentrations of residual biocide and scale inhibitors that are used to control biofouling and scale formation.

As outlined in Table 3.11, cooling water discharges may occur during the operations, CoP and preservation phases as offshore infrastructure remains powered and operational to varying degrees throughout the life of the project. Brine discharges may occur during the operations phase, and where support vessels utilise desalination systems, during vessel activities associated with the CoP phase. While support vessel brine discharges are also considered possible during the preservation phase, they are considered highly unlikely given visits are expected to be undertaken as day trips only. Brine discharges from the platform are not anticipated during the CoP or preservation phases as use of the accommodation facilities is not planned. Should the accommodation facilities be returned to service, operation of associated systems may require water circulation through the fire water system, which could result in brine discharge. Accordingly, this aspect is relevant to the operations, CoP and preservation phases, as summarised below:

Hazard	Source	Operations	CoP	Preservation
Platform	Brine discharge	✓	×	×
	Cooling water discharge	✓	✓	✓
Support vessels	Brine discharge	✓	✓	✓
	Cooling water discharge	✓	✓	✓

7.9.2 Known and Potential Environmental Impacts

The known and potential environmental impacts of cooling water and brine discharges are:

- A temporary and very localised increase in sea water temperature, causing thermal stress and behaviour changes to marine biota.
- Temporary and very localised increase in sea surface salinity, potentially causing harm to fauna unable to tolerate higher salinity.
- Potential toxicity impacts to marine fauna from the ingestion of residual biocide and scale inhibitors.

7.9.3 EMBA

The key physicochemical stressors that are associated with reject brine water discharge include salinity, pH, temperature and chemical toxicity. Water quality of the surrounding environment may be altered through the addition of chemicals and an increase in salinity. Scale inhibitors and biocides are commonly used within the systems described above to prevent fouling. Scale inhibitors are typically low molecular weight phosphorous compounds that are water-soluble and only have acute toxicity to marine organisms about two orders of magnitude higher than typically used in the water phase (Black et al., 1994). The biocides typically used in the industry are highly reactive and degrade rapidly (Black et al., 1994).

The EMBA for cooling water and brine discharges associated with platform and vessel activities is likely to be the top 10 m of the water column and a 100 m radius from the discharge point within the Operational Area. Modelling of continuous wastewater discharges (Woodside, 2008) found that discharge water temperature decreases quickly as it mixes with the receiving waters, with the discharge water temperature being less than 1°C above background levels within 100 m (horizontally) of the discharge point, and will be within background levels within 10 m vertically,

In addition to impacting the quality of the receiving waters, receptors that may occur within this EMBA, either as residents or migrants, are:

- Pelagic fauna (plankton, fish, cetaceans, pinnipeds).
- Avifauna

No impacts on valued species or habitats within the operational areas or planning areas is expected.

First Nations cultural values and sensitivities may be impacted by the activities within the EMBA including routine marine discharges.

7.9.4 Jurisdiction of Hazard

The jurisdictions for this hazard are outlined below.

Commonwealth waters	Victorian waters
YES	YES
The platform discharges brine water and vessels may discharge cooling and brine water while operating in the Yolla-A PSZ.	Vessels discharge cooling and brine water while undertaking IMR activities along the portion of the RGP within state waters.

7.9.5 Evaluation of Environmental Impacts

7.9.5.1 Seawater temperature

Once in the water column, cooling water will remain in the surface layer, where turbulent mixing and heat transfer with surrounding waters will occur. Prior to reaching background temperatures, the impact of increased seawater temperatures down current of the discharge may result in changes to the physiological processes of marine organisms, such as attraction or avoidance behaviour, stress or potential mortality. The potential impacts are expected to be negligible and have therefore been assessed as **Minor (1)** consequence.

7.9.5.2 Sea surface salinity

Brine water will sink through the water column where it will be rapidly mixed with receiving waters and be dispersed by ocean currents. Walker and MacComb (1990) found that most marine species are able to tolerate short-term fluctuations in water salinity in the order of 20-30%, and it is expected that most pelagic species passing through a denser saline plume would not suffer adverse impacts. Other than plankton, pelagic species are mobile and would be subject to slightly elevated salinity levels for a very short time as they swim through the 'plume.' As such, impacts to receptors are expected to be negligible and have therefore been assessed as **Minor (1)** consequence.

7.9.5.3 Potential toxicity impacts

Scale inhibitors and biocides are commonly used in heat exchange and desalination processes to prevent fouling in pipework. Scale inhibitors are low-molecular-weight phosphorus compounds that are water-soluble and exhibit acute toxicity to marine organisms, with toxicity levels only about two orders of magnitude higher than those typically found in water (Black et al., 1994). The biocides used in the industry are highly reactive, degrade rapidly, and are very soluble in water (Black et al., 1994).

These chemicals are considered inherently safe at the low dosages utilised, as they are typically 'consumed' during the inhibition process. This ensures that there is little to no residual chemical concentration remaining upon discharge.

The impacts of cooling and brine water discharges on the physical and biological environment are expected to be negligible and have therefore been assessed as **Minor (1)** consequence due to the following reasons:

- Low discharge volumes.
- Intermittent nature of the discharge.

- 'Consumption' of the chemicals prior to discharge.
- High dilution and dispersal factor in open waters, and
- Absence of sensitive habitats in the activity area.

7.9.5.4 Cultural values and sensitivities

The impact of routine discharges (excluding PFW) is discussed in Section 7.7.5.2.

7.9.6 Cumulative Impact Evaluation

There is a low potential for cumulative impacts resulting from the discharge of cooling and brine water from the Yolla-A platform and associated vessels when combined with other routine marine discharges from the activity or other maritime activities in Bass Strait. When considered cumulatively, these discharges result in localised increases in water temperature and salinity within the immediate vicinity of the discharge point. The discharges are rapidly dispersed in open offshore waters, limiting the potential for accumulation of residual biocide and scale inhibitors to impact water quality effects.

There are no other oil and gas operations in close proximity to BassGas, so there is no overlap in EMBAs for this hazard from other similar activities. Similarly, vessel-based activities being undertaken by offshore wind developers in the offshore wind feasibility licences to the east of BassGas are too far away (over 130 km) for cumulative impacts from cooling and brine water discharges to occur.

7.9.7 Impact Assessment

An impact assessment for the discharge of cooling and brine water is presented below in Table 7.33.

Table 7.33: Impact assessment for the discharge of cooling and brine water

ALARP decision context		
Impact decision framework context	Type A.	
Activity	Nothing new or unusual, represents business as usual, well understood activity, good practice is well defined.	
Level of certainty of impacts	Risks are well understood, uncertainty is minimal.	
Stakeholder influence	No conflict with company values, no partner interest, no significant media interest.	
Impact Consequence (inherent)		
Operations	Minor (1)	
CoP	Minor (1)	
Preservation	Minor (1)	
Assessment of Proposed Control Measures		
Control	**Cost/benefit analysis**	**Implemented?**

Store cooling water and brine onboard platform and vessels to cool prior to discharge overboard. *(All phases)* *(Commonwealth & Victorian State waters)*	This would eliminate warm water impacts to the marine environment. Given the large discharge volumes involved, storage and passive cooling prior to discharge is not technically feasible. The operational requirements, space constraints and infrastructure modifications necessary to implement this control are considered grossly disproportionate to the minor and localised environmental benefit that would be achieved.	No
Do not use biocide. *(All phases)* *(Commonwealth & Victorian State waters)*	This would eliminate potential toxicity impacts to the marine environment. However, it not feasible to avoid the use of biocides in most cooling and RO systems because these systems must be kept free of fouling in order to run efficiently. While eliminating biocide use would avoid potential ecotoxicity impacts, the resulting loss of biofouling control would compromise the reliability and efficiency of cooling and RO systems. The operational risks and consequences associated with implementing this control are considered grossly disproportionate to the environmental benefit achieved.	No
Maintain cooling and RO systems in efficient operating condition. *(All phases)* *(Commonwealth & Victorian State waters)*	Ensuring the efficient operation of cooling and RO systems ensures that discharge volumes, temperatures and biocide concentrations are as designed, thereby minimising impacts to the receiving environment. Undertaking equipment maintenance is routine practice for offshore operations. The associated costs are not grossly disproportionate to the environmental benefit achieved through minimising discharge volumes, temperatures and residual biocide concentrations and maintaining efficient system performance.	Yes **(IMP09-CM01)**
Use low toxicity biocide. *(All phases)* *(Commonwealth & Victorian State waters)*	This significantly reduces potential toxicity impacts to marine fauna in the water column. It is feasible to do this and Beach implements its Chemical Management Procedure to ensure that only low-toxicity chemicals, rated as 'Gold'/'Silver' (CHARM) or 'D'/'E' (non- CHARM)-rated chemicals by the Offshore Chemical Notification Scheme (OCNS) are used in the cooling and brine water systems. Selection of lower toxicity biocides can be achieved through existing chemical assessment and procurement processes and is consistent with standard offshore practice. The associated costs are not grossly disproportionate to the environmental benefit achieved through reducing potential impacts to marine receptors.	Yes **(IMP09-CM02, -CM05)**
Optimise biocide dosing. *(All phases)*	This significantly reduces potential toxicity impacts to marine fauna in the water column. Biocide is dosed at a rate such that it is either entirely or mostly consumed in the process, meaning very little residual biocide is released to the marine	Yes **(IMP09-CM02, -CM05)**

(Commonwealth & Victorian State waters)	environment once it's performed its required function. This is routine practice in offshore platform and vessel operations. Optimised dosing can be implemented through existing system controls and operating procedures with minimal additional cost. The costs associated with implementation are not grossly disproportionate to the environmental benefit achieved through reducing residual biocide concentrations in discharges.	
Maintain discharge outlets to maximise dilution and dispersion. *(Operations phase)* *(Commonwealth waters)*	Appropriate discharge location, orientation and flow conditions facilitate rapid mixing with ambient seawater, reducing thermal and salinity gradients. Design modifications to existing facilities may be impractical, however maintaining discharge systems in their designed operating condition is readily achievable through routine inspection and maintenance activities. The associated costs are not grossly disproportionate to the environmental benefit achieved through promoting rapid dilution and minimising localised impacts.	Yes (**IMP09-CM03)**
Maintain seawater intake screens. *(Operations phase)* *(Commonwealth waters)*	Intake screening reduces entrainment and impingement of marine organisms into cooling and RO systems. Screens are standard equipment in offshore facilities and vessels and inspection and maintenance of intake screens forms part of routine facility maintenance activities and can be readily implemented. The associated costs are not grossly disproportionate to the environmental benefit achieved through reducing entrainment and impingement of marine organisms.	Yes **(IMP09-CM04)**

Environmental Controls and Performance Measurement			
EPO	**Control measure**	**EPS**	**Measurement criteria**
IMP09-EPO01 Cooling and brine water discharges do not reduce water quality more than 100 m beyond the discharge point or disrupt biologically important behaviours of fauna beyond transient, localised responses.	**Platform (Commonwealth waters)**		
	IMP09-CM01 Cooling water and RO equipment is maintained according to manufacturer's instructions through the Beach Energy CMMS to ensure it operates efficiently. *(All phases)*	**IMP09-EPS01** Cooling water and RO equipment operates within manufacturers' specifications.	**IMP09-MC01** Maintenance work orders verify that cooling water and RO equipment are inspected and maintained to schedule.
	IMP09-CM02 Chemicals discharged to the marine environment used in the RO system are assessed prior to use to ensure the lowest toxicity, most biodegradable and least accumulative chemicals are selected in line with the Beach Chemical Management Procedure. This means:	**IMP09-EPS02** Chemicals discharged to the marine environment via the RO system are low toxicity.	**IMP09-MC02** Chemical Management Procedure assessment records verify the procedure is implemented.

• Chemicals will be selected with the lowest practicable environmental impacts and risks subject to technical constraints. • Offshore Chemical Notification Scheme (OCNS) 'Gold'/'Silver' (CHARM) or 'D'/'E' (non-CHARM)-rated chemicals (i.e., low toxicity) are used in the cooling and brine water systems. • Plant and equipment that requires cooling by water is maintained in good working order in accordance with the Yolla-A Maintenance Management System and vessels' Preventative Management System. *(Operations phase)*		
IMP09-CM03 Maintain discharge outlets to maximise dilution and dispersion. *(Operations phase)*	**IMP09-EPS03** Cooling water and brine discharge systems are maintained in accordance with the CMMS to promote rapid dilution and dispersion of discharged effluent.	**IMP09-MC03** Maintenance records verify discharge infrastructure is maintained in accordance with the CMMS.
IMP09-CM04 Maintain seawater intake screens. *(Operations phase)*	**IMP09-EPS04** Seawater intake screens are maintained to minimise entrainment and impingement of marine organisms.	**IMP09-MC04** CMMS maintenance records and inspection reports verify seawater intake screens are inspected and maintained in accordance with maintenance schedule.
Vessels (Commonwealth and Victorian state waters)		
IMP09-CM05 The Beach Marine Assurance Process is implemented to ensure vessel contractors: • Maintain plant and equipment that requires cooling by water in good working order.	As per **IMP09-EPS02**	**IMP09-MC05** Procurement documents verify that vessels meet requirements.

- Use only OCNS 'Gold' or 'Silver' (CHARM) or 'D' or 'E' (non-CHARM) -rated chemicals (lowest toxicity) in their cooling and brine water systems.

(All phases)

Impact Consequence (residual)	
Operations	Minor (1)
CoP	Minor (1)
Preservation	Minor (1)

ALARP Decision Justification

With the controls outlined in this table in place, the impact consequence has been assessed as Minor (1) and is considered to be good practice (Decision Context A). This means any additional or alternative control measures do not lower the residual consequence further or would be grossly disproportionate to the residual consequence. Therefore, a Minor (1) residual impact consequence is considered to be ALARP.

Acceptability Assessment		
Defined acceptable level	Cooling and brine water discharges are assessed as having a Minor (1) consequence, which is not considered as having the potential to result in serious or irreversible environmental damage.	
Internal context	The proposed management of the risk is aligned with the Beach Environment Policy. Activities will be undertaken in accordance with the Implementation Strategy (Section 8).	
External context	The BassGas Offshore Operations SEP is implemented to ensure that stakeholders are aware of operations issues. Stakeholders have not raised concerns about cooling and brine water.	
Legislative context	There are no legislative controls regarding cooling and brine water discharges.	
Industry practice	The consideration and alignment of EPS with the mitigation measures outlined in the below-listed guidelines and codes of practice demonstrates that BPEM will be implemented for this activity.	
	Environmental management in the upstream oil and gas industry (IOGP-IPIECA, 2020)	The control measures listed in this table meet the relevant mitigation measures listed for offshore activities with regard to: • Cooling water and desalination brine – discharge point should be designed to aid rapid dispersion, biocide dosing is kept to a minimum and freshwater generation is limited to the volumes necessary for operational requirements **(IMP09-CM02)**.
	Best Available Techniques Guidance Document on Upstream Hydrocarbon Exploration and Production (European Commission, 2019)	There are no guidelines for offshore activities with regard to managing cooling and brine water discharges.

	Environmental, Health and Safety Guidelines for Offshore Oil and Gas Development (World Bank Group, 2015)	The control measures listed in this table meet these guidelines for offshore activities with regard to: • Cooling water (items 41 & 42) - Antifouling chemical dosing to prevent marine fouling of cooling water systems should be carefully considered and appropriate screens to be fitted to the seawater intake to avoid entrainment and impingement of marine flora and fauna. The cooling water discharge depth should be selected to maximise mixing and cooling of the thermal plume to ensure it is within 3°C of ambient seawater temperature within 100 m of the discharge point **(IMP09-CM02)**. • Desalination brine (item 43) - Consider mixing desalination brine from the potable water system with cooling water or other effluent streams **(IMP09-CM01)**.
	Code of Environmental Practice (APPEA, 2008)	The control measures listed in this table meet the following offshore development and production objectives: • To reduce the volume of wastes produced to ALARP and to an acceptable level.
Environmental context	MNES	
	AMPs	No intersection or impacts.
	Ramsar wetlands	No intersection or impacts.
	NIWs	No intersection or impacts.
	TECs	No intersection or impacts.
	Nationally threatened and migratory species	This hazard does not have any impacts on threatened or migratory species.
	Other matters	
	State marine parks	This hazard does not have any impacts on state marine parks.
	Species Conservation Advice/Recovery Plans/Threat Abatement Plans	The discharge of cooling and brine water does not compromise the specific objectives or actions of the other species Recovery Plans, Conservation Management Plans or Conservation Advice referenced in this EP.
ESD principles	The EIA presented throughout this EP demonstrates that ESD principles (a), (b), (c) and (d) are met (noting that principle (e) is not relevant).	

Environmental Monitoring

None required.

Record Keeping

Platform	Vessels
• CMMS maintenance work order.	• Procurement documents.

- Chemical Management Procedure.
- Chemical inventories.
- Chemical assessment reports.

7.10 IMPACT 10: Routine Discharges - Bilge Water and Deck Drainage

7.10.1 Source of Aspect

Bilge tanks on vessels collect fluids from closed deck drainage and machinery spaces, which may contain contaminants such as oil, detergents, solvents, chemicals, and solid waste. An oily water separator (OWS) treats this water before it is discharged overboard to comply with MARPOL regulations, which stipulate that the oil-in-water (OIW) concentration must not exceed 15 parts per million (ppm). The volume of these discharges is small and occurs intermittently, based on the storage levels in the bilge tanks. If an OWS is not available, the contaminated fluids are stored in tanks for disposal onshore.

Vessels with unbunded decks that drain directly into the sea may unintentionally discharge contaminated water. This can occur due to ocean spray, rain (often referred to as "green water"), or deck washing activities that capture trace amounts of contaminants such as oil, grease, detergents, or chemical spills (e.g., hydraulic fluids or lubricating oils) that are washed overboard.

On the Yolla-A platform, open deck drains in non-process areas direct water overboard without treatment (see Section 3.5.7). If contaminants are present, there is a risk of these being washed overboard during rain or when the deck is washed. In process areas, deck drainage is directed to the dump caisson for OIW treatment prior to discharge.

As outlined in Table 3.11, hydrocarbons and chemicals will continue to be stored and used during the operations, CoP and preservation phases in support of offshore infrastructure and associated vessel activities. While the quantities present are expected to be reduced during the preservation phase, approximately 6,000-7,000 L of diesel and 1,000 L of fire-fighting foam are anticipated to ring the preservation phase, it is anticipated that about 6,000-7,000 litres of diesel will need to remain on the platform and fire-fighting foam will also remain on the platform (about 1,000 litres) to support the quarterly visits to the platform by 2-3 personnel. The dump caisson will remain open during the preservation phase. remain on the platform to support ongoing visits and maintenance activities. The dump caisson will also remain open during the preservation phase. Accordingly, there remains potential for accidental releases throughout all project phases, and this aspect is therefore relevant to the operations, CoP and preservation phases as summarised below:

Hazard	Source	Operations	CoP	Preservation
Platform	Deck drainage	✓	✓	✓
Support vessels	Deck drainage	✓	✓	✓
	Bilge discharge	✓	✓	✓

7.10.2 Known and Potential Environmental Impacts

The known and potential environmental impacts of the discharge of bilge water and deck drainage are:

- Temporary and localised reduction of surface water quality around the discharge point.

- Acute toxicity to marine fauna through ingestion of contaminated water in a small mixing zone.

7.10.3 EMBA

The EMBA for bilge and deck water discharges is likely to be the top 10 m of the water column and less than a 100 m radius from the discharge point (Woodside, 2008) within the Operational Area.

In addition to impacting the quality of the receiving waters, receptors that may occur within this EMBA, either as residents or migrants, are:

- Pelagic fauna (plankton, fish, cetaceans, pinnipeds).
- Avifauna

No impacts on valued species or habitats within the operational areas or planning areas is expected.

First Nations cultural values and sensitivities may be impacted by the activities within the EMBA including routine marine discharges.

7.10.4 Jurisdiction of Hazard

The jurisdictions for this hazard are outlined below.

Commonwealth waters	Victorian waters
YES	YES
The platform discharges deck drainage. Vessels discharge bilge water and deck drainage while undertaking IMR activities in the platform PSZ or along the portion of the RGP within Commonwealth waters.	Vessels discharge bilge water and deck drainage while undertaking IMR activities along the portion of the RGP within state waters.

7.10.5 Evaluation of Environmental Impacts

7.10.5.1 Water quality

Small volumes and low concentrations of oily water (less than 15 ppm) from bilge discharges, along with traces of chemicals or hydrocarbons released into the ocean through open deck drainage, may temporarily compromise water quality.

Since there are no sensitive habitat types in the water column of the EMBA affected by these discharges, the primary risk is to plankton and pelagic fish. However, these discharges will be rapidly diluted, dispersed, and biodegraded to undetectable levels within a very small mixing zone, according to the EMBA). The potential impacts are expected to be negligible and have therefore been assessed as **Minor (1)** consequence.

7.10.5.2 Potential toxicity impacts

While small volumes and low concentrations of oily water from bilge discharges may temporarily reduce water quality, such discharges are generally not expected to cause acute or chronic toxicity impacts on marine fauna or plankton through ingestion or absorption through the skin.

If a vessel's OWS malfunctions and discharges water that does not meet specifications, toxicity impacts might occur, but this is likely to happen only in a highly localized mixing zone, meaning that few individuals would be exposed.

Overall, the impacts of bilge water and deck drainage on the physical and biological environment are expected to be negligible and have therefore been assessed as **Minor (1)** consequence due to the following reasons:

- Low discharge volumes.
- Intermittent nature of the discharge.
- High dilution and dispersal factor in open waters, and
- Absence of sensitive habitats in the Operational Area and EMBA.

7.10.5.3 Cultural values and sensitivities

The impact of routine discharges (excluding PFW) is discussed in Section 7.7.5.2.

7.10.6 Cumulative Impact Evaluation

There is a low potential for cumulative impacts resulting from the discharge of bilge water and deck drainage from the Yolla-A platform and associated vessels when combined with other routine marine discharges from the activity or other maritime activities in Bass Strait. When considered cumulatively, these discharges result in localised increases in water temperature and salinity within the immediate vicinity of the discharge point. The discharges are rapidly dispersed in open offshore waters, limiting the potential for accumulation of residual OIW or trace contaminants to impact water quality.

There are no other oil and gas operations in close proximity to BassGas, so there is no overlap in EMBAs for this hazard from other similar activities. Similarly, vessel-based activities being undertaken by offshore wind developers in the offshore wind feasibility licences to the east of BassGas are too far away (over 130 km) for cumulative impacts of bilge water and deck drainage discharges to occur.

7.10.7 Impact Assessment

An impact assessment for the discharge of bilge water and deck drainage is presented below in Table 7.34.

Table 7.34: Impact assessment for the discharge of bilge water and deck drainage

ALARP decision context	
Impact decision framework context	Type A.
Activity	Nothing new or unusual, represents business as usual, well understood activity, good practice is well defined.
Level of certainty of impacts	Risks are well understood, uncertainty is minimal.
Stakeholder influence	No conflict with company values, no partner interest, no significant media interest.

Impact Consequence (inherent)	
Operations	Minor (1)
CoP	Minor (1)
Preservation	Minor (1)

Assessment of Proposed Control Measures		
Control	**Cost/benefit analysis**	**Implemented?**
Store treated bilge onboard for disposal onshore. *(All phases)* *(Commonwealth & Victorian State waters)*	This would eliminate impacts to the marine environment from low concentrations of oily water. Given the large volumes involved, storage for subsequent onshore disposal is not technically feasible. The infrastructure requirements, operational constraints and additional handling activities associated with this control are considered grossly disproportionate to the minor and localised environmental benefit that would be achieved.	No
Capture and treat all deck drainage water. *(All phases)* *(Commonwealth & Victorian State waters)*	Most discharge from decks is produced from rainfall events and is unavoidable. Contamination levels associated with rainwater runoff from decks is generally very low. Eliminating deck drainage by collecting all rainwater (contaminated or otherwise) is not feasible as the platform was not designed to perform this function (as is the case for all production platforms). Given the generally low contaminant levels associated with deck drainage, the lack of purpose-built infrastructure and the minor nature of the residual impact, the costs and operational complexity associated with implementing this control are considered grossly disproportionate to the environmental benefit achieved.	No
Use an OWS to treat bilge water. *(All phases)* *(Commonwealth & Victorian State waters)*	It is a legislative requirement to treat oily water prior to overboard discharge and the system is incorporated into the design of the platform and vessels. The costs associated with installation, operation and maintenance of the OWS are not grossly disproportionate to the environmental benefit achieved through reducing hydrocarbon concentrations in discharged bilge water.	Yes **(IMP10-CM01)**
Maintain vessel bilge water systems. *(All phases)* *(Commonwealth & Victorian State waters)*	Ensuring the efficient operation of the bilge system ensures that discharge volumes, temperatures and biocide concentrations are as designed, thereby minimising impacts to the receiving environment. Undertaking equipment maintenance is routine practice for offshore operations. The associated costs are not grossly disproportionate to the environmental benefit achieved through ensuring bilge water treatment systems operate as designed and continue to minimise environmental impacts.	Yes **(IMP10-CM01)**
Bund hydrocarbon and chemical storage areas. *(All phases)*	Bunding is designed to provide containment for accidental releases of stored hydrocarbons and chemicals. Bunding is standard industry practice and can be readily maintained through existing operational arrangements.	Yes **(IMP10-CM03, -CM04)**

(Commonwealth & Victorian State waters)	The associated costs are not grossly disproportionate to the environmental benefit achieved through preventing accidental releases from reaching the marine environment.	
Check that bunding and drains are intact and functioning as designed. *(All phases)* *(Commonwealth & Victorian State waters)*	Ensuring that bunding and drains are operating in line with their design requirements minimises oily water impacts to the receiving environment. Undertaking inspections and maintenance is routine practice for offshore operations. The associated costs are not grossly disproportionate to the environmental benefit achieved through maintaining containment systems and reducing the potential for contaminated discharges.	Yes **(IMP10-CM01, -CM03)**
Use portable bunding and drip trays during maintenance, refuelling and chemical handling activities. *(All phases)* *(Commonwealth & Victorian State waters)*	This minimises the likelihood of hydrocarbons and chemicals entering deck drainage systems. Portable bunds and drip trays are inexpensive, readily available and routinely used during offshore maintenance activities. The costs associated with implementing this control are not grossly disproportionate to the environmental benefit achieved through preventing contaminants entering deck drainage systems..	Yes **(IMP10-CM04)**
Conduct routine inspections of decks, drains and bunded areas to identify spills, leaks or defects. *(All phases)* *(Commonwealth & Victorian State waters)*	Early identification and remediation of spills reduces the potential for contaminants entering deck drainage systems. These inspections are undertaken as part of normal operational activities and require minimal additional resources. The associated costs are not grossly disproportionate to the environmental benefit achieved through early identification and remediation of spills, leaks and defects.	Yes **(IMP10-CM03)**
Maintain and periodically verify OWS performance and oil content monitoring equipment on vessels. *(All phases)* *(Commonwealth & Victorian State waters)*	Verification provides assurance that oily water discharges remain compliant with the 15 ppm MARPOL limit and that equipment failures are identified before environmental impacts occur. Verification activities can be incorporated into routine maintenance and assurance programs and represent standard maritime practice. The associated costs are not grossly disproportionate to the environmental benefit achieved through maintaining compliance and reducing the likelihood of non-compliant oily water discharges.	Yes **(IMP10-CM01, -CM06)**
Make spill response equipment available onboard. *(All phases)*	It is best practice to ensure that spill response equipment is available on offshore platforms and vessels and that marine crew are trained to use it in order to enable a prompt response to spills with the aim of reducing the likelihood of hydrocarbons reporting	Yes **(IMP10-CM05)**

(Commonwealth & Victorian State waters)	to the marine environment. It is also a requirement of the OPGGS (Environment) Regulations that oil pollution emergency arrangements and capability is in place for the life of an activity.
Train personnel to be competent in spill response. *(All phases)* *(Commonwealth & Victorian State waters)*	This control measure is feasible and in place for BassGas platform and vessel operations. The costs associated with maintaining spill response equipment and capability are not grossly disproportionate to the environmental benefit achieved through enabling a timely response to spills and reducing potential environmental impacts.

Environmental Controls and Performance Measurement			
EPO	**Control measure**	**EPS**	**Measurement criteria**
IMP10-EPO01 Bilge water and deck drainage discharges do not reduce water quality more than 100 m beyond the discharge point.	**Platform (Commonwealth waters)**		
	IMP10-CM01 The hazardous and non-hazardous open drain system, closed drain system and dump caisson are maintained through the Beach Energy CMMS to ensure efficient operation. *(All phases)*	**IMP10-EPS01** Oily water is captured and treated prior to overboard discharge.	**IMP10-MC01** Maintenance work orders verify that the bilge water system is inspected and maintained to schedule.
	IMP10-CM02 All chemicals that are discharged to the marine environment are assessed prior to use to ensure the lowest toxicity, most biodegradable and least accumulative chemicals are selected in line with the technical requirements of the Beach Chemical Management Procedure. This means: • Chemicals will be selected with the lowest practicable environmental impacts and risks subject to technical constraints. • Only OCNS 'Gold'/'Silver' (CHARM) or 'D'/'E' (non-CHARM)-rated chemicals (i.e., low toxicity) are stored onboard the platform. *(All phases)*	**IMP10-EPS02** All chemicals discharged to the marine environment have low toxicity.	**IMP10-MC02** Chemical Management Procedure assessment records verify the procedure is implemented.

IMP10-CM03 Hydrocarbon and chemical storage areas (process areas) remain bunded and free of defects (such as corrosion holes) and drain to the bilge tank. *(All phases)*	**IMP10-EPS03** Hydrocarbons and chemicals are not discharged overboard via the open drain system.	**IMP10-MC03** Site inspections (and associated completed checklists) verify that bunding is in place and piping and instrumentation diagrams (P&IDs) verify that, for vessels, they drain to the bilge tank.
IMP10-CM04 Portable bunds and/or drip trays are used to collect spills or leaks from equipment that is not contained within a permanently bunded area (non-process areas). *(All phases)*	**IMP10-EPS04** Portable bunds and/or drip trays are used during activities that present a risk of hydrocarbon or chemical spills outside permanently bunded areas to meet the requirements of the *Protection of the Sea (Prevention of Pollution from Ships) Act* 1983 (Cth).	**IMP10-MC04** Site inspections (and associated completed checklists) verify that portable bunds and/or drip trays are used in non-process areas as required.
IMP10-CM05 The platform crew is competent in spill response and has access to spill response equipment in order to prevent or minimise hydrocarbon or chemical spills discharging overboard. *(All phases)*	**IMP10-EPS05** The crew is familiar with their spill response roles.	**IMP10-MC05** Training records verify that vessel crews receive spill response training.
Vessels (Commonwealth and Victorian state waters)		
IMP10-CM06 The Beach Marine Assurance System ensures that vessels meet relevant maritime laws, including but not limited to: • Bilge water passes through a MARPOL-compliant OIWS set to limit OIW discharges to less than 15 ppm prior to overboard discharge. • The OWS is maintained in accordance with the planned maintenance system, including calibration to ensure 15 ppm OIW limit is met.	**IMP10-EPS06** Bilge water is treated through a MARPOL-compliant OWS and discharged only when the oil content is less than 15 ppm.	**IMP10-MC06** Marine assurance records, vessel certification and planned maintenance records verify that oily water separators and oil content monitors are maintained and operated in compliance with MARPOL requirements.

- A SMPEP (or equivalent appropriate to class) is in place.

(All phases)

Impact Consequence (residual)	
Operations	Minor (1)
CoP	Minor (1)
Preservation	Minor (1)

ALARP Decision Justification

With the controls outlined in this table in place, the impact consequence has been assessed as Minor (1) and is considered to be good practice (Decision Context A). This means any additional or alternative control measures do not lower the residual consequence further or would be grossly disproportionate to the residual consequence. Therefore, a Minor (1) residual impact consequence is considered to be ALARP.

Acceptability Assessment		
Defined acceptable level	Bilge water and deck drainage are assessed as having a Minor (1) consequence, which is not considered as having the potential to result in serious or irreversible environmental damage.	
Internal context	The proposed management of the risk is aligned with the Beach Environment Policy. Activities will be undertaken in accordance with the Implementation Strategy (Section 8).	
External context	The BassGas Offshore Operations SEP is implemented to ensure that stakeholders are aware of operations issues. Stakeholders have not raised concerns about cooling and brine water.	
Legislative context	The control measures outlined in this EP align with the requirements of • *Navigation Act* 2012 (Cth): o Chapter 4 (Prevention of Pollution). o AMSA Marine Order 91 (Marine Pollution Prevention - oil). • *Protection of the Sea (Prevention of Pollution from Ships) Act* 1983 (Cth): o Part II (Prevention of pollution by oil). o Part III (Prevention of pollution by noxious substances). • *POWBONS Act* 1986 (Vic): o Part 2, Division 1 (Pollution by oil). o Part 2, Division 2 (Pollution by noxious substances).	
Industry practice	The consideration and alignment of control measures with the mitigation measures outlined in the below-listed guidelines and codes of practice demonstrates that BPEM is implemented for this activity.	
	Environmental management in the upstream oil and gas industry (IOGP-IPIECA, 2020)	The control measures listed in this table meet these guidelines for offshore activities with regard to: <update prior tables to have this consistent wording> • Deck drainage and bilge water – hydrocarbon and chemical storage areas are bunded, clean and contaminated drainage systems are segregated, oily water is treated prior to discharge, spill response

		equipment is maintained and vessels carry a valid IOPP certificate and Oil Record **(IMP10-CM01, -CM03, -CM04, IMP10-CM06)**.
	Best Available Techniques Guidance Document on Upstream Hydrocarbon Exploration and Production (European Commission, 2019)	The control measures listed in this table meet these guidelines for offshore activities with regard to: • Management of drain water (item 24). The BAT are met for Yolla-A operations with regard to ensuring deck coaming is in place, maintaining a chemical inventory, implementing an inspection, maintenance and repair schedule and ensuring that personnel are trained in the use of spill kits **(IMP10-CM01, CM-02, CM-03, CM-04, -CM05)**.
	Environmental, Health and Safety Guidelines for Offshore Oil and Gas Development (World Bank Group, 2015)	The control measures listed in this table meet these guidelines with regard to: • Other waste waters (item 44). Bilge waters are routed to appropriate treatment systems before discharge, process and non-process drainage systems are segregated, process areas are bunded, and spill prevention and response measures are implemented to minimise hydrocarbon contamination of deck drainage **(IMP10-CM01, -CM03, -CM04, -CM05, -CM06)**.
	Code of Environmental Practice (APPEA, 2008)	The control measures listed in this table meet the following offshore development and production objectives: • To reduce the volume of routine waste discharges on the marine environment to ALARP and to an acceptable level.
Environmental context	MNES	
	AMPs	No intersection or impacts.
	Ramsar wetlands	No intersection or impacts.
	NIWs	No intersection or impacts.
	TECs	No intersection or impacts.
	Nationally threatened and migratory species	This hazard does not have any impacts on threatened or migratory species.
	Other matters	
	State marine parks	This hazard does not have any impacts on state marine parks.
	Species Conservation Advice/Recovery Plans/Threat Abatement Plans	The discharge of bilge water and deck drainage does not compromise the specific objectives or actions of the other species Recovery Plans, Conservation Management Plans or Conservation Advice referenced in this EP.
ESD principles	The EIA presented throughout this EP demonstrates that ESD principles (a), (b), (c) and (d) are met (noting that principle (e) is not relevant).	
Environmental Monitoring		

None required.

Record Keeping	
Platform	Vessels
• CMMS maintenance work order. • Chemical inventories. • Chemical assessment reports. • Personnel training records. • Incident reports. • Bund inspection records. • Drainage system inspection records. • Spill kit inspection records. • Spill response exercise records.	• Procurement documents. • Marine assurance reports. • IOPP certificate. • Oil record book. • Planned maintenance records. • SMPEP records.

7.11 RISK 1: Accidental Discharge of Waste to the Ocean

7.11.1 Source of Aspect

The handling and storage of materials and waste on Yolla-A and vessels carry the risk of accidental disposal of both hazardous and non-hazardous materials and waste overboard, which can contribute to marine debris.

During routine operations and maintenance, small quantities of hazardous and non-hazardous materials are used, and waste is generated. Typically, solid and liquid hazardous and non-hazardous materials and waste are stored on the platform and vessels until they can be disposed of at licensed onshore facilities via port services. However, accidental releases into the sea are a possibility, particularly in rough ocean conditions, when items may roll or be blown off the deck.

The following non-hazardous materials and waste are designated for disposal ashore but pose a risk of being accidentally dropped or disposed of overboard due to overflowing containers or operator errors during crane operations:

- Paper and cardboard.
- Wooden pallets.
- Scrap steel, metal and aluminium.
- Glass.
- Foam (e.g., ear plugs.)
- Plastics (e.g., hard hats).

The following hazardous materials, defined as substances or objects that display hazardous characteristics, are no longer suitable for their intended use, and require disposal as outlined in Annex III of the Basel Convention, may be toxic, flammable, explosive, or poisonous. These materials may be

used in consumable products, resulting in waste that will be disposed of on shore. However, there is a risk that they may accidentally be dropped or disposed of overboard.

- Hydrocarbons, hydraulic oils and lubricants.
- Hydrocarbon-contaminated materials (e.g., oily rags, pipe dope, oil filters).
- Batteries, empty paint cans, aerosol cans and fluorescent tubes.
- Contaminated personal protective equipment (PPE).
- Laboratory wastes (such as acids and solvents).

Larger dropped objects (that may be hazardous or non-hazardous) may be lost to the sea through accidents (e.g., crane operations) include:

- Sea containers.
- Towed equipment.
- ROV, and
- Entire skip bins/crates.

Over the last five years, there has been one recorded incident of waste lost overboard from Yolla-A, which involved some domestic waste blowing out of a bin during strong winds.

As outlined in Table 3.11, project activities during the operations, CoP and preservation phases involve continued activities, as well as support vessel movements. These activities have the potential to generate waste materials that could be incorrectly disposed of or accidentally discharged to the marine environment. While this aspect is relevant to all phases, the likelihood of an incorrect disposal or accidental discharge is expected to be lower during the preservation phase due to the reduced number of personnel visits and the smaller quantity of materials and consumables retained on the platform. Accordingly, this aspect is relevant to all phases, as summarised below:

Hazard	Source	Operations	CoP	Preservation
Platform	Incorrect disposal or accidental discharge	✓	✓	✓
Support vessels	Incorrect disposal or accidental discharge	✓	✓	✓

7.11.2 Known and Potential Environmental Risks

The risks of the release of hazardous and non-hazardous materials and waste to the ocean are:

- Fatality, injury and entanglement of individual animals (such as seabirds and seals).
- Localised (and normally temporary) smothering or pollution of benthic habitats.

7.11.3 EMBA

The accidental discharge of hazardous and non-hazardous materials and waste could occur within the Operational Area potentially impacting the following receptors, either as residents or migrants:

- Benthic fauna.
- Benthic habitat (sand and reef substrates).
- Pelagic fish.
- Cetaceans.
- Pinnipeds.
- Avifauna.
- Traditional Owners with cultural connections to these waters.

These ecological receptors are values of the following within the Operational Area:

- Conservation values and sensitivities
- Cultural values and sensitivities

A wide range of EPBC Act-listed species are documented as being negatively impacted by the ingestion of, or entanglement in, harmful marine debris, including numerous species of turtles, seabirds, seals, and cetaceans (whales and dolphins) DCCEEW, 2025 and are known to occur in the EMBA such as the following endangered species:

- Loggerhead turtle (*Caretta caretta*).
- Leatherback turtle (*Dermochelys coriacea*)
- Southern Right whale (*Eubalaena australis*).
- Blue whale (*Balaenoptera musculus*).
- Northern royal albatross (*Diomedea sanfordi*).
- Shy Albatross (*Thalassarche cauta*)
- Grey headed albatross (*Thalassarche chrysostoma*)
- Southern giant petrel (*Macronectes giganteus*)
- Gould's petrel (*Pterodroma leucoptera leucoptera*).

A number of species are listed as vulnerable, including the green turtle (*Chelonia mydas*), fin (*Balaenoptera physalus*) and sei (*Balaenoptera borealis*) whales, white shark (*Carcharodon carcharias*), 11 albatrosses and four petrels. The full list of these species is in **Appendix 5**.

7.11.4 Jurisdiction of Hazard

The jurisdictions for this hazard are outlined below.

Commonwealth waters	Victorian waters
YES	YES
Accidental discharges could occur during routine operations and IMR activities.	Accidental discharges could occur from vessels while undertaking IMR activities along/on the portion of the RGP within state waters.

7.11.5 Evaluation of Environmental Risks

7.11.5.1 Non-hazardous Materials and Waste

If discharged overboard, non-hazardous wastes can smother benthic habitats and cause injury or mortality to marine fauna. Although all marine vertebrates are exposed to risks of both entanglement and ingestion of non-hazardous materials, the likelihood of each impact varies between fauna. Seabirds, turtles and fish typically have the greatest risk of ingesting marine waste such as plastics, whereas cetaceans and pinnipeds are more often harmed through entanglement with marine debris. For example, Ceccarelli (2009) reports 104 records of cetaceans in Australian waters impacted by plastic debris through entanglement or ingestion since 1998, with 92.2% of these records relating to entanglement. The author notes that the number of cetacean interactions with marine debris are almost certainly an under representation (Ceccarelli, 2009).

Entanglement in marine debris, can restrict mobility, lead to starvation, infection, amputation, drowning and smothering (DoEE, 2018b). Seabirds entangled in plastic packing straps or other marine debris may lose their ability to move quickly through the water, reducing their ability to catch prey and avoid predators, or they may suffer constricted circulation, leading to asphyxiation and death. In marine mammals and turtles, entanglement can lead to infection or the amputation of flippers, tails or flukes (DoEE, 2018b). Plastics have also been implicated in the deaths of marine species including marine mammals and turtles, through ingestion.

As a result, the consequence is assessed as **Moderate (2)** and likelihood as **Highly Unlikely (B),** and the residual risk is **Low** and of an acceptable level.

7.11.5.2 Hazardous Materials and Waste

Hazardous materials and wastes released to the sea cause pollution and contamination, with either direct or indirect effects on marine organisms. For example, chemical or hydrocarbon spills can (depending on the volume released) impact on marine life from plankton to pelagic fish communities, causing physiological damage through ingestion or absorption through the skin. Impacts from an accidental release would be limited to the immediate area surrounding the release, prior to the dilution of the chemical with the surrounding seawater. In an open ocean environment such as Bass Strait, it is expected that any minor release would be rapidly diluted and dispersed, and thus temporary and localised. The absence of particularly sensitive seabed habitats and the widespread nature of the sandy seabed present in the activity area further limits the extent of potential impacts.

Solid hazardous materials, such as paint cans containing paint residue, batteries and so forth, would settle on the seabed if dropped overboard. Over time, this may result in the leaching of hazardous

materials to the seabed, which is likely to result in a small area of substrate becoming toxic and unsuitable for colonisation by benthic fauna. The benthic habitats of the operational area are broadly similar to those elsewhere in the region (e.g., extensive sandy seabed), so impacts to very localised areas of seabed will not result in the long-term loss of benthic habitat or species diversity or abundance.

All hazardous waste is disposed of onshore at appropriately licensed facilities, by licenced contractors, so impacts such as illegal dumping or disposal to an unauthorised onshore landfill that is not lined are highly unlikely to result from BassGas operations.

As a result, the consequence is assessed as **Moderate (2)** and likelihood as **Highly Unlikely (B)**, and the residual risk is **Low** and of an acceptable level.

7.11.5.3 Socio-economic receptors

In the event a buoyant object is accidentally released and cannot be recovered by a vessel, the buoyant object may present a navigation or entanglement hazard to commercial fishers and other marine users. Further the buoyant object may become non-buoyant overtime and sink to the seabed, where it may present a snagging hazard on the seafloor for commercial trawling activities. The extent of the area of impact is adjacent to the RGP and Yolla Platform or support vessels within the Operational Area.

As a result, the consequence is assessed as **Moderate (2)** and likelihood as **Highly Unlikely (B)**, and the residual risk is **Low** and of an acceptable level.

7.11.5.4 Cultural values and sensitivities

The following cultural values and sensitivities have been identified as potentially at risk from a loss of waste or other materials overboard:

- Birds including short-tailed shearwater (muttonbird)
- Cetaceans
- Seals.

The marine fauna listed above are connected to places associated with songlines or connected to individuals through ceremony (Section 5.7.3). The connection of marine fauna to places or individuals are considered cultural intangible values. Loss of waste or other materials overboard is a potential risk to marine fauna that have songlines, or spiritual connection to First Nations people. It is considered that risks to species at a population level may prevent First Nations people's obligations to maintain spiritual connections and care for culturally significant species and their habitat. If First Nations people's obligations have not been met it may reinforce a sense of powerlessness to members of First Nations groups responsible for these obligations (Holcombe 2022).

Section 7.11.2 details the known and potential environmental risk to these receptors and concluded loss of waste or other materials overboard will not result in risks at a population level. As a result, the consequence is assessed as **Minor (1)** and likelihood as **Unlikely (C),** and the risk to cultural values and sensitivities from loss of waste or other materials overboard is **Low** and of an acceptable level.

7.11.6 Cumulative Risk Evaluation

There is a low potential for cumulative impacts on the physical, biological, cultural, and socio-economic environment resulting from the accidental discharge of hazardous and non-hazardous waste from the Yolla-A platform and associated vessels when combined with other marine activities in the region. When considered cumulatively, these discharges result in localised increases in water temperature and salinity within the immediate vicinity of the discharge point. The discharges are rapidly dispersed in open offshore waters, limiting the potential for accumulation of residual OIW or trace contaminants to impact water quality. In the unlikely event of multiple accidental releases, floating debris may travel kilometres with ocean currents, while non-buoyant materials would sink locally, potentially causing minor, temporary smothering of benthic habitats or localised hazards to marine fauna.

There are no other oil and gas operations in close proximity to BassGas, so there is no overlap in EMBAs for this hazard from other similar activities. Similarly, vessel-based activities being undertaken by offshore wind developers in the offshore wind feasibility licences to the east of BassGas are too far away (over 130 km) for cumulative impacts of accidental waste discharges to occur.

7.11.7 Risk Assessment

A risk assessment for the accidental disposal of hazardous and non-hazardous materials and waste is presented in Table 7.35.

Table 7.35: Risk assessment for the accidental disposal of hazardous and non-hazardous materials and waste to the marine environment.

ALARP decision context			
Impact decision framework context	Type A.		
Activity	Nothing new or unusual, represents business as usual, well understood activity, good practice is well defined.		
Level of certainty of risk	Risks are well understood, uncertainty is minimal.		
Stakeholder influence	No conflict with company values, no partner interest, no significant media interest.		
Risk Assessment (inherent)			
Phase	**Likelihood**	**Consequence**	**Risk**
Operations	Highly Unlikely (B)	Moderate (2)	Low
CoP	Highly Unlikely (B)	Moderate (2)	Low
Preservation	Highly Unlikely (B)	Moderate (2)	Low
Assessment of Proposed Control Measures			
Control	**Cost/benefit analysis**		**Implemented?**
Implement a platform Waste Management Plan. *(All phases)*	Reduces the likelihood of unplanned waste releases to the marine environment, minimising potential impacts on marine fauna and water quality. Routine inspections provide an additional verification step by identifying damaged containers, overfilled bins, unsecured lids and housekeeping issues before		Yes **(RSK01-CM01)**

(Commonwealth waters)	a release can occur, while waste tracking provides assurance that wastes are appropriately managed throughout handling, transport and disposal. The plan is implemented through existing operational and environmental management systems and can be maintained at low cost. The associated costs are not grossly disproportionate to the environmental benefit achieved through reducing the likelihood of accidental waste releases and supporting effective waste management.	
Use approved lifting and handling procedures for waste transfers. *(All phases)* *(Commonwealth & Victorian state waters)*	The use of established lifting procedures reduces the likelihood of containers, skips or packaged waste being dropped during transfer operations. The procedures utilise existing lifting systems, competency requirements and operational processes. The costs associated with implementation are not grossly disproportionate to the environmental benefit achieved through reducing the likelihood of dropped objects and accidental waste releases.	Yes **(RSK01-CM02)**
Implement operational procedures to report and recover (where safe and practicable to do so) any solid waste accidentally discharged to the marine environment. *(All phases)* *(Commonwealth & Victorian state waters)*	Reduces the likelihood and consequences of accidental waste discharges to the marine environment by ensuring incidents are promptly reported and recovered where practicable. This minimises potential impacts on marine fauna and water quality while limiting the extent and persistence of pollution. These procedures can be readily incorporated into existing incident management arrangements and require minimal additional resources. The costs associated with implementation are not grossly disproportionate to the environmental benefit achieved through reducing the extent and duration of environmental impacts following an accidental release.	Yes **(RSK01-CM05)**
Vessels comply with the MARPOL Annex V requirements to implement a garbage management plan. *(All phases)* *(Commonwealth & Victorian state waters)*	Reduces the likelihood of unplanned waste releases to the marine environment, minimising potential impacts on marine fauna and water quality. All vessels are required to comply with MARPOL as part of standard operational requirements. Compliance with MARPOL requirements forms part of routine vessel operations and existing management systems. The costs associated with implementation and verification are not grossly disproportionate to the environmental benefit achieved through reducing the likelihood of accidental waste discharges to the marine environment.	Yes **(RSK01-CM03; -CM04)**
Implement a procurement vetting process for vessels. *(All phases)* *(Commonwealth & Victorian state waters)*	Ensures that only appropriate vessel operators and vessels are contracted to Beach. This is routine offshore practice built into existing systems and processes. The costs associated with vessel assurance and procurement screening are not grossly disproportionate to the environmental benefit achieved through reducing the likelihood of waste management failures and environmental incidents.	Yes **(RSK01-CM03)**

Secure cargo, materials and waste containers prior to transport and during transfers. *(All phases)* *(Commonwealth & Victorian state waters)*	Appropriate securing of cargo and waste containers on vessels and during crane lifts reduces the likelihood of accidental loss overboard during vessel movements, particularly during adverse weather conditions that are common in Bass Strait. This is standard offshore marine practice and aligns with cargo securing requirements under Marine Order 42. The costs associated with implementing this control are not grossly disproportionate to the environmental benefit achieved through reducing the likelihood of accidental loss of materials and waste to the marine environment.	Yes **(RSK01-CM06)**

Environmental Controls and Performance Measurement			
EPO	**Control measure**	**EPS**	**Measurement criteria**
RSK01-EPO01 No unplanned release of hazardous or non-hazardous solid wastes or materials to the marine environment.	**Platform (Commonwealth waters)**		
	RSK01-CM01 Beach's Waste Management Plan – Otway and Bass Strait Offshore (S4000AD719914) is implemented to ensure that wastes are eliminated, reduced, recycled and/or reused as far as reasonably practicable and includes requirements for the appropriate disposal, recycling, reuse, tracking and reporting of all wastes. This includes the requirement for: • No discharge of general operational or maintenance wastes, including plastics or plastic products of any kind. • Solid and hazardous wastes are correctly segregated to ensure appropriate handling, storage and disposal. • Waste containers are fitted with secure lids to prevent solid wastes from being blown overboard • All solid wastes are stored in designated areas prior to being transported ashore for recycling, disposal or treatment.	**RSK01-EPS01** There is no unplanned release of hazardous or non-hazardous solid wastes or materials to the marine environment.	**RSK01-MC01.1** Inspection records verify that the Waste Management Plan is implemented. **RSK01-MC01.2** Waste tracking records demonstrate the type, quantity and destination of wastes generated by the activity.

• Liquid wastes stored on deck are provided with at least one level of containment to minimise the risk of spills entering the marine environment. This includes measures such as containment lips (primary bunding) and/or secondary containment (e.g., bunding, containment pallets, transport packs or absorbent barriers). • Waste tracking documentation is maintained through to final disposal, recycling or treatment. *(All phases)*		
RSK01-CM02 Waste transfers and offloading are undertaken in accordance with the Lifting and Load Safety Operations Procedure (CDN/ID 3674901) and under a Permit to Work (PTW). *(All phases)*	**RSK01-EPS02** Crane lifting operations for wastes are conducted in accordance with approved Beach procedures.	**RSK01-MC02** PTW records verify that crane transfers and offloading of waste are undertaken in accordance with the Lifting and Load Safety Operations procedure (CDN/ID 3674901).
Vessels (Commonwealth and Victorian state waters)		
RSK01-CM03 The Beach Marine Assurance System is implemented to ensure that all vessels: • Implement a Garbage Management Plan (GMP) and maintain a Garbage Record Book. • Securely stow cargoes and containers. *(All phases)*	**RSK01-EPS03** Vessels comply with *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* (Cth), *Pollution of Waters by Oil and Noxious Substances Act 1986* (Vic) and Marine Order 42.	**RSK01-MC03** Procurement documents verify that vessels meet legislative requirements.
RSK01-CM04 Waste is stored, handled and disposed of in accordance with the vessel's GMP. This includes: • No discharge of general operational or maintenance wastes,	**RSK01-EPS04** Beach implements its Marine Assurance System during the vessel procurement process to ensure that contracted vessels meet legislative requirements.	**RSK01-MC04.1** Procurement documents verify that vessels meet requirements. **RSK01-MC04.2** Annual audits of vessels verify that waste records are maintained.

including plastics or plastic products of any kind. • Waste containers are fitted with secure lids to prevent solid wastes from being blown overboard. • All solid wastes are stored in designated areas prior to being transported ashore for recycling, disposal or treatment. • Liquid wastes stored on deck are provided with at least one level of containment to minimise the risk of spills entering the marine environment. This includes measures such as containment lips (primary bunding) and/or secondary containment (e.g., bunding, containment pallets, transport packs or absorbent barriers). • Solid and hazardous wastes are correctly segregated to ensure appropriate handling, storage and disposal. *(All phases)*		
RSK01-CM05 Solid waste that is accidentally lost overboard is recovered, where practicable to do so. *(All phases)*	**RSK01-EPS05** Any solid waste accidentally lost to the marine environment and recovered where it is safe and reasonably achievable to do so.	**RSK01-MC05.1** Daily reports record any accidental discharge events and document actions taken, including recovery efforts where practicable. **RSK01-MC05.2** Incident register and reports demonstrate that all accidental discharges are formally recorded, investigated (where required), and managed in

		accordance with operational procedures.
RSK01-CM06 Secure cargo, materials and waste containers prior to transport and during transfers.	**RSK01-EPS06** Cargo, materials and waste containers are secured during storage, transport and transfer operations to prevent accidental loss to the marine environment.	**RSK01-MC06.1** Cargo securing inspections verify that cargo, materials and waste containers are appropriately secured prior to transfer operations. **RSK01-MC06.2** Pre-transfer and lift records verify cargo securing arrangements are implemented during transfer operations. **RSK01-MC06.3** Incident reports demonstrate that any cargo or waste lost overboard events are recorded, investigated and managed in accordance with operational procedures.

Risk Assessment (residual)			
Phase	**Likelihood**	**Consequence**	**Risk**
Operations	Highly Unlikely (B)	Moderate (2)	Low
CoP	Highly Unlikely (B)	Moderate (2)	Low
Preservation	Highly Unlikely (B)	Moderate (2)	Low

ALARP Decision Justification

With the controls outlined in this table in place, this risk has been assessed as 'Low' and is considered to be good practice (Decision Context A). This means any additional or alternative control measures do not lower the residual consequence further or would be grossly disproportionate to the residual consequence. Therefore, a residual risk score ranking of 'Low' is considered to be ALARP.

Acceptability Assessment	
Defined acceptable level	Accidental waste discharges are assessed as having a 'Low' residual risk rating, which is not considered as having the potential to result in serious or irreversible environmental damage.
Internal context	The proposed management of the risk is aligned with the Beach Environment Policy. Activities will be undertaken in accordance with the Implementation Strategy (Section 8).
External context	The BassGas Offshore Operations SEP is implemented to ensure that stakeholders are aware of operations issues. Stakeholders have not raised concerns about disposal of waste.
Legislative context	The control measures outlined in this EP align with the requirements of: • *Navigation Act 2012* (Cth):

	○ Chapter 4 (Prevention of Pollution). ○ Marine Orders Part 42 (Carriage, stowage and securing of cargoes and containers). ○ Marine Orders Part 94 (Marine pollution prevention – packaged harmful substances). ○ Marine Orders Part 95 (Marine pollution prevention – garbage). • *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* (Cth): ○ Part III (Prevention of pollution by noxious substances) ○ Part IIIA (Prevention of pollution by packaged harmful substances) ○ Part IIIC (Prevention of pollution by garbage) • *Pollution of Wate by Oil and Noxious Substances Act* 1986 (Vic): ○ Part 2, Division 2 (Pollution by noxious substances). ○ Part 2, Division 2A (Prevention of pollution by garbage). ○ Part 2, Division 2B (Prevention of pollution by packaged harmful substances). ○ Section 23B (Prevention of disposal of garbage into State waters).	
Industry practice	The control measures outlined in the below-listed guidelines and codes of practice demonstrate that BPEM will be implemented for this activity.	
	Environmental management in the upstream oil and gas industry (IOGP-IPIECA, 2020)	The control measures listed in this table meet the relevant mitigation measures listed for offshore activities with regard to: Non-hazardous waste – Manage in accordance with MARPOL Annex V requirements, no planned offshore disposal of solid waste, segregate into recyclable and non-recyclable waste **(all control measures for RSK01)**.
	Best Available Techniques Guidance Document on Upstream Hydrocarbon Exploration and Production (European Commission, 2019)	The control measures listed in this table meet these guidelines for offshore activities with regard to: Environmental monitoring (item 26). The BAT are met for Yolla-A operations with regard to monitoring waste streams **(RSK01-CM01)**.
	Environmental, Health and Safety Guidelines for Offshore Oil and Gas Development (World Bank Group, 2015)	The control measures listed in this table meet these guidelines for offshore activities with regard to: Waste management (items 46) - Materials should be segregated offshore and shipped to shore for reuse, recycling or disposal. A waste management plan should be developed and contain a mechanism allowing waste consignments to be tracked **(RSK01-CM01, -CM04)**.
	Code of Environmental Practice (APPEA, 2008)	The control measures listed in this table meet the following offshore development and production objectives: To reduce the risk of any unplanned release of material into the marine environment to ALARP and to an acceptable level.
	Waste-specific guidance	

	Guidelines for the Implementation of MARPOL: Annex V (IMO, 2017)	Beach's Waste Management Plan is developed in accordance with these guidelines.
Environmental context	MNES	
	AMPs	No intersection or impacts.
	Ramsar Wetlands	No intersection or impacts.
	NIWs	No intersection or impacts.
	TECs	No intersection or impacts.
	Nationally threatened and migratory species	This hazard does not have any impacts on threatened or migratory species.
	Other matters	
	State marine parks	This hazard does not have any impacts on State Marine Parks.
	Species Conservation Advice/Recovery Plans/Threat Abatement Plans	The discharge of waste to the marine environment will not compromise the specific objectives or actions (regarding marine pollution) of the following species conservation plans, specifically threats including the attraction of marine fauna to food sources, ingestion of waste and entanglement by waste and impact to habitat: • Threat Abatement Plan for the Impacts of Marine Debris on the Vertebrate Wildlife of Australia's Coasts and Oceans (DoEE, 2018) • Recovery Plan for Marine Turtles in Australia (DoEE, 2017) • Approved Conservation Advice for the Humpback Whale (TSSC, 2015) • Albatross and Giant Petrels Recovery Plan (DCCEEW, 2022) • Wildlife Conservation Plan for Seabirds (CoA, 2020a).
ESD principles	The EIA presented throughout this EP demonstrates that ESD principles (a), (b), (c) and (d) are met (noting that principle (e) is not relevant).	

Environmental Monitoring

Waste tracking.

Record Keeping

Platform

- Waste Management Plan.
- Waste tracking records.
- PTW records.
- Shore-based waste contract.
- Inspection records/checklists.
- BassGas stakeholder engagement register.
- Incident register/reports.

Vessels

- Procurement records.
- Annual vessel audit reports.
- Daily reports.
- Incident reports.
- Pre-transfer and lift records.

7.12 RISK 2: Vessel Collision with Megafauna

7.12.1 Source of Aspect

The movement of the PSV in the PSZ and other vessels throughout the Operational Area has the potential to result in collision with megafauna (defined here as cetaceans and pinnipeds). Such megafauna commonly dwell at or near the water's surface, are large and slow moving (in the case of whales), bow ride (in the case of dolphins) or are inquisitive (seals).

The platform jacket does not present a strike hazard to megafauna as it is fixed in place and is readily detected and avoided by megafauna (or is an attraction in the case of fur-seals). In Bass Strait, fur-seals frolic around platform jackets without any apparent risk of injury.

Over the last five years, there have been no incidents of vessel collisions with megafauna for the vessels contracted to Beach.

As outlined in Table 3.11, project activities during the operations, CoP and preservation phases involve ongoing IMR activities and support vessel movements associated with the operation, preservation and monitoring of offshore infrastructure. While the frequency and nature of these activities vary between phases, including periodic vessel visits during the preservation phase, the potential for interactions associated with IMR activities and vessel movements remains throughout the project life. Accordingly, this aspect is relevant to all phases, as summarised below:

Hazard	Source	Operations	CoP	Preservation
Support vessels	IMR activities	✓	✓	✓
	Vessel movement	✓	✓	✓

7.12.2 Known and Potential Environmental Risks

The risks of vessel strike with megafauna are injury and death.

7.12.3 EMBA

The EMBA for vessel strike with megafauna is the immediate area around the vessel within the Operational Area. Receptors most at risk within this EMBA are:

- Cetaceans (whales and dolphins).
- Pinnipeds (fur-seals).
- Traditional Owners with cultural connections to these species.

7.12.4 Jurisdiction of Hazard

The jurisdictions for this hazard are outlined below.

Commonwealth waters	Victorian waters
YES	YES
Collisions with megafauna may occur while a vessel is located within the platform PSZ or undertaking IMR along the portion of the RGP within Commonwealth waters.	Collisions with megafauna may occur while vessels are undertaking IMR along the portion of the RGP within state waters.

7.12.5 Evaluation of Environmental Risks

7.12.5.1 Marine species

Cetaceans and pinnipeds are naturally inquisitive marine mammals that are often attracted to offshore vessels, and dolphins commonly 'bow ride' with offshore vessels. The reaction of whales to the approach of a vessel is quite variable. Some species remain motionless when in the vicinity of a vessel 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).

Peel et al (2016) reviewed vessel strike data (2000-2015) for marine species in Australian waters and identified the following:

- Whales including the humpback, pygmy blue, Antarctic blue, southern right, dwarf minke, Antarctic minke, fin, bryde's, pygmy right, sperm, pygmy sperm and pilot species were identified as having interacted with vessels. The humpback whale exhibited the highest incidence of interaction followed by the southern right whale, and these species may migrate through the waters of the Operational Area (see Section 5.6.5).

- Dolphins including the Australian humpback, common bottlenose, indo-pacific bottlenose and Risso's dolphin species were also identified as interacting with vessels. The common bottlenose dolphin exhibited the highest incidence of interaction. A number of these species may reside in or pass through the waters of the activity area (see Section 5.6.5).

- There were no vessel interaction reports during the period for either the Australian or New Zealand fur-seal. There have been incidents of seals being injured by boat propellers, however all indications are rather than 'boat strike' these can be attributed to be the seal interacting/playing with a boat, with a number of experts indicating the incidence of boat strike for seals is very low.

- All turtle species present in Australian waters are identified as interacting with vessels. The green and loggerhead species exhibited the highest incident of interaction. The presence of turtles in the operational area and EMBA is considered remote.

Collisions between vessels and cetaceans occur more frequently where high vessel traffic and cetacean habitat coincide (WDCS, 2006). There have been recorded instances of cetacean deaths in Australian waters (e.g., a Bryde's whale in Bass Strait in 1992), though the data indicates this is more likely to be associated with container ships and fast ferries (WDCS, 2006). Some cetacean species, such as

humpback whales, can detect and change course to avoid a vessel (WDCS, 2006). The Australian National Marine Safety Committee (NMSC) reports that during 2009, there was one report of a vessel collision with an animal (species not defined) (NMSC, 2010).

The DoE (2015d) reports that there were two blue whale strandings in the Bonney Upwelling (western Victoria) with suspected ship strike injuries visible. When the vessels are stationary or slow moving, the risk of collision with cetaceans is extremely low, as the vessel sizes and underwater noise 'footprint' will alert cetaceans to its presence and thus illicit avoidance. Laist et al (2001) identifies that larger vessels moving in excess of 10 knots may cause fatal or severe injuries to cetaceans with the most severe injuries caused by vessels travelling faster than 14 knots. When support vessels are operating within the platform's PSZ or working along the pipeline, they will be travelling very slowly or will be stationery, so the risk associated with fast moving vessels is eliminated for BassGas operations.

The DSEWPC (2012b) notes that whale entanglement in nets and lines often causes physical damage to skin and blubber. These wounds can then expose the animal to infection. Entanglement can also result in amputation (e.g., of a flipper or tail fluke), and death over a prolonged period. The DoE (2015d) states that entanglement (in the context of fishing nets, lines or ropes) has the potential to cause physical injury that can result in loss of reproductive fitness, and mortality of individuals from drowning, impaired foraging and associated starvation, or infection or physical trauma. There is an almost negligible risk of this occurring to megafauna with tethered ROVs as the tethers are likely to break under the weight of entanglement. The Australian and New Zealand fur-seals are highly agile species that haul themselves onto rocks and platform jackets. As such, it is likely that they will be able to avoid tethered equipment such as ROVs and are unlikely to become entangled within them.

As a result, the consequence is assessed as **Serious (3)** and likelihood as **Remote (A)**, and the residual risk is **Low** and of an acceptable level.

7.12.5.2 Cultural values and sensitivities

Marine fauna listed above are connected to places associated with songlines or connected to individuals through ceremony (Section 5.7.3). The connection of marine fauna to places or individuals are considered cultural intangible values. Vessel and/or helicopter movements have the potential to impact marine fauna that have songlines, or spiritual connection to First Nations people. It is considered that impacts to species at a population level may prevent First Nations people's obligations to maintain spiritual connections and care for culturally significant species and their habitat. If First Nations people's obligations have not been met it may reinforce a sense of powerlessness to members of First Nations groups responsible for these obligations (Holcombe 2022).

The predicted environmental risk to these receptors, assessed in the above listed sections, determined fauna interaction with vessel and/or helicopter movements will have no effect at a population level. As a result, the consequence is assessed as **Serious (3)** and likelihood as **Remote (A)**, and the risk to cultural values and sensitivities from fauna interaction is assessed as **Low** and of an acceptable level.

7.12.6 Cumulative Risk Evaluation

There is a low potential for cumulative impacts on megafauna associated with vessel movements in the Operational Area when combined with other marine activities in the region.

There are no other oil and gas operations in close proximity to BassGas, so there is no additional risk to megafauna from other similar activities. Similarly, vessel-based activities being undertaken by

offshore wind developers in the offshore wind feasibility licences to the east of BassGas are too far away (over 130 km) for cumulative collision risk to occur.

7.12.7 Risk Assessment

A risk assessment for vessel collision with megafauna is presented below in Table 7.36.

Table 7.36: Risk assessment for vessel collision with megafauna

ALARP decision context			
Impact decision framework context	Type A.		
Activity	Nothing new or unusual, represents business as usual, well understood activity, good practice is well defined.		
Level of certainty of risk	Risks are well understood, uncertainty is minimal.		
Stakeholder influence	No conflict with company values, no partner interest, no significant media interest.		
Risk Assessment (inherent)			
Phase	**Likelihood**	**Consequence**	**Risk**
Operations	Highly Unlikely (B)	Serious (3)	Medium
CoP	Highly Unlikely (B)	Serious (3)	Medium
Preservation	Highly Unlikely (B)	Serious (3)	Medium
Assessment of Proposed Control Measures			
Control	**Cost/benefit analysis**		**Implemented?**
Do not use vessels for resupply or IMR. *(All phases)* *(Commonwealth and Victorian state waters)*	Eliminates the potential collision source. However, it is not feasible to implement this control as vessels are necessary for conducting IMR and platform resupply activities. Vessels carry equipment that is too bulky and too heavy to be transported by helicopter and as such, their use cannot be eliminated or substituted. The elimination of vessels would prevent essential platform resupply and maintenance activities and is therefore not technically feasible. The operational consequences of implementing this control are grossly disproportionate to the environmental benefit achieved.		No
Eliminate the use of vessels during cetacean migration, foraging and breeding seasons. *(All phases)* *(Commonwealth and Victorian state waters)*	Eliminates the potential collision source. However, it is not feasible to implement this control as vessels are necessary for conducting IMR and platform resupply activities, for the reasons noted above. Given the continuous requirement for vessel support and the diversity of cetacean species in Bass Strait and their overlapping migration, foraging and breeding seasons means there is effectively no window of time when cetaceans are not present., the operational constraints associated with implementing this control are considered grossly disproportionate to the limited additional reduction in collision risk that may be achieved.		No

Assessment of Proposed Control Measures		
Seasonal scheduling of non-essential IMR activities outside peak cetacean migration periods. *(All phases)* *(Commonwealth and Victorian state waters)*	Scheduling discretionary activities outside peak migration periods may reduce the likelihood of vessel interactions with migrating whales. However, platform integrity, safety and maintenance requirements necessitate flexibility in activity scheduling. Delaying IMR activities may introduce safety, asset integrity and operational risks. Given the limited opportunity to avoid all cetacean migration periods and the effectiveness of existing controls, the operational costs and risks associated with implementing this control are considered grossly disproportionate to the environmental benefit achieved.	No
Vessels will not travel at greater than 10 knots at all times when travelling between the port and the platform. *(All phases)* *(Commonwealth and Victorian state waters)*	Reduced vessel speed may decrease the likelihood and potential severity of vessel strikes with megafauna. However, a blanket speed restriction is not considered appropriate due to varying operational, weather and navigational requirements, including emergency response situations. Existing whale management controls already require no-wake speeds within prescribed approach distances to cetaceans, and Beach has not recorded any megafauna collisions with its Yolla-A supply vessels. Any additional reduction in risk achieved through a permanent vessel speed restriction would be marginal relative to existing controls and is considered grossly disproportionate to the operational impacts, increased transit times and reduced operational flexibility associated with implementation.	No
No night-time/low visibility vessel operations. *(All phases)* *(Commonwealth and Victorian state waters)*	Reduces the likelihood of collision with megafauna. This option is feasible but not preferred because this could restrict urgent deliveries to the platform and increase the length of time required to complete IMR activities, especially if the vessel must return to port each night or remain anchored on location and not undertaking necessary work. The increased costs, scheduling constraints and operational inefficiencies associated with implementing this control are considered grossly disproportionate to the negligible reduction in collision risk that may be achieved.	No
Restrict support vessel speed to no greater than wake speed in the PSZ. *(All phases)* *(Commonwealth and Victorian state waters)*	Given the low likelihood of collision and the need to retain navigational flexibility for safety and operational reasons, the operational consequences of implementing this control are considered grossly disproportionate to the environmental benefit achieved.	No
Use a dedicated MMO onboard the vessels for all activities. *(All phases)* *(Commonwealth and Victorian state waters)*	Reduces the likelihood of collision with megafauna because it improves the ability to spot megafauna by allowing vessel masters to focus on navigation duties. However, all vessels have dedicated officers of the watch as part of the bridge crew, who as part of their watch keeping training and certification, are instructed to keep watch for hazards such as megafauna. Given the existing bridge watchkeeping arrangements, the absence of recorded megafauna collisions and the limited additional risk reduction likely to be achieved, the costs associated with implementing dedicated MMO coverage are	No

Assessment of Proposed Control Measures		
	considered grossly disproportionate to the environmental benefit gained.	
Use of tunnel thruster guards on vessels. *(All phases)* *(Commonwealth and Victorian state waters)*	Grates on vessel tunnel thrusters would prevent entrapment of marine mammals, in particular seals, which are known to approach/play with vessels while stationary on DP. Smaller support vessels (such as those used to deploy ROVs) do not generally have grates on tunnel thrusters, however it is more common for larger platform supply vessels. Adding grates to thrusters significantly impacts efficiency of vessels leading to increased fuel usage and air emissions, particularly for small vessels. Grates can also lead to increased potential for marine growth (which further reduces efficiency of thrusters). While tunnel thruster guards may reduce the risk of marine fauna interaction with thrusters, the associated reduction in vessel efficiency, increased fuel consumption and potential maintenance issues are considered grossly disproportionate to the limited environmental benefit achieved.	No
Implement the *Australian National Guidelines for Whale and Dolphin Watching* (2017) *(All phases)* *(Commonwealth and Victorian state waters)*	Reduces the likelihood of collision with megafauna. This guideline gives effect to the regulatory requirements 'interacting with cetaceans and whale watching' in EPBC Regulations Part 8. Implementation of the guideline requirements forms part of standard offshore vessel operations and can be achieved through existing procedures and personnel training. The associated costs are not grossly disproportionate to the environmental benefit achieved through reducing the likelihood of vessel interactions with cetaceans.	Yes **(RSK02-CM01)**
Report vessel strike or entanglement with megafauna to regulatory authorities. *(All phases)* *(Commonwealth and Victorian state waters)*	Reporting cetacean interactions to regulatory authorities allows for data to be compiled in a central location and for that data to be analysed. In so doing, patterns can be recognised and if relevant, these patterns can be used to inform mitigation. Reporting can be readily undertaken through existing incident and regulatory reporting processes and imposes minimal additional operational burden. The associated costs are not grossly disproportionate to the environmental benefit achieved through improving understanding of interactions and supporting adaptive management across the industry.	Yes **(RSK02-CM04, -CM05)**

Environmental Controls and Performance Measurement			
EPO	**Control measure**	**EPS**	**Measurement criteria**
RSK02-EPO01 No injury or death of megafauna as a result of vessel strike or entanglement	**Vessels only (Commonwealth and Victorian state waters)**		
	RSK02-CM01 Beach's Bass Offshore Operations Whale Management Procedure (WMP) (CDN/ID 19063285) is implemented to minimise anthropogenic noise threats to whale species of concern (blue and southern right whales), including: ○ Maintaining safe distances:	**RSK02-EPS01** The requirements of the EPBC Regulations 2025 (Part 8, Division 8.1) are met.	**RSK02-MC01.1** Daily operations reports note when cetaceans were sighted and what actions were taken to avoid collision or entanglement. **RSK02-MC01.2**

Assessment of Proposed Control Measures			
with subsea equipment.	○ Caution zone (300 m either side of whales and 150 m either side of dolphins) – vessels must operate at no wake speed in this zone. ○ No approach zone (100 m either side of whales and 50 m either side of dolphins) – vessels should not enter this zone and should not wait in front of the direction of travel or an animal or pod/group. ○ Do not encourage bow riding. ○ If animals are bow riding, do not change course or speed suddenly. ○ If there is a need to stop, reduce speed gradually. • Whale surveys will be undertaken by the Officer of the Watch for 30 minutes prior to the activity commencing. If a whale is sighted within the pre-activity survey zone, the activity will not commence until: ○ No whales are observed for 30 minutes within the pre-activity survey zone; or ○ Whales are observed leaving the pre-activity survey zone. ○ Activities can commence at night or in low visibility conditions (i.e., when observations cannot be undertaken) if no more than three whale species of concern have been recorded in the activity zone in the 30 minutes prior to darkness. *(All phases)*		Personnel induction records verify that Officers of the Watch are inducted into the WMP.
	RSK02-CM02 Vessel masters, officers of the watch and other relevant bridge personnel will be inducted into the Whale Management Procedure and required fauna interaction requirements prior to undertaking activities within the Operational Area. *(All phases)*	**RSK02-EPS02** Relevant vessel personnel are aware of and implement the Whale Management Procedure requirements.	**RSK02-MC02** Training and induction records verify relevant personnel have been inducted into the Whale Management Procedure.
	RSK02-CM03 Megafauna sightings observed during vessel operations are recorded and communicated to relevant vessel personnel where required. *(All phases)*	**RSK02-EPS03** Megafauna sightings are recorded and considered during vessel operations.	**RSK02-MC03** Vessel logs demonstrate sightings have been documented where required.

Assessment of Proposed Control Measures			
RSK02-EPO02 Vessel strike or entanglement with marine megafauna is reported to regulatory authorities.	**RSK02-CM04** Vessel strike causing injury to or death of a cetacean is reported to DAWE via the online National Ship Strike Database (https://data.marinemammals.gov.au/report/shipstrike) within 72 hours of the incident. *(All phases)*	**RSK02-EPS04** Regulatory authority vessel strike and entanglement reporting requirements are met.	**RSK02-MC04** Electronic record of report verifies that the incident was reported.
	RSK02-CM05 Entanglement of megafauna (such as ROV tether) is reported to the Victorian Whale and Dolphin Emergency Hotline on 1300 136 017 as soon as possible. No attempts to disentangle megafauna should be made by vessel crew. *(All phases)*	**RSK02-EPS05** Megafauna entanglement reporting requirements are met.	**RSK02-MC05.1** Incident records verify that entanglement events were reported to the Victorian Whale and Dolphin Emergency Hotline as soon as practicable following identification. **RSK02-MC05.2** Incident reports verify that vessel personnel did not attempt to disentangle megafauna.

Risk Assessment (residual)			
Phase	**Likelihood**	**Consequence**	**Risk**
Operations	Remote (A)	Serious (3)	Low
CoP	Remote (A)	Serious (3)	Low
Preservation	Remote (A)	Serious (3)	Low

ALARP Decision Justification
With the controls outlined in this table in place, this risk has been assessed as 'Low' and is considered to be good practice (Decision Context A). This means any additional or alternative control measures do not lower the residual consequence further or would be grossly disproportionate to the residual consequence. Therefore, a residual risk score ranking of 'Low' is considered to be ALARP.

Acceptability Assessment	
Defined acceptable level	The risk of vessel collision with megafauna is assessed as having a Low' residual risk rating, which is not considered as having the potential to result in serious or irreversible environmental damage.
Internal context	The proposed management of the risk is aligned with the Beach Environment Policy. Activities will be undertaken in accordance with the Implementation Strategy (Section 8).
External context	The BassGas Offshore Operations SEP is implemented to ensure that stakeholders are aware of operations issues. Stakeholders have not raised concerns about disposal of waste.

ALARP Decision Justification		
Legislative context	The control measures outlined in this EP align with the requirements of: • *Wildlife Act 1975* (Vic). ○ Section 77 (Action to be taken with respect to killing or taking a whale). • *Wildlife (Marine Mammal) Regulations 2013* (Vic). ○ Part 2 (Prescribed minimum distance). ○ Part 3 (General restrictions on activities relating to marine mammals). • EPBC Act 1999 (Cth): ○ Section 199 (failing to notify taking of listed species or listed ecological community). • EPBC Regulations 2025 (Cth): ○ Part 8, Division 8.1 (Interacting with cetaceans).	
Industry practice	The control measures outlined in the below-listed guidelines and codes of practice demonstrate that BPEM will be implemented for this activity.	
	Environmental management in the upstream oil and gas industry (IOGP-IPIECA, 2020)	The control measures listed in this table meet the relevant mitigation measures listed for offshore activities with regard to: • Collision with marine fauna – vessels should monitor for the presence and movements of large cetaceans and pinnipeds so that avoidance action can be taken where marine fauna is observed on a collision course with vessels (**RSK02-CM01**).
	Best Available Techniques Guidance Document on Upstream Hydrocarbon Exploration and Production (European Commission, 2019)	There are no guidelines for offshore activities with regard to minimising the risk of collisions with megafauna.
	Environmental, Health and Safety Guidelines for Offshore Oil and Gas Development (World Bank Group, 2015)	There are no guidelines regarding minimising the risk of collisions with megafauna.
	Code of Environmental Practice (APPEA, 2008)	The control measures listed in this table meet the following offshore development and production objectives: • To reduce the risks to the abundance, diversity, geographical spread and productivity of marine species to ALARP and to an acceptable level.
	Megafauna collision-specific guidance	
	The Australian Guidelines for Whale and Dolphin Watching (DoEE, 2017)	The controls measures in this table are aligned with the requirements of these guidelines, despite the fact that the support vessels are not acting in the capacity of dedicated whale or dolphin watching vessels.
	National Strategy for Reducing Vessel Strike on Cetaceans and other	The control measures in this table are aligned with objective 3 of this strategy, which is to reduce the likelihood and severity of megafauna vessel collisions.

ALARP Decision Justification		
	Marine Megafauna (DoEE, 2017)	
Environmental context	MNES	
	AMPs	No intersection or impacts.
	Ramsar Wetlands	No intersection or impacts.
	NIWs	No intersection or impacts.
	TECs	No intersection or impacts.
	Nationally threatened and migratory species	The low frequency of vessel movements to and from Yolla-A, along with the infrequent nature of vessel-based IMR activities, makes it unlikely that vessel strike or entanglement with megafauna will occur. If vessel strike or entanglement does occur to individual animals, this will not be a significant impact in the context of a species' populations.
	Other matters	
	State marine parks	This hazard does not have any impacts on state marine parks.
	Species Conservation Advice/Recovery Plans/Threat Abatement Plans	Vessel collisions (and/or entanglements) are listed as a threat to cetaceans in the following plans: ○ Conservation Management Plan for the Blue Whale (DoE, 2015). ○ National Recovery Plan for the Southern Right Whale (DCCEEW, 2024). ○ Conservation advice for the sei whale (TSSC, 2015b); ○ Conservation advice for the fin whale (TSSC, 2015c); and ○ Conservation advice for the humpback whale (TSSC, 2015d). The control measures outlined in this table will not compromise the specific objectives or actions outlined in these plans to avoid vessel collisions and/or entanglements with whales.
ESD principles	The EIA presented throughout this EP demonstrates that ESD principles (a), (b), (c) and (d) are met (noting that principle (e) is not relevant).	

Environmental Monitoring
Megafauna sightings.

Record Keeping	
<u>Vessels only</u> • Daily operations reports. • Induction records. • Whale Management Procedure. • Incident reports.	• Megafauna sighting reports. • Vessel logs. • Electronic record of vessel strike causing injury or death of a cetacean report.

7.13 RISK 3: Introduction and Establishment of Invasive Marine Species

7.13.1 Source of Aspect

The DAWR (2018) defines marine pests (referred to in this EP as invasive marine species, IMS) as:

> *non-native marine plants or animals that harm Australia's marine environment, social amenity or industries that use the marine environment, or have the potential to do so if they were to be introduced, established (that is, forming self-sustaining populations) or spread in Australia's marine environment.*

The following activities have the potential to result in the introduction of IMS in the operational area:

- Discharge of ballast water from the PSV and other vessels containing foreign species.
- Translocation of foreign species through biofouling on vessel hulls, niches (e.g., thruster tunnels, sea chests) or in-water equipment (e.g., ROV and tethers).

The PSV and vessels undertaking inspection, maintenance and repair activities may ballast and de-ballast to improve stability, even out vessel stresses and adjust vessel draft, list and trim, with regard to the weight of equipment on board at any one time.

Biofouling is the accumulation of aquatic microorganisms, algae, plants and animals on vessel hulls and submerged surfaces. More than 250 non-indigenous marine species have established in Australian waters, with research indicating that biofouling has been responsible for more foreign marine introductions than ballast water (DAWR, 2015).

The DAWR estimates that ballast water is responsible for 30% of all marine pest incursions into Australian waters (DAWR, 2018). The DAWR declares that all saltwater from ports or coastal waters outside Australia's territorial seas presents a high risk of introducing foreign marine pests into Australia (AQIS, 2011), while DAWR (2018) notes that the movement of vessels and marine infrastructure is the primary pathway for the introduction of IMS.

Because the Yolla-A platform is fixed in place and does not discharge ballast water, it does not present a risk of introducing IMS to the Operational Area. As such, this risk assessment is focused on the PSV and other vessels undertaking activity within the Operational Area. Over the last five years, there have been no evidence of IMS introduction to the Operational Area from vessels.

As outlined in Table 3.11, project activities during the operations, CoP and preservation phases involve ongoing IMR activities and support vessel movements associated with the operation, preservation and monitoring of offshore infrastructure. While the frequency and nature of these activities vary between phases, including periodic vessel visits during the preservation phase, the potential for IMS associated with IMR activities and vessel movements remains throughout the project life. Accordingly, this aspect is relevant to all phases, as summarised below:

Hazard	Source	Operations	CoP	Preservation
Support vessels	IMR activities	✓	✓	✓
	Vessel movement	✓	✓	✓

7.13.2 Known and Potential Environmental Risks

IMS may become established where conditions are suitable, and these species may have impacts on local ecological and economic values. However, establishment of IMS is mostly likely to occur in shallow waters in areas where large numbers of vessels are present and are stationary for an extended period.

If the risk of establishment of IMS is realised this could result in a change in ecosystem dynamics which may include a reduction in native marine species diversity and abundance, displacement of native marine species, socio-economic impacts on commercial fisheries, and changes to conservation values of protected areas and First Nations cultural values and sensitivities.

7.13.3 EMBA

The EMBA for IMS introduction is anywhere within the Operational Area, though if IMS survive the introduction and go on to colonise and spread, this EMBA could extend to large parts of Bass Strait.

Receptors most at risk within this EMBA, either as residents or migrants, are:

- Benthic fauna (because of their limited ability to move to other suitable areas).
- Benthic habitat, and
- Pelagic fish.
- Traditional Owners with cultural connections to these waters.

7.13.4 Jurisdiction of Hazard

The jurisdictions for this hazard are outlined below.

Commonwealth waters	Victorian waters
YES	YES
Vessels working within the platform PSZ or undertaking IMR activities along the portion of the RGP within Commonwealth waters.	Vessels undertaking IMR activities along the portion of the RGP within state waters.

7.13.5 Evaluation of Environmental Risks

Successful IMS invasion requires the following three steps:

1. Colonisation and establishment of the marine pest on a vector (e.g., vessel hull) in a donor region (e.g., home port).
2. Survival of the settled marine species on the vector during the voyage from the donor to the recipient region (e.g., activity area).
3. Colonisation (e.g., dislodgement or reproduction) of the marine species in the recipient region, followed by successful establishment of a viable new local population.

If successful invasion takes place, the IMS is likely to have little or no natural competition or predation, thus potentially outcompeting native species for food or space, preying on native species or changing the nature of the environment. It is estimated that approximately one in six introduced marine species becomes pests (AMSA, n.d). Marine pest species can also deplete fishing grounds and aquaculture stock, with between 10% and 40% of Australia's fishing industry being potentially vulnerable to marine pest incursion (AMSA, n.d). For example, the introduction of the Northern Pacific seastar (*Asterias amurensis*) in Victorian and Tasmanian waters was linked to a decline in scallop fisheries. Similarly, the ability of the New Zealand screw shell (*Maoricolpus roseus*) to reach densities of thousands of shells per square metre has presented problems for commercial scallop fishers (MESA, 2017). The ABC (2000) reported that the New Zealand screw shell is likely to displace similar related species of screw shells, several of which occupy the same depth range and sediment profile.

Marine pests can also damage marine and industrial infrastructure, such as encrusting jetties and marinas or blocking industrial water intake pipes. By building up on vessel hulls, they can slow the vessels down and increase fuel consumption.

During routine operations, the risk of introducing IMS to the operational area is low because the PSV contracted to undertake activities will be (where possible) locally- based. This means that species contained within the vessel's ballast water or within hull fouling are local and unlikely to be IMS.

The following species are identified and known to occur within Port Phillip Bay:

- Asian date or bag mussel (*Arcuatula senhousia*).
- European fan worm (*Sabella spallanzanii*).
- European shore crab (*Carcinus maenas*).
- Japanese kelp (*Undaria pinnatifida*).
- Northern Pacific seastar (*Asterias amurensis*).

While there is a risk of transferring IMS from Port Phillip Bay into the operational area, the control measures adopted by the PSV render the risk of successful transportation as low. For example, biofouling is managed in accordance with National Biofouling Management Guidance for the Petroleum Production and Exploration Industry (AQIS, 2009), which involves in-water inspections, cleaning of vessel niches and applying anti-fouling coating. In addition, the PSVs will be managed in accordance with the International Maritime Organisation (IMO) Biofouling Guidelines which recommends vessel maintain and implement a Biofouling Management Plan and Biofouling Record Book in order to control and minimise the transfer of aquatic IMS while conducting routine operations on the activity.

During maintenance activities at the platform or along the pipeline, non-locally based specialist vessels (e.g., diving support vessels) may be contracted. The IMS risks posed by these vessels will be managed in accordance with the EPS outlined in Table 7.37 and will begin with a pre-qualification undertaken by the new vessel contractor prior to charter in order to determine that its biofouling and ballast water controls meet the requirements of this EP.

As a result, the consequence is assessed as **Serious (3**) and likelihood as **Highly Unlikely (B)**, and the residual risk is **Medium** and of an acceptable level.

7.13.5.1 Cultural values and sensitivities

Given the impact of a successful IMS colonisation has the ability to significantly impact local species and thus change local epifauna and infauna populations permanently, which could also impact State and Commonwealth fisheries, and alter conservation values and First Nations cultural values and sensitivities, the consequences have been evaluated as **Serious (3)**. However, it is considered such an event is **Highly Unlikely (B)**, due to the unfavourable conditions within the Operational Area required for colonisation and the implementation of the Beach Domestic IMS Biofouling Risk Assessment Process in accordance with regulatory requirements to manage the introduction of IMS and this risk is therefore assessed as **Medium** and of an acceptable level.

7.13.6 Cumulative Risk Evaluation

There is a remote likelihood for cumulative impacts associated with the risk of the introduction and establishment of IMS in the Operational Area due to the numerous control measures in place to prevent the introduction of IMS. While the potential consequences of IMS establishment could be major—affecting native biodiversity, commercial fisheries, and cultural values—such outcomes are considered highly unlikely given the numerous preventive measures in place.

There are no other oil and gas operations in close proximity to BassGas, so there is no overlap in risk for this hazard from other similar activities. Similarly, vessel-based activities being undertaken by offshore wind developers in the offshore wind feasibility licences to the east of BassGas are too far away (over 130 km) for the cumulative impacts of IMS introduction to occur over the remaining life of the BassGas assets.

7.13.7 Risk Assessment

A risk assessment for the introduction of IMS is presented in Table 7.37.

Table 7.37: Risk assessment for the introduction of IMS

ALARP decision context			
Impact decision framework context	Type A.		
Activity	Nothing new or unusual, represents business as usual, well understood activity, good practice is well defined.		
Level of certainty of risk	Risks are well understood, uncertainty is minimal.		
Stakeholder influence	No conflict with company values, no partner interest, no significant media interest.		
Impact / Risk Assessment (inherent)			
Phase	**Likelihood**	**Consequence**	**Risk**
Operations	Highly Unlikely (B)	Serious (3)	Medium
CoP	Highly Unlikely (B)	Serious (3)	Medium
Preservation	Highly Unlikely (B)	Serious (3)	Medium

Assessment of Proposed Control Measures		
Control	**Cost/benefit analysis**	**Implemented?**
Use only locally/regionally sourced vessels. *(All phases)* *(Commonwealth and Victorian state waters)*	This control minimises the likelihood of introducing IMS. Historically, this has been feasible because support vessels for BassGas operations have been sourced from Victorian ports or other Australian states to support higher manning levels on the platform. With the reduced manning requirements on the platform, Beach is now using vessels of opportunity to support BassGas operations. Beach's preference is to support local contractors ahead of internationally-based contractors, but committing to only using locally or regionally-based vessels is no longer feasible. Given the reduced manning requirements and need to utilise vessels of opportunity, restricting vessel selection in this way would significantly reduce vessel availability and operational flexibility. The operational constraints associated with implementing this control are considered grossly disproportionate to the incremental reduction in IMS risk that would be achieved beyond existing IMS management controls.	No
Do not exchange or discharge ballast water in the OAs. *(All phases)* *(Commonwealth and Victorian state waters)*	The control minimises the likelihood of introducing IMS. As ballast water management is necessary to maintain vessel stability and safety, this control is not technically feasible. The operational and safety consequences associated with implementing this control would be grossly disproportionate to the environmental benefit achieved.	No
Use only freshwater ballast. *(All phases)* *(Commonwealth and Victorian state waters)*	This control minimises the likelihood of introducing IMS. Some vessel owners prefer to carry freshwater ballast in order to preserve internal systems (i.e., no salt water induced corrosion), but this is not always possible on every vessel or every vessel type for a number of operational and safety reasons. Implementing this control would significantly restrict the pool of vessels available to support the activity and may introduce operational and safety constraints for vessel operators. These consequences are considered grossly disproportionate to the incremental reduction in IMS risk that would be achieved.	No
Apply an IMS risk assessment process to vessel selection. *(All phases)* *(Commonwealth and Victorian state waters)*	This control minimises the likelihood of introducing IMS. Beach developed a company-wide Domestic IMS Biofouling Risk Assessment Process (as detailed in the Beach IMS Management Plan) that incorporates legislative requirements and best practice IMS prevention measures from numerous government and industry IMS management guidelines. This process has been successfully implemented for several years across all of Beach's Bass Strait activities (operations and exploration). Vessel contractors that regularly work for Beach are familiar with these requirements and factor them into their routine operations. The associated costs are not grossly disproportionate to the environmental benefit achieved through reducing the likelihood of IMS introduction and establishment.	Yes **(RSK03-CM01, -CM02)**

Assessment of Proposed Control Measures		
Require current biofouling records and maintenance history during vessel mobilisation. *(All phases)* *(Commonwealth and Victorian state waters)*	Reviewing biofouling maintenance records, dry dock history, antifouling coating age and cleaning records provides additional assurance regarding vessel IMS risk. This is a low-cost administrative control that can readily be incorporated into the existing IMS risk assessment process. The benefit is already substantially achieved through the Beach Domestic IMS Biofouling Risk Assessment Process, which assesses vessel-specific IMS risks. Review of vessel records can be readily incorporated into existing vessel assurance processes at minimal additional cost. The associated costs are not grossly disproportionate to the environmental benefit achieved through improving confidence in vessel biosecurity performance.	Yes **(RSK03-CM01)**
Additional IMS assessment undertaken following extended vessel lay-up periods. *(All phases)* *(Commonwealth and Victorian state waters)*	Vessels that have remained stationary for extended periods can accumulate fouling on their hulls. Triggering an enhanced IMS assessment for vessels returning from lay-up may further reduce IMS risk. This measure is practical and low cost and is incorporated into the existing Beach IMS Management Plan assessment framework. Therefore, this measure is effectively implemented through existing controls rather than as a standalone requirement. This measure utilises existing IMS assessment processes and requires minimal additional effort where trigger conditions are met. The associated costs are not grossly disproportionate to the environmental benefit achieved through reducing biofouling-related IMS risks.	Yes **(RSK03-CM01)**
Inspect and clean submerged equipment prior to mobilisation. *(All phases)* *(Commonwealth and Victorian state waters)*	Submerged equipment, such as ROVs, mooring equipment, baskets and sampling equipment, may act as vectors for IMS transfer. Inspection, and cleaning (if required) prior to deployment can eliminate or reduce the likelihood of translocation. Costs are borne by the vessel contractor and the measure is considered industry good practice. The existing immersible equipment risk assessment undertaken through the Beach IMS Management Plan deals with this risk and achieves a comparable reduction in risk at significantly lower cost. Implementation can be achieved through existing equipment assurance and mobilisation processes and is consistent with industry good practice. The associated costs are not grossly disproportionate to the environmental benefit achieved through reducing the risk of IMS translocation.	Yes **(RSK03-CM01)**

Assessment of Proposed Control Measures		
IMS inspection of all vessels by third-party specialists. *(All phases)* *(Commonwealth and Victorian state waters)*	IMS inspection by third-party specialists would provide additional confidence but at substantial cost and scheduling impacts. The existing risk-based vessel assessment undertaken through the Beach Domestic IMS Biofouling Risk Assessment Process, achieves a comparable reduction in risk at significantly lower cost. Therefore, this measure is effectively implemented through existing controls rather than as a standalone requirement. Accordingly, the costs associated with mandatory third-party inspections would be grossly disproportionate to the incremental environmental benefit achieved.	No
Restrict the transfer of onboard equipment containing retained seawater between locations. *(All phases)* *(Commonwealth and Victorian state waters)*	Residual seawater within equipment (such as hoses) has the potential to transport microscopic life stages of marine organisms. Draining or treating retained seawater before mobilisation between locations may further reduce the likelihood of IMS translocation. However, the IMS risk associated with vessel and equipment movements is already managed through the Beach Domestic IMS Biofouling Risk Assessment Process, which assesses the overall risk profile of vessels and immersed equipment and identifies additional risk reduction measures where required. Any incremental risk reduction achieved through a blanket requirement to drain or treat retained seawater is expected to be negligible given the low residual risk and effectiveness of the existing IMS management framework. Accordingly, the additional implementation and verification requirements are considered grossly disproportionate to the environmental benefit achieved.	No
Undertake routine eDNA monitoring around the platform and RGP. *(All phases)* *(Commonwealth and Victorian state waters)*	While technically feasible, eDNA monitoring remains an emerging technology with uncertainty regarding species detection and interpretation of results. The significant implementation costs associated with routine monitoring are considered grossly disproportionate to the environmental benefit achieved given the low residual IMS risk and the preventative controls already in place.	No

Environmental Controls and Performance Measurement			
EPO	**Control measure**	**EPS**	**Measurement criteria**
RSK03-EPO01 No introduction of IMS within the Operational Area as a result of the activity.	**Vessels only (Commonwealth and Victorian state waters)**		
	RSK03-CM01 Vessels and immersible equipment mobilised to undertake activities within the Operational Area will be assessed against against the Beach	**RSK03-EPS01** Only vessels and equipment deemed to have passed the IMS risk assessment are	**RSK03-MC01** Domestic IMS Biofouling Risk Assessment reports verify that vessels and immersible equipment

Assessment of Proposed Control Measures			
	Domestic IMS Biofouling Risk Assessment Process (as detailed in the Beach IMS Management Plan) (S400AH719916) prior to their initial mobilisation to the Operational Area. The process in this plan: ○ Validates compliance with regulatory requirements (Commonwealth and State) in relation to biosecurity prior to engaging in activities within the Operational Area. ○ Identifies the potential IMS risk profile of vessels and submersible equipment prior to deployment within the Operational Area. ○ Identifies potentially deficiency of IMS controls prior to entering the Operational Area. ○ Identifies additional controls to manage IMS risk. ○ Prevents the translocation and potential establishment of IMS into non-affected environments (either to or from the Operational Area). *(All phases)*	permitted to work in the Operational Area.	meet the Beach IMS requirements.
	RSK03-CM02 Contractors and vessel operators engaged to undertake activities within the Operational Area will be assessed through the Beach Marine Assurance Process prior to mobilisation to ensure compliance with the most recent version of the Australian Ballast Water Management Requirements. This process: • Confirms vessels have the required ballast water management documentation, including a valid Ballast Water Management Plan (BWMP) and Ballast Water Management Certificate (where applicable). • Verifies ballast water is managed using an approved ballast water	**RSK03-EPS02** Only vessel operators that have been pre-qualified by Beach and demonstrated compliance with the most recent version of the Australian Ballast Water Management Requirements are permitted to undertake activities within the Operational Area.	**RSK03-MC02** Procurement vetting records verify that: • Vessel operators have undergone Beach's contractor pre-qualification process prior to engagement. • Vessel operators have demonstrated compliance with the most recent version of the Australian Ballast Water Management Requirements. • Relevant ballast water management documentation has been reviewed and

Assessment of Proposed Control Measures		
	management method and in accordance with vessel-specific management procedures. • Confirms ballast water reporting, record-keeping and certification requirements are maintained, where applicable. • Identifies deficiencies in ballast water management arrangements prior to vessels undertaking activities within the Operational Area. • Identifies additional controls required to minimise the risk of introducing or translocating invasive marine species via ballast water. • Reduces the likelihood of introducing or spreading invasive marine species within and between Australian waters and the Operational Area. *(All phases)*	accepted where required.

Risk Assessment (residual)			
Phase	**Likelihood**	**Consequence**	**Risk**
Operations	Remote (A)	Moderate (2)	Low
CoP	Remote (A)	Moderate (2)	Low
Preservation	Remote (A)	Moderate (2)	Low

ALARP Decision Justification
With the controls outlined in this table in place, this risk has been assessed as 'Low' and is considered to be good practice (Decision Context A). This means any additional or alternative control measures do not lower the residual consequence further or would be grossly disproportionate to the residual consequence. Therefore, a residual risk score ranking of 'Low' is considered to be ALARP.

Acceptability Assessment	
Defined acceptable level	The risk of introducing IMS is assessed as having a 'Low' residual risk rating, which is not considered as having the potential to result in serious or irreversible environmental damage.
Internal context	The proposed management of the risk is aligned with the Beach Environment Policy. Activities will be undertaken in accordance with the Implementation Strategy (Section 8).
External context	The BassGas Offshore Operations SEP is implemented to ensure that stakeholders are aware of operations issues. Stakeholders have not raised concerns about disposal of waste.
Legislative context	The control measures outlined in this EP align with the requirements of: ○ *Biosecurity Act 2015* (Cth): ▪ Chapter 4 (Managing biosecurity risk).

ALARP Decision Justification		
	▪ Chapter 5, Part 3 (Management of discharge of ballast water). ▪ Biosecurity Amendment (Biofouling Management) Regulations 2021. o *Navigation Act 2012* (Cth) ▪ Marine Order 98 (Marine pollution – anti-fouling systems). o *Protection of the Sea (Harmful Anti-fouling Systems) Act 2006* (Cth): ▪ Part 2 (Application or use of harmful anti-fouling systems). ▪ Part 3 (Anti-fouling certificates and anti-fouling declarations).	
Industry practice	The control measures outlined in the below-listed guidelines and codes of practice demonstrate that BPEM will be implemented for this activity.	
	Environmental management in the upstream oil and gas industry (IOGP-IPIECA, 2020)	The control measures listed in this table meet the relevant mitigation measures listed for offshore activities with regard to: • Introduction of IMS – develop an IMS Management Plan (where applicable), ensure vessels have a valid IAFS certificate, undertake regular vessel hull inspections, manage ballast water in accordance with local guidelines and carry a ballast water record book and ballast water management certificate **(RSK03-CM01)**.
	Best Available Techniques Guidance Document on Upstream Hydrocarbon Exploration and Production (European Commission, 2019)	There are no guidelines for offshore activities with regard to minimising the risk of introducing IMS.
	Environmental, Health and Safety Guidelines for Offshore Oil and Gas Development (World Bank Group, 2015)	There are no guidelines regarding minimising the risk of introducing IMS.
	Code of Environmental Practice (APPEA, 2008)	The control measures listed in this table meet the following offshore development and production objectives: • To reduce the risk of introduction of marine pests to ALARP and to an acceptable level. • To reduce the impacts to benthic communities to ALARP and to an acceptable level.
	IMS-specific guidance	
	Anti-Fouling and In-Water Cleaning Guidelines (DAFF, 2024)	The control measures in this table reflect the guidance regarding the management of biofouling.
	Reducing marine pest biosecurity risks through good practice biofouling management (NOPSEMA, 2024)	The control measures in this table reflect the guidance regarding the management of biofouling and ballast water.

ALARP Decision Justification		
	National Strategic Plan for Marine Pest Biosecurity 2018-2023 (DAWR, 2018)	The control measures in this table meet Objective 1 of the plan, which is to minimise the risk of IMS introductions, establishment and spread.
	Offshore Installations - Biosecurity Guide (DAWR, 2023, v1.5)	This guide focuses on conveyances (vessels and aircraft) that interact with an installation (the platform and pipeline) and biosecurity controls that the government enforces, focused on topsides (not biofouling). Biofouling and ballast water requirements point to the other guidelines listed in this table.
	Guidelines for the Control and Management of Ships' Biofouling to Minimise the Transfer of Invasive Aquatic Species (IMO, 2023)	The control measures in this table reflect the guidance regarding minimising the transfer of IMS from biofouling.
	Australian Ballast Water Management Requirements (DAWR, 2020, v8)	The control measures in this table reflect the guidance regarding ballast water.
Environmental context	MNES	
	AMPs	The South-east Marine Parks Network Management Plan 2025 (DNP, 2025) identifies IMS from vessel ballast and bilge water discharges and biofouling as a threat to the AMP network. The long distance from the OA (>65 km) and the deeper cooler waters of the closest AMPs make it unlikely that IMS would become established in those AMPs if introduced in the OA.
	Ramsar Wetlands	No intersection or risks.
	NIWs	No intersection or risks.
	TECs	No intersection or risks.
	Nationally threatened and migratory species	The threatened and migratory species within the EMBA are all highly mobile species. There are no EPBC Act-listed or FFG Act-listed benthic species listed as occurring in the OA; these are generally more susceptible to the effects of IMS than mobile fauna.
	Other matters	
	State marine parks	This hazard does not have any impacts on state marine parks.
	Species Conservation Advice/Recovery Plans/Threat Abatement Plans	The National Strategic Plan for Marine Pest Biosecurity (2018-2023) (DAWR, 2018) has five objectives. The control measures listed in this table are aligned with the plan's objective to minimise the risk of marine pest introductions, establishment and spread (noting that the other four objectives do not apply to BassGas operations).
ESD principles	The EIA presented throughout this EP demonstrates that ESD principles (a), (b), (c) and (d) are met (noting that principle (e) is not relevant). • Is there a threat of serious or irreversible environmental damage?	

ALARP Decision Justification
▪ Possibly, but implementation of the control measures aims to avoid this. • Is there scientific uncertainty as to the environmental damage? ▪ Yes. Individual species fill different ecological niches and understanding how one or more species are likely to behave outside their native habitat is generally unknown until it occurs.
Environmental Monitoring
Opportunistic sightings via subsea IMR activities (e.g., ROV surveys of the Yolla-A jacket and RGP).
Record Keeping
• IMS Management Plan Assessment reports. • Vessel procurement records.

7.14 RISK 4: LoC of Bulk Chemicals, Hydrocarbons and Nitrogen

7.14.1 Source of Aspect

The following activities have the potential to result in accidental overboard LoC of chemicals, hydrocarbons and pressurised nitrogen:

- Use, handling and transfer of hydrocarbons, chemicals and pressurised nitrogen on board vessels and the platform.
- Platform topside operations – crane transfers, bunkering operations, failure of or damage to bunding systems, hydraulic line failure from equipment, deck washdowns, bund overfills.
- Support vessel operations – cane transfers, failure of or damage to bunding systems, hydraulic line failure from equipment, hydraulic cable failures from ROV, deck washdowns and bund overfills.
- CoP operations – de-inventory and flushing of hydrocarbons and process fluids, use and transfer of preservation and decommissioning chemicals, pressurised nitrogen purging activities, crane lifts associated with removal works, temporary storage and transfer of waste liquids, hose or valve failures during fluid transfer, overfilling of temporary storage tanks or containers, failure of temporary containment systems and hydraulic line failures from intervention equipment.

During the preservation phase, nitrogen will be retained within preserved topsides equipment and the offshore RGP under positive pressure. Unplanned releases may occur from valves, fittings, pressure regulation equipment, preserved process piping, vessel interfaces or failures of pipeline or topsides containment systems, resulting in a release of nitrogen to the atmosphere.

Specifically, spills overboard or emissions to atmosphere or the ocean may be caused by, but not limited to:

- Failure to align valves correctly during transfer, flushing, de-inventory or waste handling operations.
- Overfilling of tanks, temporary storage vessels or containers on the platform or vessel.
- Dropped objects from crane transfers.

- Accidental or emergency disconnection of hoses, lines or temporary pipework.
- Failure of hoses, seals, flanges, couplings or transfer equipment during the movement of hydrocarbons, chemicals or waste fluids.
- Failure of temporary containment or bunding systems associated with CoP activities.
- Hydraulic line or umbilical failures from intervention or ROV equipment.
- Unplanned releases during hydrocarbon de-inventorying, flushing, purging or cleaning activities.

Products that may be accidentally discharged overboard or emitted to atmosphere or the ocean includes:

- Bulk chemicals (e.g., methanol, corrosion inhibitor and hydraulic fluid, cleaning chemicals and preservation chemicals, generally in 1 m^3 IBCs).
- Residual hydrocarbons, produced fluids and hydrocarbon-contaminated liquids generated during de-inventory, flushing and cleaning activities.
- Hydraulic fluids associated with lifting, subsea intervention and ROV equipment.
- Nitrogen (300-600 m^3 in preserved topsides equipment)
- MDO.

Jet A1 fuel used for helicopter refuelling has been excluded because there are no refuelling facilities on the Yolla-A platform.

The design of the platform assists in minimising the LoC of chemicals and hydrocarbons from the topsides, in so far as process equipment drains to the closed drain header, which is routed back to the flare KO drum. Deck open drains also drain to the dump caisson, with hydrocarbons recovered via the flare KO drum.

Over the last five years, there has been one incident of LoC of hydrocarbons, where the flare KO drum pump leaked condensate into the bund. The bund had partially rusted and about 45 litres of condensate was estimated to have been lost overboard.

This aspect is relevant to the all phases, though the risk is lower during the preservation phase as there will be fewer materials on the platform that could be lost overboard and fewer personnel visits during this phase (with fewer associated lifts and transfers). There will also be fewer vessel movements.

Hazard	Source	Operations	CoP	Preservation
Platform	Bulk transfers	✓	✓	×
	Bulk storage	✓	✓	×
	Incorrect storage and handling	✓	✓	×
	Equipment failure	✓	✓	×
	LoC from drains	✓	✓	×

Support vessels	Bulk transfers	✓	✓	✓
	Bulk storage	✓	✓	✓
	Incorrect storage and handling	✓	✓	✓

7.14.2 Known and Potential Environmental Risks

The known and potential risks of the LoC of bulk chemicals, hydrocarbons and pressurised nitrogen are:

- Temporary and localised reduction of water quality.
- Acute toxicity to marine fauna through ingestion or absorption.

During CoP activities, additional release scenarios may arise from the de-inventorying, flushing, pigging and preservation of topsides facilities and the offshore RGP. These activities may involve the handling, transfer and temporary storage of residual hydrocarbons, produced fluids, TEG, methanol, preservation chemicals and contaminated liquids. Unplanned releases may occur due to failures of hoses, valves, fittings, temporary storage containers or containment systems, resulting in a temporary and localised reduction in water quality and potential exposure of marine fauna to hydrocarbons or chemicals through ingestion or absorption.

Nitrogen is inert, non-toxic and naturally comprises approximately 78% of the atmosphere. Any unplanned release of nitrogen from topsides equipment or the offshore RGP during CoP or preservation activities would rapidly disperse to the atmosphere and is not expected to adversely affect marine water quality, sediment quality or ecological receptors.

The primary environmental risks associated with this aspect therefore relate to the accidental release of hydrocarbons, chemicals or contaminated liquids to the marine environment.

The primary environmental risks associated with this aspect therefore relate to the accidental release of hydrocarbons, chemicals or contaminated liquids to the marine environment.

7.14.3 EMBA

The EMBA for the LoC of bulk chemicals and hydrocarbons is likely to range from tens to hundreds of metres from the release site (the platform or a vessel when within 500 m of BassGas infrastructure), depending on the product and volume spilled, within the Operational Area. Receptors most at risk, either as residents or migrants, are:

- Benthic fauna.
- Benthic habitat (sand and reef substrates).
- Pelagic fish.
- Cetaceans.
- Pinnipeds.
- Avifauna.

- Traditional Owners with cultural connections to these waters.

These ecological receptors are values of the following within the Operational Area:

- Conservation values and sensitivities
- Cultural values and sensitivities.

7.14.4 Jurisdiction of Hazard

The jurisdictions for this hazard are outlined below.

Commonwealth waters	Victorian waters
YES	YES
Vessels working within the platform PSZ or undertaking IMR activities along the portion of the RGP within Commonwealth waters.	Vessels undertaking IMR activities along the portion of the RGP within state waters.

7.14.5 Evaluation of Environmental Risks

The known and potential environmental impacts of a hydrocarbon spill are:

- Change in water quality.

As a result of a change in water quality, further impacts may occur, which include:

- Injury or mortality to fauna.
- Change in fauna behaviour.
- Change in ecosystem dynamics.
- Changes to the conservation, socio-economic and cultural values and sensitivities.

The impact and risks associated with the LoC of chemicals are described in Section 7.10 (bilge water and deck drainage). Quantities inferred here (in the order of several cubic metres at most) will be greater than Section 7.10, though the nature of the impacts will be the same, albeit over a larger area.

The risks associated with the LoC of MDO are described in Section 7.17.2.

During CoP, temporary fluid handling and transfer activities will be undertaken to de-inventory hydrocarbons and process fluids, remove TEG and preservation chemicals, and transfer waste liquids for onshore disposal. Potential release mechanisms include hose failures, valve alignment failures, overfilling of temporary storage containers, lifting incidents involving bulk liquid containers, failure of temporary containment systems and transfer system leaks.

The environmental impacts associated with these releases are consistent with those assessed for operational LoC, comprising a temporary and localised reduction in water quality and potential exposure of marine fauna to hydrocarbons or chemicals. While CoP activities involve additional fluid handling relative to routine operations, they occur over a short duration and are undertaken under

established procedures and containment requirements. Consequently, the environmental impacts and risks are not expected to exceed those assessed for operational losses of containment.

The release of nitrogen during CoP or preservation activities would be limited to gaseous discharge to the atmosphere. Nitrogen is not expected to cause toxicity effects to marine fauna, generate marine pollution, or result in measurable changes to environmental values or sensitivities. Any release would be localised and temporary and would rapidly disperse into the atmosphere. Consequently, the environmental consequence associated with nitrogen release is lower than for hydrocarbons or chemicals and is bounded by the existing assessment for accidental loss of containment.

In the quantities assumed to be required for preservation of topsides equipment (, the consequence is assessed as **Moderate (2)** and likelihood as **Highly Unlikely (B)**, and the residual risk is **Low** and of an acceptable level.

7.14.6 Cumulative Risk Evaluation

There is a low potential for cumulative impacts resulting from the accidental overboard LoC of bulk chemicals and hydrocarbons from platform and vessel operations when combined with other routine marine discharges from the activity or other maritime activities in Bass Strait. When considered cumulatively, these discharges would result in localised reductions in water quality within the immediate vicinity of the discharge point. The discharges are rapidly dispersed in open offshore waters, limiting the potential for toxicity impacts to marine fauna.

There are no other oil and gas operations in close proximity to BassGas, so there is no overlap in EMBAs for this hazard from other similar activities. Similarly, vessel-based activities being undertaken by offshore wind developers in the offshore wind feasibility licences to the east of BassGas are too far away (over 130 km) for cumulative impacts from LoC of bulk chemicals and hydrocarbons to occur.

7.14.7 Risk Assessment

A risk assessment for the LoC of bulk chemicals and hydrocarbons is presented in Table 7.38.

Table 7.38: Risk assessment for the LoC of bulk chemicals and hydrocarbons

ALARP decision context			
Impact decision framework context	Type A.		
Activity	Nothing new or unusual, represents business as usual, well understood activity, good practice is well defined.		
Level of certainty of risk	Risks are well understood, uncertainty is minimal.		
Stakeholder influence	No conflict with company values, no partner interest, no significant media interest.		
Risk Assessment (inherent)			
Phase	**Likelihood**	**Consequence**	**Risk**
Operations	Highly Unlikely (B)	Moderate (2)	Low
CoP	Highly Unlikely (B)	Moderate (2)	Low

Preservation	Highly Unlikely (B)	Moderate (2)	Low

Assessment of Proposed Control Measures		
Control	**Cost/benefit analysis**	**Implemented?**
Manage chemical and hydrocarbon discharges in accordance with MARPOL Annex I. *(All phases)* *(Commonwealth and Victorian state waters)*	MARPOL Annex I is given effect in Australia under the *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* (Cth). Compliance with MARPOL Annex I is implemented through existing vessel management systems and represents standard offshore industry practice. The costs associated with implementing this control are not grossly disproportionate to the environmental benefit achieved through reducing the likelihood and consequences of hydrocarbon discharges..	Yes **(RSK04-CM01)**
All chemicals that are or could be discharged to the marine environment are low-toxicity OCNS-rated chemicals. *(All phases)* *(Commonwealth and Victorian state waters)*	Reduces the potential for toxicity impacts to marine fauna. It is feasible to restrict the selection of chemicals to substances with the lowest practicable environmental toxicity in accordance with the OCNS, ensuring operational needs are met while minimising potential impacts to marine receptors from chemical discharges. Selection of lower-toxicity chemicals can be achieved through existing chemical assessment and procurement processes and is routinely applied across offshore operations. The costs associated with implementing this control are not grossly disproportionate to the environmental benefit achieved through reducing potential toxicity impacts following an accidental release.	Yes **(RSK04-CM01)**
Bund chemical and hydrocarbon storage areas. *(All phases)* *(Commonwealth and Victorian state waters)*	Bunding is a standard industry control, and the platform has been designed to contain and prevent spills to the marine environment. This control is feasible and in place for BassGas operations. The costs associated with installation, inspection and maintenance of bunding are not grossly disproportionate to the environmental benefit achieved through preventing spills from reaching the marine environment.	Yes **(RSK04-CM02)**
Maintain chemical and hydrocarbon storage areas and transfer systems in accordance with a PMS. *(All phases)* *(Commonwealth and Victorian state waters)*	Ensuring that bunding and drains are operating in line with their design requirements minimises the likelihood of chemicals or hydrocarbons reporting to the receiving environment. Regular inspection identifies integrity issues such as corrosion, damaged containment, blocked drains or accumulation of liquids before a loss of containment occurs. Undertaking equipment inspections and maintenance is routine practice for offshore operations. The associated costs are not grossly disproportionate to the environmental benefit achieved through reducing the likelihood of loss of containment events.	Yes **(RSK04-CM03)**
Crane transfers of bulk chemicals and hydrocarbons are undertaken in accordance with documented procedures. *(All phases)* *(Commonwealth and Victorian state waters)*	Following documented transfer procedures for the movement of bulk goods around the platform or from PSV to platform (and vice-versa) aims to ensure that facility-specific tried and tested methods are implemented to avoid the risk of losing goods overboard. This is standard offshore practice. The procedures utilise existing operational systems, personnel competency requirements and lifting equipment. The costs associated with implementation are not grossly disproportionate to the environmental benefit achieved through reducing the likelihood of dropped loads and accidental releases.	Yes **(RSK04-CM04)**

Assessment of Proposed Control Measures		
Bulk transfer operations undertaken only under suitable weather and sea-state conditions. *(All phases)* *(Commonwealth and Victorian state waters)*	Restricting transfers during adverse weather reduces the likelihood of transfer equipment failure, uncontrolled vessel movement, lifting incidents and hose damage. Weather assessment forms part of routine offshore operational planning and requires minimal additional resources. The associated costs are not grossly disproportionate to the environmental benefit achieved through reducing transfer-related spill risks.	Yes **(RSK04-CM04)**
Bulk transfer hoses fitted with dry-break couplings, pressure tested and maintained to inspection schedules. *(All phases)* *(Commonwealth and Victorian state waters)*	Dry-break couplings and periodic hose testing reduce the likelihood of hose failure, leakage and product release during transfer operations. This control is part of normal offshore industry operations and provides a direct reduction in spill risk for a relatively low implementation cost. The associated costs are not grossly disproportionate to the environmental benefit achieved through reducing the likelihood of transfer system failures and releases.	Yes **(RSK04-CM05)**
Maintain an inventory of chemicals and hydrocarbons stored on the facility. *(All phases)* *(Commonwealth waters)*	Maintaining an up-to-date inventory supports chemical management, emergency response planning and spill investigations. This provides operational awareness of stored volumes and locations while requiring minimal administrative effort. This control can be implemented through existing inventory management systems and requires minimal administrative effort. The associated costs are not grossly disproportionate to the environmental benefit achieved through supporting chemical management and incident investigation.	Yes **(RSK04-CM06)**
Implement a procurement vetting process for vessels. *(All phases)* *(Commonwealth and Victorian state waters)*	Ensures that only appropriate vessel operators and vessels are contracted to Beach. This is routine offshore practice built into existing systems and processes. The costs associated with vessel assurance and procurement screening are not grossly disproportionate to the environmental benefit achieved through reducing risks associated with vessel operations and transfer activities.	Yes **(RSK04-CM07)**
Spill response equipment is maintained and readily available. *(All phases)* *(Commonwealth and Victorian state waters)*	Regular inspection and replenishment of spill response equipment ensures spill kits remain fit for purpose and immediately available during an incident. The maintenance and inspection of spill response equipment can be readily incorporated into existing assurance programs. The associated costs are not grossly disproportionate to the environmental benefit achieved through improving spill response effectiveness and reducing potential environmental impacts.	Yes **(RSK04-CM08; -CM09)**
Emergency response is planned and implemented in accordance with an approved OPEP. *(All phases)* *(Commonwealth and Victorian state waters)*	Emergency response planning ensures that Beach and its contractors are effective in implementing a response. It is a requirement of the OPGGS (Environment) Regulations that oil pollution emergency arrangements and capability is in place for the life of an activity. This is feasible and in place for BassGas operations. The costs associated with maintaining response arrangements and capability are not grossly disproportionate to the	Yes **(RSK04-CM08)**

Assessment of Proposed Control Measures		
	environmental benefit achieved through ensuring an effective and timely response to spill incidents.	
Vessels spill response is planned and implemented in accordance with a SMPEP. *(All phases)* *(Commonwealth and Victorian state waters)*	Spill response planning, including regular spill drills, ensures that vessel contractors are effective in implementing a response. It is a requirement of the *Navigation Act 2012* (Cth) and MARPOL Annex I that vessels over 400 gross tonnes have a SMPEP in place. The requirements are already embedded within vessel management systems and represent standard maritime practice. The associated costs are not grossly disproportionate to the environmental benefit achieved through improving vessel spill preparedness and response capability.	Yes **(RSK04-CM08)**
Secondary spill vessel standby during routine transfers. *(All phases)* *(Commonwealth and Victorian state waters)*	Routine chemical and hydrocarbon transfer operations are already managed through approved procedures, vessel assurance, containment systems, transfer monitoring and emergency response arrangements. Additional dedicated standby response capability would provide only limited incremental risk reduction beyond existing preventative and response controls. The costs associated with maintaining a dedicated standby vessel are considered grossly disproportionate to the additional environmental benefit achieved.	No
Real-time hydrocarbon leak detection on all portable transfer systems. *(All phases)* *(Commonwealth and Victorian state waters)*	Visual monitoring, transfer procedures, pressure testing, dry-break couplings and operator supervision already provide effective controls. The additional risk reduction achieved through real-time leak detection would be marginal and the implementation costs are considered grossly disproportionate to the incremental environmental benefit achieved.	No

Environmental Controls and Performance Measurement			
EPO	**Control measure**	**EPS**	**Measurement criteria**
RSK04-EPO01 No LoC of bulk chemicals or hydrocarbons to the environment.	**Platform only (Commonwealth waters)**		
	RSK04-CM01 All chemicals that are or could be discharged to the marine environment are assessed prior to use to ensure the lowest toxicity, most biodegradable and least accumulative chemicals are selected in line with the Beach Chemical Management Procedure (CDN/ID S4000AD719917). This means: • Chemicals will be selected with the lowest practicable environmental impacts	**RSK04-EPS01** Chemicals that are discharged to the marine environment are low toxicity.	**RSK04-MC01.1** Chemical Management Procedure assessment records verify the procedure is implemented. **RSK04-MC01.2** Platform inspection records verify log of any non-complying firefighting foams and their quarantine/removal (if applicable).

Assessment of Proposed Control Measures		
and risks subject to technical constraints. • Offshore Chemical Notification Scheme (OCNS) 'Gold'/'Silver' (CHARM) or 'D'/'E' (non- CHARM)-rated chemicals (i.e., low toxicity) are used. ○ Chemicals used are reviewed to ensure compliance with the listing of chemicals on the Industrial Chemicals Environmental Management Standard (IChEMS) Register. ○ Any new firefighting foams to be brought onboard are reviewed to ensure they contain no PFOS, PFOA, PFHxS or related substances (i.e., PFAS) in compliance with iChEMS (Schedule 7). *(All phases)*		
RSK04-CM02 Hydrocarbons and chemicals are stored, handled and transferred in a manner that prevents spills and leaks including: • The use of secure receptacles (DNV rated) • Bunded areas or dedicated lockers • Appropriate containment on open decks • Controlled lifting operations in accordance with approved procedures. • Fire-fighting foams are not used to test the functioning of the fire-fighting system. Foams are laboratory tested for their effectiveness.	**RSK04-EPS02** Hydrocarbon and chemical storage and transfer systems are maintained and operated to ensure containment integrity and compliance with approved procedures.	**RSK04-MC02.1** Visual inspection verifies that hydrocarbons and chemicals are stored within secure receptacles within bunded areas or dedicated chemical lockers that drain to bilge tanks (excluding methanol where justified). **RSK04-MC02.2** Visual inspection verifies that where hydrocarbons and chemicals are stored within open draining decks, receptacles are stored on/in temporary bunds. **RSK04-MC02.3** Inspection records verify bunds, containment systems, drains and chemical storage areas remain free from defects and maintain containment capacity.

Assessment of Proposed Control Measures		
(All phases)		
RSK04-CM03 Chemical and hydrocarbon storage areas and transfer systems are maintained to ensure the integrity through the Beach Energy CMMS and vessels' PMS. For the platform specifically, this includes the dump caisson pump, back-up pump and alarms. *(All phases)*	**RSK04-EPS03** Chemical and hydrocarbon storage and transfer systems operate within design and manufacturer specifications.	**RSK04-MC03** Maintenance work orders verify that chemical and hydrocarbon storage areas and transfer systems are inspected and maintained to schedule.
RSK04-CM04 The Beach Lifting and Load Safety Operations - Australia (CDN/ID 3674901) is used for crane transfers of bulk chemicals and hydrocarbons and are undertaken under a Permit to Work (PTW). *(All phases)*	**RSK04-EPS04** Crane lifting operations for chemicals and hydrocarbons are conducted in accordance with approved procedures and permit requirements.	**RSK04-MC04.1** PTW records verify that crane transfers of bulk chemicals and hydrocarbons are undertaken in accordance with the Lifting and Load Safety Operations procedure (CDN/ID 3674901). **RSK04-MC04.2** Permit records and transfer checklists verify pre-transfer inspections have been completed prior to chemical and hydrocarbon transfer operations.
RSK04-CM05 Bulk transfer hoses are fitted with dry-break couplings, pressure tested and maintained to inspection schedules. *(All phases)*	**RSK04-EPS05** Bulk transfer hoses used for chemical and hydrocarbon transfers are maintained fit for purpose, fitted with compliant dry-break couplings, and managed to minimise the risk of loss of containment during transfer operations.	**RSK04-MC05** Hose inspection, pressure test and maintenance records verify that transfer hoses remain fit for purpose and fitted with compliant dry-break couplings.
RSK04-CM06 Maintain an inventory of chemicals and hydrocarbons stored on the facility. *(All phases)*	**RSK04-EPS06** An accurate and current inventory of chemicals and hydrocarbons is maintained to support effective storage, handling, spill preparedness and environmental risk management.	**RSK04-MC06** Chemical management system verifies chemical and hydrocarbon inventories are current, accurate and consistent with products and quantities stored on the facility.
Vessels only (Commonwealth and Victorian state waters)		
RSK04-CM07 The Beach Marine Assurance System is implemented to ensure that all vessels comply with applicable legislative	**RSK04-EPS07** Discharges meet the requirements of the *Navigation Act 2012* (Cth), *Protection of the Sea (Prevention of Pollution from*	**RSK04-MC07.1** Procurement documents verify that vessels meet requirements.

Assessment of Proposed Control Measures			
	discharge requirements. This includes but is not limited to: • Ensure that any oily water discharged to the marine environment contains <15 ppm of oil. *(All phases)*	*Ships) Act 1983* (Cth) and POWBONS Act 1986 (Vic).	**RSK04-MC07.2** Oil record book verifies the discharge of treated oily water is <15 ppm.
RSK04-EPO02 Any unplanned release of bulk chemicals or hydrocarbons to the marine environment is responded to promptly to minimise environmental harm.	**Platform and vessels (Commonwealth and Victorian state waters)**		
	RSK04-CM08 Emergency spill response capability for the platform and vessels is maintained, and response actions are implemented in accordance with the NOPSEMA-accepted OPEP and the vessel Shipboard Marine Pollution Emergency Plan (SMPEP), ensuring readiness, adequacy of resources and compliance with regulatory requirements. *(All phases)*	**RSK04-EPS08** Platform and vessel spill response actions are conducted in accordance with the OPEP and SMPEP.	**RSK04-MC08.1** The OPEP and SMPEPs are available and readily accessible. **RSK04-MC08.2** Emergency response training and drill records demonstrate OPEP and SMPEP competency and preparedness. **RSK04-MC08.3** Incident reports verify emergency response actions were undertaken in line with OPEP and SMPEP procedures.
	RSK04-CM09 Spill kits are located in proximity to chemical and hydrocarbon storage areas, are readily accessible at all times and are regularly inspected and maintained to ensure they remain fully stocked and fit for purpose. *(All phases)*	**RSK04-EPS09** Spill response equipment on the platform and vessels is used in the event of a spill.	**RSK04-MC09.1** Spill kits are present, accessible and fully stocked at all designated locations near chemical and hydrocarbon storage areas. **RSK04-MC09.2** Inspection and maintenance records demonstrate ongoing readiness and fit-for-purpose condition of spill kits.

Impact Consequence (residual)			
Phase	**Likelihood**	**Consequence**	**Risk**
Operations	Highly Unlikely (B)	Minor (1)	Low
CoP	Highly Unlikely (B)	Minor (1)	Low
Preservation	Highly Unlikely (B)	Minor (1)	Low

ALARP Decision Justification

With the controls outlined in this table in place, this risk has been assessed as 'Low' and is considered to be good practice (Decision Context A). This means any additional or alternative control measures do not lower the residual consequence further or would be grossly disproportionate to the residual consequence. Therefore, a residual risk score ranking of 'Low' is considered to be ALARP.

Acceptability Assessment

ALARP Decision Justification		
Defined acceptable level	The risk of LoC of bulk chemicals and hydrocarbons is assessed as having a 'Low' residual risk rating, which is not considered as having the potential to result in serious or irreversible environmental damage.	
Internal context	The proposed management of the risk is aligned with the Beach Environment Policy. Activities will be undertaken in accordance with the Implementation Strategy (Section 8).	
External context	The BassGas Offshore Operations SEP is implemented to ensure that stakeholders are aware of operations issues. Stakeholders have not raised concerns about LoC of bulk chemicals and hydrocarbons.	
Legislative context	The control measures outlined in this EP align with the requirements of: ○ *Navigation Act 2012* (Cth) ▪ Chapter 4 (Prevention of Pollution) ▪ Marine Order 91 (Marine pollution prevention – oil) ▪ Marine Order 93 (Marine pollution prevention – noxious liquid substances) ○ *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* (Cth): ▪ Part II (Prevention of pollution by oil). ▪ Part III (Prevention of pollution by noxious substances) • *POWBONS Act 1986* (Vic): ▪ Part 2, Division 1 (Pollution by oil) ▪ Part 2, Division 2 (Pollution by noxious substances).	
Industry practice	The control measures outlined in the below-listed guidelines and codes of practice demonstrate that BPEM will be implemented for this activity.	
	Environmental management in the upstream oil and gas industry (IOGP-IPIECA, 2020)	The control measures listed in this table meet the relevant mitigation measures listed for offshore activities with regard to: • Accidental release of bulk chemicals – vessels to have IOPP certificate in place, harmful substances must comply with MARPOL Annex III, chemical storage and handling procedures are in place, chemical spill containment and recovery equipment is available near chemical inventories, chemical transfers are only undertaken in suitable weather conditions. **(RSK04-CM03, -04, -05, -08)**.
	Best Available Techniques Guidance Document on Upstream Hydrocarbon Exploration and Production (European Commission, 2019)	The control measures listed in this table meet the guidelines for offshore activities with regard to: • Risk management for handling and storage of hydrocarbons (item 18) and chemicals (item 19) - The BAT are met for Yolla-A operations by having deck coaming in place, a facility-specific OPEP, ensuring that personnel are trained in the use of spill kits, ensuring storage of chemicals in bunded areas and using chemicals with a low toxicity (as rated by the OCNS).
	Environmental, Health and Safety Guidelines for Offshore Oil and Gas Development (World Bank Group, 2015)	Guidelines met with regard to: • Other waste waters (item 44) - All process areas should be bunded to ensure that drainage water flows into the closed drainage system.

ALARP Decision Justification		
	Code of Environmental Practice (APPEA, 2008)	The control measures listed in this table meet the following offshore development and production objectives: • To reduce the risk of any unplanned release of material into the marine environment to ALARP and to an acceptable level.
Environmental context	MNES	
	AMPs	No intersection or risks.
	Ramsar Wetlands	No intersection or risks.
	NIWs	No intersection or risks.
	TECs	No intersection or risks.
	Nationally threatened and migratory species	This hazard does not have any impacts on threatened or migratory species.
	Other matters	
	State marine parks	This hazard does not have any impacts on state marine parks.
	Species Conservation Advice/Recovery Plans/Threat Abatement Plans	The LoC of bulk chemicals or hydrocarbons does not compromise the specific objectives or actions of the other species Recovery Plans, Conservation Management Plans or Conservation Advice referenced in this EP.
ESD principles	The EIA presented throughout this EP demonstrates that ESD principles (a), (b), (c) and (d) are met (noting that principle (e) is not relevant).	

Environmental Monitoring

Impacts as a result of a LoC resulting in a hydrocarbon spill will be monitored and reported in accordance with the OSMP.

Record Keeping

Platform

- CMMS maintenance work order.
- Chemical inventories.
- Chemical assessment reports.
- Environmental inspection/audit records.
- OPEP exercise reports.
- Personnel training records.
- Incident reports.
- OPEP.
- Hose inspection, pressure test and maintenance records.
- PTW records.
- Pre-transfer checklists.

Vessels

- Procurement documents.
- PMS records.
- SMPEP (or equivalent appropriate to class).
- Emergency response training records.
- Incident reports.
- Oil record book.

7.15 RISK 5: Loss of Well Control

7.15.1 Source of Aspect

Activities associated with the operations of the Yolla wells have the potential to result in a loss of well containment of hydrocarbons from unplanned or uncontrolled releases of substances or fluids from their containment, such as significant hydrocarbon spills from a loss of well control (LoWC). These incidents have the potential to harm the existing environment, depending on the likelihood and severity of harm from exposure, and can lead to serious hazards, including fires, explosions, and/or hazardous emissions. Although a LoWC is considered rare, it can have severe consequences, including loss of life, serious environmental impacts, and significant damage to assets and reputation.

The IOGP Risk Assessment Data Directory – Blowout Frequencies Report 434-02 (2019a) provides updated blowout frequencies for gas production wells:

- North Sea standard operations – 7.2×10^{-5} per well year (excluding eternal causes), and 2.7×10^{-5} per well year (external causes such as storms or vessel collision)
- Gulf of Mexico operations - 1.6×10^{-4} per well year (excluding eternal causes), and 3.4×10^{-5} per well year (external causes such as storms or vessel collision)
- Non-North Sea standard or unknown operations - 3.3×10^{-5} (surface flow), and 4.0×10^{-6} (underground flow).

Unplanned events such as a LoWC are considered credible hypothetical scenarios, for which it is important to have either preventive action, a contingency-planned response, or both, as required. Data from Volkman et al. (1994) and AMSA (2019) indicate that at least six blowouts have occurred during offshore well drilling in Australia. The most notable incident, due to the duration of LoWC, occurred at the Montara Platform in the Timor Sea in 2009. However, only one blowout has occurred during offshore routine operations: during wireline operations at Marlin A4 (Gippsland Basin) in 1971. This demonstrates that the risk of a LoWC event during routine operations is remote. These major hazards and risks are well documented in the industry, and engineering controls and standard operating procedures have evolved over several decades to reduce the likelihood of such incidents, particularly those related to LoWC incidents.

A LoWC event at Yolla may be a result of:

- Equipment failure.
- Well integrity failure.
- Inadequate maintenance.
- Vessel collision/impact.
- Dropped objects (while carrying out platform crane lifts, etc).
- Extreme weather.
- Human error.

- Sabotage.
- Fire/explosion on the platform.

This aspect is only relevant to the operations and CoP phases. However, the risk is substantially reduced during the CoP and preservation phases as production activities have ceased, reservoir pressure is depleted and wells have been shut-in or suspended. This significantly reduces the likelihood of a LoWC event and any associated hydrocarbon release during CoP and preservation.

Hazard	Source	Operations	CoP	Preservation
Platform	Presence of wells	✓	✓	✓

7.15.2 Known and Potential Environmental Risks

The potential surface release is condensate during offshore operations from a LoWC during associated BassGas activities are considered credible spill scenarios and form the primary focus for oil spill modelling (OSM).

Potential environmental risks resulting from a LoWC include:

- Localised and temporary reduction of water quality.

As a result of a change in water quality, further secondary potential impacts that may occur are:

- Injury or death of marine life; pelagic fauna, avifauna.
- Change in ecosystem dynamics.
- Localised air quality reduction due to GHG emissions.
- Change to the conservation, socio-economic and cultural values and sensitivities.
- Disruption to third-party operations such as shipping and commercial fishing (e.g., potential loss of fisheries. resulting from temporary fisheries closures, mortalities from fish stocks or tainted catches).

7.15.2.1 Yolla Condensate Properties

The Yolla condensate is characterised as a light, non-persistent oil with high proportions of volatile and semi-volatile hydrocarbons, leading it to rapid evaporation under favourable conditions. Table 7.39 outlines the key characteristics of Yolla condensate.

Table 7.39: Yolla condensate Characteristics

Yolla condensate Characteristics	
API Gravity:	52.5
Density:	770.6 kg/m^3 at 15°C
Viscosity:	0.14 cP at 25°C
Pour Point:	-3°C

Yolla condensate Characteristics	
Hydrocarbon Property Category:	Group I (Not-Persistent Oil)
Composition:	
Volatile components (<180°C boiling point)	80.0% evaporates within the first 12 hours
Semi-volatile components (180–265°C boiling point)	12.0% evaporates within the first 24 hours
Low-volatile components (265–380°C boiling point)	6.6% evaporates over several days
Persistent components (>380°C boiling point)	1.4%
Evaporation Behaviour:	Under calm conditions (constant 5 knots wind speed at 15°C water temperature), 92.0% of the oil is predicted to evaporate within 24 hours. Under variable wind conditions (1–12 knots at 15°C water temperature), 89.4% of the oil mass is forecast to evaporate within 24 hours, with 9.3% entrained into the water column.

Source RPS, 2025

7.15.2.2 Condensate Characteristics

The OSM is used to inform the overall potential impacts and risks. This modelling also adopted a conservative approach, to not consider any spill prevention or mitigation measures proposed for implementation, nor allowing for interventions following a spill to reduce volumes and/or prevent hydrocarbons from reaching sensitive receptors. Consequently, the modelling results represent the maximum extent and potential impact for a released hydrocarbon.

The OSM was performed by RPS Australia Group Pty Ltd (RPS) using the Spill Impact Model Application Program (SIMAP), an advanced three-dimensional trajectory and fates model. This SIMAP calculates the transport, spreading, entrainment and evaporation of spilled hydrocarbons over time, based on the prevailing wind and current conditions, and the physical and chemical properties of the hydrocarbon released.

Floating oil exposure thresholds, shoreline accumulation thresholds and dissolved and entrained (i.e. in the water column) hydrocarbon thresholds used in the OSM are shown in Table 7.40.

Table 7.40: Oil Spill Exposure Values

Level	Exposure	Description
Floating Oil Exposure Value (g/m^2)		
Low	1	Approximates range of socioeconomic effects and established planning area for environmental monitoring Approximately 1,000 litres of oil per km^2.
Moderate	10[)]	Approximates lower limit for harmful exposure, represents the thickness of oiling that has been observed to mortally impact some birds and other fauna that interact with the water surface.

Level		Exposure	Description
			This threshold defines the practical limit for surface response options, i.e., below this thickness, containment, recovery and dispersant treatment options become ineffective. Approximately 10,000 litres of oil per km^2.
High		>50	A concentration thickness considered harmful to marine fauna and birds that come into contact with the oil and can lead to mortality in affected birds. This threshold defines the zone of potential high sea surface oil exposure. Approximates surface oil slick and informs response planning. Approximately 50,000 litres of oil per km^2.
Shoreline Accumulation Value Thresholds (g/m^2)			
Low		10	Predicts potential for some socio-economic and environmental receptor impact. 10 mL of oil per m^2.
Moderate		100	Loading predicts area likely to require clean-up effort. Appearance may range from 1 mm think coating over approximately 1 m^2 or 100 ml of oil per m^2.
High		>1,000	Loading predicts are likely to require intensive clean-up effort, impact to and secondary receptor impacts. Considered the lethal threshold for invertebrates living on hard substrates and sediments in intertidal habitats. Approximately 1 L of oil per m^2.
Water Column Exposure Value (ppb)*			
Dissolved	Low	10	Establishes planning area for scientific monitoring bases on potential for exceedance of water quality triggers.
	Moderate	50	Approximate potential toxic effect, particularly sublethal effect to sensitive species.
	High	>400	Approximates toxic effects including lethal effects to sensitive species
Entrained	Low	10	Establishes planning area for scientific monitoring based on potential for exceedance of water quality triggers.
	Moderate	100	As appropriate given oil characteristic for informing risk evaluation.

* These refer to instantaneous concentrations, where instantaneous would be generally determined by the model time step (generally a 1 hr time step).

Sources: (RPS, 2025; NOPSEMA, 2019).

7.15.2.3 Oil Spill Trajectory Modelling

The LoWC for the Yolla-A scenario predicts minimal floating oil exposure and no shoreline accumulation, but dissolved and entrained hydrocarbons could impact marine receptors significantly over large distances, based on a spill volume of 70,489 barrels (~11,207 m^3).

The release rate for the LoWC scenario varies over time; on day 1, the release rate is 836.6 barrels per day (STB/day) and on day 86, the release rate decreases slightly to 802.9 barrels per day (STB/day). The average release rate over the 86-day period is approximately 819.65 barrels per day. The release

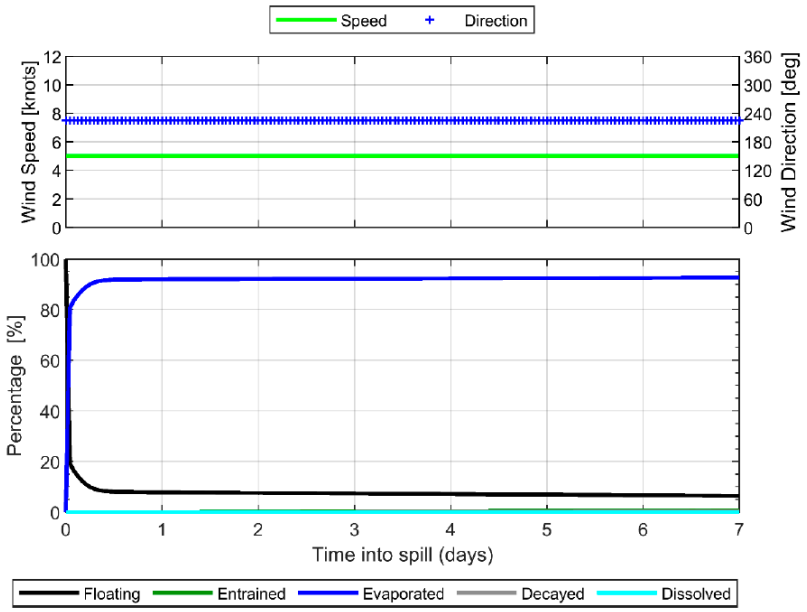
volume (802.9 bbl/day) is based on current production rates and the 86 days includes the time required to contract a relief well drill rig, estimated mobilisation it to site, estimated duration for drilling and pumping kill fluid as outline in the BassGas Relief Well Plan or equivalent.

A summary of the modelling results determined the following:

- Sea Surface Floating Oil Exposure:
  - Maximum distance of floating oil exposure was 3 km (West-Northwest) during winter conditions at the low threshold (1–10 g/m^2).
  - No exposure was predicted for moderate (10–50 g/m^2) and high (>50 g/m^2) thresholds.
  - Only receptors within the Yolla Well Head area showed floating oil exposure above the low threshold.
- Shoreline Oil Accumulation:
  - No shoreline oil contact at or above the low threshold (10 g/m^2) was predicted.
- Dissolved Hydrocarbons:
  - Maximum distances to dissolved hydrocarbon exposure were 68.01 km (low threshold, 10 ppb) and 59.68 km (moderate threshold, 50 ppb) southeast during winter.
  - Receptors within the Yolla Well Head area showed 100% probability of exposure to low and moderate thresholds.
  - Quickest time before exposure was 0.05 days (summer) and 0.06 days (winter) for the low threshold.
- Entrained Hydrocarbons:
  - Maximum distances to entrained hydrocarbon exposure were 552.28 km (10 ppb threshold, northeast, winter) and 7.59 km (100 ppb threshold, east-southeast, winter).
  - Southeast Shelf Transition IMCRA and Tasmanian State Waters showed 24% probability of exposure during summer and winter.
  - Quickest time before exposure was 46.93 days (winter) for Little Penguin - Foraging (Northwestern edge of Cape Barren Island) BIA.

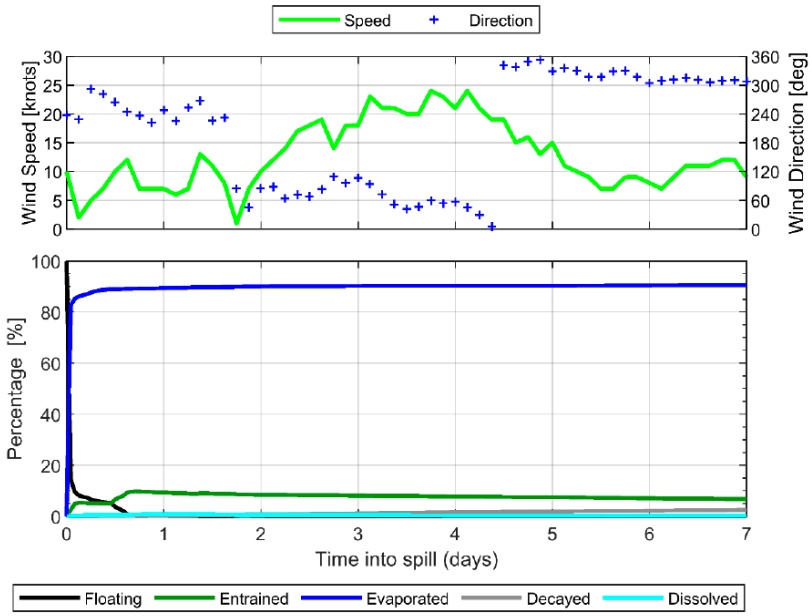
Figure 7.15 and Figure 7.16 show that evaporation is the key weathering mechanism.

The OSTM results for sea surface contact are presented in Figure 7.17, entrained hydrocarbons in Figure 7.18, and dissolved hydrocarbons in Figure 7.19 (**Appendix 14)**.



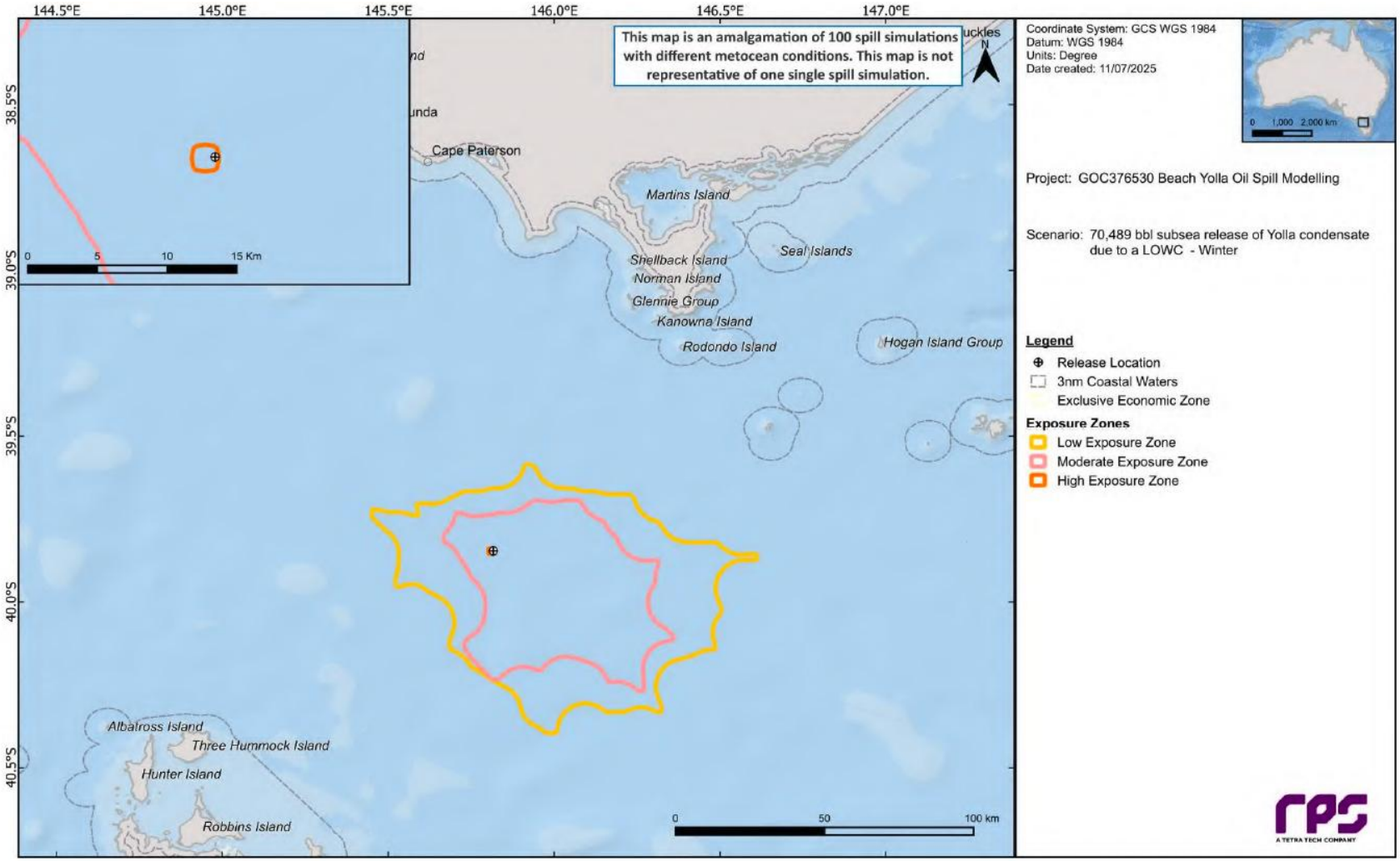
Source RPS, 2025

Figure 7.15: Proportional mass balance plot representing the weathering of Yolla condensate spilled onto the water surface over 1 hour and subject to a constant 5 knots (2.6 m/s) wind speed at 15°C water temperature.



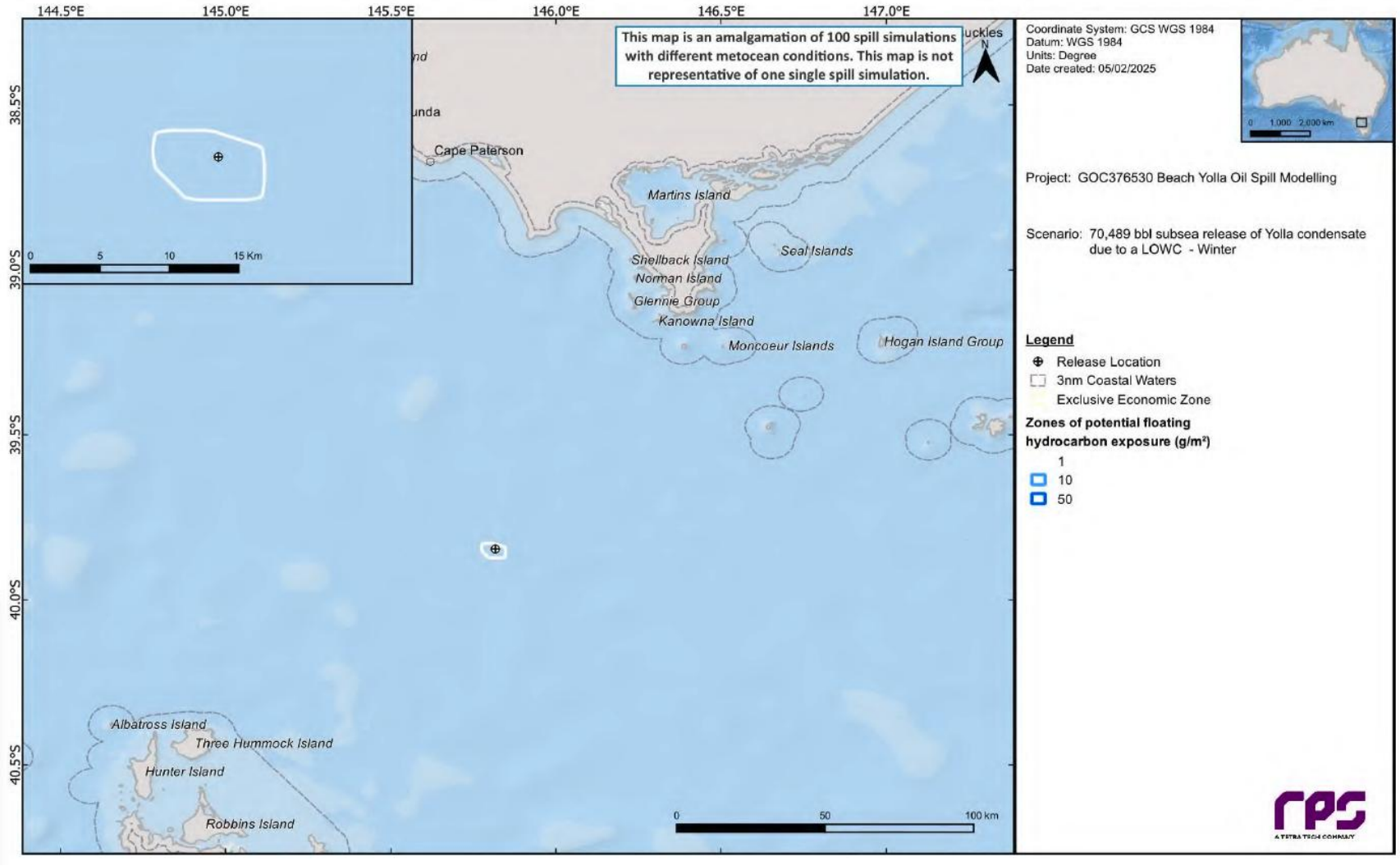
Source RPS, 2025

Figure 7.16: Proportional mass balance plot representing the weathering of Yolla condensate spilled onto the water over 1 hour and subject to variable wind speeds (1-12 knots or 1.9-23 m/s) at 15°C water temperature.



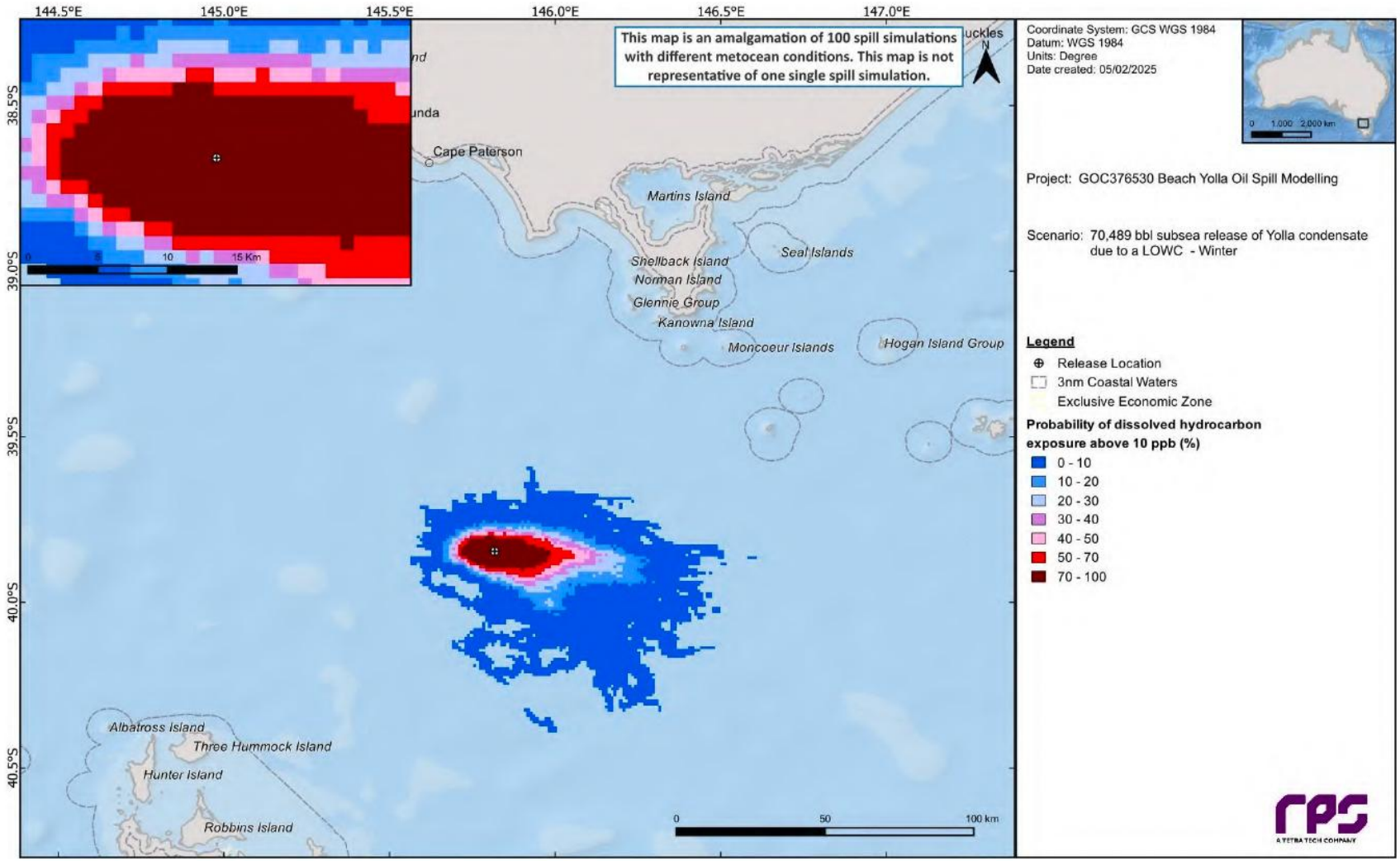
Source RPS, 2025

Figure 7.17: Predicted Area of Exposure for Low, Medium and High Thresholds from 70,489 bbl subsea release of condensate over 86 days from LOWC at the Well Head during winter conditions.



Source RPS, 2025

Figure 7.18: Zone of potential Floating Oil Exposure in the event of a 70,489 bbl subsea release of condensate over 86 days from LOWC at the Well Head during winter conditions.



Source RPS, 2025

Figure 7.19: Probability of Dissolved Hydrocarbon Exposure above 10 ppb, at 0-10 m below the sea surface in the event of a 70,489 bbl subsea release of condensate over 86 days from LOWC at the Well Head during winter conditions

7.15.3 EMBA

As outlined in Table 5.1, the hydrocarbon spill EMBA comprises the Planning Area extent (Figure 5.1), and is defined as:

> *The amalgamation of the extent of low level hydrocarbon exposure to the sea surface (1 g/m^2), entrained in the water column (10 ppb), dissolved in the water column (10 ppb), and contact to shorelines (10 g/m^2) as a result of a 70,489 bbl subsea release of gas condensate at the Yolla-A location (over 86 days), during annualised metocean conditions.*

This EMBA has been established through hydrocarbon spill modelling scenarios and results as provided in the above Section 7.15.2.3.

The receptors most at risk for a LoWC exposure and the BIAs include:

- Black-browed Albatross (Foraging in the South-east Marine Region).
- Bullers Albatross (Foraging in most of the South-east Marine Region).
- Campbell Albatross (Foraging in the South-east Marine Region including Macquarie Island).
- Common Diving-petrel (Foraging in buffer areas around Tasmania and Victoria).
- Indian Yellow-nosed Albatross (Foraging in most of the South-east Marine Region).
- Pygmy Blue Whale (Foraging in the majority of Bass Strait and coastal waters of Tasmania).
- Short-tailed Shearwater (Foraging in buffer areas around Tasmania including Bass Strait).
- Shy Albatross (Foraging likely in the South-east Marine Region).
- Southern Right Whale (Known core range in coastal waters between Sydney and Perth, including off Tasmania).
- Wandering Albatross (Foraging in the South-east Marine Region).
- White Shark (Distribution between the 60-120m depth contour, low density in Australian waters from Barrow Island/Montebello Islands, WA to Yeppoon/Swains Reef, Qld, and known distribution in Coastal/Shelf/Upper Slope waters out to 1000m depth contour).
- White-faced Storm-petrel (Foraging in buffer areas around the northern side of Tasmania into Bass Strait).

Specific receptors with high probabilities of exposure to entrained hydrocarbons:

- Southern Right Whale (Migration and resting on migration in Philip Island area to Wilsons Promontory, with 99-100% probability of exposure during summer and winter).
- White Shark (Foraging in waters off pinniped colonies throughout the Southeast Marine Region, with 96-98% probability of exposure during summer and winter). (Known distribution in

Coastal/Shelf/Upper Slope waters out to 1000m depth contour, with 100% probability of exposure during summer and winter).

- Pygmy Blue Whale (Distribution, foraging, and known foraging area, with 100% probability of exposure during summer and winter).
- Shy Albatross (Foraging likely in the South-east Marine Region, with 100% probability of exposure during summer and winter).

These receptors are exposed to floating oil, dissolved hydrocarbons, and entrained hydrocarbons at varying thresholds during both summer and winter conditions, making them most at risk during a LoWC event.

Socio-economic receptors within the EMBA are limited to waters of the EMBA. Given there is no predicted shoreline contact, there will be no impacts to beaches of the Gippsland coast. Key marine users and activities in these areas are:

- Commercial fishing
- Merchant shipping

Traditional Owners with cultural connections to these waters and species, particularly cetaceans which are strongly linked to cultural stories and values, may be impacted in the event of a LoWC.

7.15.4 Jurisdiction of Hazard

The jurisdictions for this hazard are outlined below.

Commonwealth waters	Victorian waters
YES	YES
The OSTM predicts that an 86-day release of Yolla condensate will contact Commonwealth waters.	The OSTM predicts that an 86-day release of Yolla condensate will not result in surface, shoreline, dissolved phase hydrocarbons or entrained hydrocarbons reaching Victorian state waters

7.15.5 Evaluation of Environmental Risks

7.15.5.1 Cultural values and sensitivities

Beach understands that First Nations people are linked to the marine environment and may be affected by a change in the environment. The potential impact of a LoWC event associated with the Yolla wells as modelled by RPS (2025) is described in Section 7.15.2.3. Although no long term or permanent changes to marine environment are expected it is considered that the visual presence of floating oil may impact Sea Country at a spiritual level (i.e. rituals, Songlines, culturally important species) and could affect culturally important activities such as mutton birding or affect culturally important species including whales. Visible shoreline hydrocarbons have the potential to reduce the visual amenity of Sea Country. Spill modelling by RPS (2025) indicates that condensate associated with a LoWC from the Yolla wells is not predicted to reach the shoreline.

The relatively low volume of in-water hydrocarbons means there may be short-term and localised consequences. Although no long-term or permanent changes to marine environment are expected the short-term contamination of Sea Country may result in impacts associated at a spiritual level (i.e. rituals, Songlines, culturally important species) and could affect culturally important activities such as mutton birding or affect culturally important species including eels and whales.

Any impacts are anticipated to be short-term and localised. The consequence to cultural values and sensitivities is assessed as **Major (4)** and likelihood as **Remote(A)**, and the residual risk is **Medium** and of an acceptable level.

Table 7.41 provides the criteria used to determine the sensitivity of receptors within the EMBA. The evaluation of environmental risks to these receptors and including fauna, marine parks and fisheries resulting from a LoWC is presented in Table 7.43, Table 7.44, Table 7.45, Table 7.46, Table 7.47, Table 7.48, Table 7.49,

Table 7.50 and Table 7.51.

As a result, the consequence is assessed as **Major (4)** and likelihood as **Remote (A)**, and the residual risk is **Medium** and of an acceptable level.

Table 7.41: Criteria used to determine receptor sensitivity in the EMBA.

Sensitivity	Protected areas	Species status	BIA	Coastal sensitivity	Receptors in the EMBA
Low	State - no marine protected areas. Cth - multiple use zones are the dominant component of the AMP.	Species not threatened (or limited to only a few species of a particular faunal grouping). Present in the EMBA only occasionally or as vagrants. Populations known to recover rapidly from disturbance.	No BIA (or limited to only a few species of a particular faunal grouping).	Low sensitivity habitat, such as fine-grained beaches, exposed wave-cut platform and exposed rocky shores, with rapid recovery from oiling (~ 1 year or less). Public recreation beaches not present or not widely used. No harbours or marinas.	Benthic assemblages. Plankton. Pelagic fish. Macroalgae. Sandy beaches. Rocky shores.
Medium	State – no marine protected area. Cth - little to no special purpose zonation.	Species may be threatened (or some species of a particular faunal grouping). Species may or may not be present at time of activity. Some susceptibility to oiling. Populations may take a moderate time to recover from oiling.	Some intersection with one or more BIAs, generally for distribution or foraging rather than breeding.	Moderately sensitive habitat present, such as sheltered rocky rubble coasts, exposed tidal flats, gravel beaches, mixed sand and gravel beaches, with a medium recovery period from oiling (~2-5 years). Public recreation beaches present but not often used. No harbours or marinas.	Marine reptiles.
High	State - marine protected area present. Cth - special purposes zones are the dominant component of the AMP.	Species are threatened (or most species of a particular faunal grouping). Species known to be present at time of activity. Known to be susceptible to oiling. Populations may take a long time to recover from oiling.	Significant intersection with one or more BIAs, particularly with regard to breeding or migration.	Sensitive habitat present, such as mangrove, salt marshes, and sheltered tidal flats, with long recovery periods from oiling (> 5 years). Public recreation beaches present that are widely used. Busy harbours or marinas.	Cetaceans. Pinnipeds. Seabirds. Shorebirds. Commercial fishing. Marine parks Cultural values and sensitivities

Table 7.42: Potential risks of LoWC on benthic fauna

General sensitivity to oiling – benthic fauna	
Sensitivity rating of benthic species and communities:	Low
A description of benthic fauna in the EMBA is provided in:	Section 5.6.1

Surface hydrocarbons

Benthic species are generally protected from exposure to surface hydrocarbon. The primary modes of exposure for benthic communities in oil spills include:

- Direct exposure to dispersed oil (e.g., physical smothering) where bottom discharges stay at the ocean bottom.
- Direct exposure to dispersed and non-dispersed oil (e.g., physical smothering) where oil sinks down from higher depths of the ocean.
- Direct exposure to dispersed and non-dispersed oil dissolved in sea water and/or partitioned onto sediment particles.
- Indirect exposure to dispersed and non-dispersed oil through the food web (e.g., uptake of oiled plankton, detritus, prey, etc.) (NRDA, 2012).

Adult marine invertebrates and larvae usually reside within benthic substrates and pelagic waters, rarely reaching the water's surface in their life cycle (to breed, breathe and feed). Therefore, surface hydrocarbons are not considered to pose a high risk to marine invertebrates and there is no surface oil predicted to reaches shorelines.

Acute or chronic exposure, through surface contact, and/or ingestion can result in toxicological risks. However, the presence of an exoskeleton (e.g., crustaceans) will reduce the impact of hydrocarbon absorption through the surface membrane. Other invertebrates with no exoskeleton and larval forms may be more prone to impacts from pelagic hydrocarbons.

Water column/seabed hydrocarbons

Entrained and dissolved hydrocarbons can have negative impacts on marine invertebrates and associated larval forms, while impacts to adult species is reduced as a result of the presence of an exoskeleton. Localised impacts to larval stages may occur which could impact on population recruitment that year. If invertebrates are contaminated by hydrocarbons, tissue taint can remain for several months, although taint may eventually be lost. For example, it has been demonstrated that it took 2-5 months for lobsters to lose their taint when exposed to a light hydrocarbon (NOAA, 2002).

Exposure to microscopic oil droplets may also impact aquatic biota either mechanically (especially filter feeders) or act as a conduit for exposure to semi-soluble hydrocarbons (that might be taken up by the gills or digestive tract) (McCay-French, 2009). Toxicity is primarily attributed to water soluble PAHs, specifically the substituted naphthalene (C_2 and C_3) as the higher C-ring compounds become insoluble and are not bioavailable. ANZG (2018) identifies the following 96-hr LC50 concentrations for naphthalene (a key primary PAH toxicant that acts via the dissolved phase in crude oils, particularly for benthic species that are exposed to contaminated porewater):

- For the bivalve mollusc, Katelysia opima: A 96-hour LC50 concentration of 57,000 ¬µg/L (which is equivalent to 57,000 ppb).
- For six species of marine crustaceans: A range of 48 to 96-hour LC50 concentrations between 850 and 5,700 µg/L (or ppb).

Other possible impacts from the presence of dispersed and non-dispersed oil include effects of oxygen depletion in bottom waters due to bacterial metabolism of oil (and/or dispersants), and light deprivation under surface oil (NRDA, 2012).

General sensitivity to oiling – benthic fauna

Surveys undertaken after the Montara well blowout in the Timor Sea in 2009 found no obvious visual signs of major disturbance at Barracouta and Vulcan shoals (Heyward *et al*., 2010), which occur about 20-30 m below the water line in otherwise deep waters (generally >150 m water depth). Later sampling indicated the presence of low-level severely degraded oil at some shoals, though in the absence of pre-impact data, this could not be directly linked to Montara spill. Levels of hydrocarbons in the sediments were, in any case, several orders of magnitude lower than levels at which biological effects become possible (Heyward *et al*., 2012; Gagnon & Rawson, 2011).

Studies undertaken since the Macondo well blowout in the Gulf of Mexico (GoM) in 2010 have shown that fewer than 2% of the more than 8,000 sediment samples collected exceeded the EPA sediment toxicity benchmark for aquatic life, and these were largely limited to the area close to the wellhead (BP, 2015).

Studies of offshore benthic seaweeds in the northwest GoM prior to and after the Macondo well blowout at Sackett and Ewing banks (in water depths of 55-75 m) found a dramatic die-off of seaweeds after the spill (60 species pre-spill compared with 10 species post-spill) (Felder et al., 2014). Benthic decapod assemblages (crabs, lobsters, prawns) associated with the seaweeds and benthic substrate also showed a strong decline in abundance at both banks post-spill (species richness on Ewing Bank reduced by 42% and on Sackett Bank by 29%), though it is noted that these banks are exposed to influences from Mississippi River discharges that vary year to year, so definitive links to the oil spill are not possible. It is noted, however, that petroleum residues were observed on Ewing Bank and it is possible that this may have caused localized mortalities, reduced the fecundity of surviving female decapods or reduced recruitment (Felder et al., 2014). Felder et al (2014) also notes that freshly caught soft-sediment decapod samples caught in early and mid-2011 near the spill site exhibited lesions that were severe enough to cause appendage loss and mortality.

Recovery of benthic habitats exposed to entrained hydrocarbons would be expected to return to background water quality conditions within weeks to months of contact. Several studies have indicated that rapid recovery rates may occur even in cases of heavy oiling (Committee on Oil in the Sea, 2003).

Potential risk form LOWC			
Sea Surface	Water column – dissolved phase	Water column – entrained phase	Shoreline
Not applicable	Maximum distance: 68 km (low threshold, winter). 100% probability of exposure for receptors within the Yolla Well Head area. The water column exposure depth for dissolved hydrocarbons during a LOWC is primarily assessed at 0-10 meters below the sea surface.	Limited, with a maximum distance of 3 km at the low threshold (1–10 g/m^2). No moderate or high exposure zones predicted.	There is no shoreline contact from LOWDI.
At this low threshold, the risks of toxic or sub- lethal impacts to benthic fauna or habitats are **Low**.			

Table 7.43: Potential risks of LoWC on macroalgal communities

General sensitivity to oiling – macroalgal communities	
Sensitivity rating of macroalgal communities:	Low
A description of macroalgal communities in the EMBA is provided in:	Section 5.6.3

Macroalgae are generally limited to growing on intertidal and subtidal rocky substrata in shallow waters to 10 m depth. As such, they may be exposed to subsurface, entrained, and dissolved hydrocarbons; however, they are more susceptible to surface hydrocarbon exposure, particularly in intertidal habitats.

Smothering, fouling and asphyxiation are some of the physical effects that have been documented from oil contamination in marine plants (Blumer, 1971; Cintron et al., 1981). In macroalgae, oil can act as a physical barrier for the diffusion of CO2 across cell walls (O'Brian & Dixon, 1976). The effect of hydrocarbons, however, is largely dependent on the degree of direct exposure and how much of the hydrocarbon adheres to algae, which will vary depending on the oil's physical state and relative 'stickiness. The morphological features of macroalgae, such as the presence of a mucilage layer or the presence of fine 'hairs' will influence the amount of hydrocarbon that will adhere to the algae. A review of field studies conducted after spill events by Connell et al. (1981) indicated a high degree of variability in the level of impact, but in all instances, the algae appeared to recover rapidly from even very heavy oiling. The rapid recovery of algae was attributed to the fact that for most algae, new growth is produced from near the base of the plant, while the distal parts (which would be exposed to the oil contamination) are continually lost. Other studies have indicated that oiled kelp beds recovered to 90% within 3-4 years of the impact; however, full recovery to pre-spill diversity may not occur for long periods after the spill (French-McCay, 2004).

Intertidal macroalgal beds are more prone to oil spills than subtidal beds because, although the mucous coating prevents oil adherence, oil that is trapped in the upper canopy can increase the persistence of the oil, which impacts site-attached species. Additionally, when oil sticks to dry fronds on the shore, they can become overloaded and break due to wave action (IPIECA, 2002).

The toxicity of macroalgae to hydrocarbons varies for the different macroalgal life stages, with water-soluble hydrocarbons more toxic to macroalgae (Van Overbeek & Blondeau, 1954; Kauss et al., 1973; cited in O'Brien and Dixon, 1976). Toxic effect concentrations for hydrocarbons and algae have varied greatly among species and studies, ranging 0.002–10,000 ppm (Lewis & Pryor, 2013). The sensitivity of gametes, larva and zygote stages, however, has all proven more responsive to petroleum oil exposure than adult growth stages (Thursby & Steele, 2003; Lewis & Pryor, 2013).

Macrophytes, including seagrasses and macroalgae, require light to photosynthesise. In addition to the potential impacts from direct smothering or exposure to entrained and dissolved hydrocarbons, the presence of entrained hydrocarbons in the water column can affect light quality and the ability of macrophytes to photosynthesise.

Potential risk form LOWC			
Sea Surface	Water column – dissolved phase	Water column – entrained phase	Shoreline
Floating vegetation in central Bass Strait may be exposed to low concentrations of hydrocarbons at the sea surface.	Dissolved hydrocarbons in the water column, particularly in the 0–10 m depth layer, can potentially impact macralgae due to their bioavailability and toxicity. Macroalgae may be exposed to hydrocarbons through direct contact or	Limited, with a maximum distance of 3 km at the low threshold (1–10 g/m^2). No moderate or high exposure zones predicted.	There is no shoreline contact from LOWC.

General sensitivity to oiling – macroalgal communities	
	absorption, which could affect their growth and health.
The nature of the spill in this scenario (occurring in central Bass Strait water ~60-80 m deep) means the risk to macroalgal communities is **Low**.	

Table 7.44: Potential risk of LoWC on plankton

General sensitivity to oiling – plankton	
Sensitivity rating of plankton	Low
A description of plankton in the EMBA is provided in:	Section 5.6.2

Plankton is found in nearshore and open waters beneath the surface in the water column. These organisms migrate vertically through the water column to feed in surface waters at night (NRDA, 2012). As they move close to the sea surface it is possible that they may be exposed to both surface hydrocarbons but to a greater extent, hydrocarbons dissolved or entrained in the water column.

Phytoplankton is typically not sensitive to oil impacts, though they can accumulate oil rapidly due to their small size and high surface area-to-volume ratio (Hook et al., 2016). If phytoplankton are exposed to hydrocarbons at the sea surface, this may directly affect their photosynthetic ability and have implications for the next trophic level in the food chain (e.g., small fish) (Hook et al., 2016). In addition, the presence of surface hydrocarbons may result in a reduction of light penetrating the water column, which could affect the rate of photosynthesis for phytoplankton in instances where there is prolonged presence of surface hydrocarbons over an extensive area such that the phytoplankton was restricted from exposure to light. Oil can affect the rate of photosynthesis and inhibit phytoplankton growth, depending on its concentration. For example, photosynthesis is stimulated by low concentrations of oil in the water column (10-30 ppb), but becomes progressively inhibited above 50 ppb. Conversely, photosynthesis can be stimulated at levels below 100 ppb in response to weathered oil (Volkman et al., 2004).

Zooplankton (microscopic animals such as rotifers, copepods and krill that feed on phytoplankton) are vulnerable to hydrocarbons due to their small size and high surface area to volume ratio, along with (in many cases) their high lipid content (that facilitates hydrocarbon uptake) (Hook et al., 2016). Water column organisms that come into contact with oil risk exposure through ingestion, inhalation and dermal contact (NRDA, 2012), which can cause immediate mortality or declines in egg production and hatching rates along with a decline in swimming speeds (Hook et al., 2016).

Plankton is generally abundant in the upper layers of the water column and acts as the basis for the marine food web, meaning that an MDO spill in any one location is unlikely to have long-lasting impacts on plankton populations at a regional level. Variations in the temporal scale of oceanographic processes typical of the ecosystem have a greater influence on plankton communities than the direct effect of spilt hydrocarbons. This is because reproduction by survivors or migration from unaffected areas would likely rapidly replenish any losses of permanent zooplankton (Volkman et al., 2004).

Field observations from oil spills show minimal or transient effects on marine plankton (Volkman et al., 2004). Once background water quality conditions have re-established, the plankton community will take weeks to months to recover (ITOPF, 2011a), allowing for seasonal influences on the assemblage characteristics.

Potential risk form LOWC

General sensitivity to oiling – plankton			
Sea Surface	Water column – dissolved phase	Water column – entrained phase	Shoreline
Plankton found in open water of the EMBA is expected to be widely represented within waters of the wider Bass Strait region.	Dissolved hydrocarbons in the water column could reach maximum distances of 68.01 km (low threshold of 10 ppb) and 59.68 km (moderate threshold of 50 ppb) during winter conditions. Plankton in the upper water column is likely to be directly (e.g., through smothering and ingestion) and indirectly (e.g., toxicity from decrease in water quality and bioaccumulation). Once background water quality conditions are rapidly re-established following the natural weathering and dispersion of the hydrocarbons, plankton populations are expected to recover rapidly due to recruitment of plankton from surrounding waters.	Plankton, typically inhabiting the upper layers of the water column, are likely to be exposed to entrained hydrocarbons in the 0–10 m depth layer. No moderate or high exposure zones predicted.	There is no shoreline contact from LOWC.
The risk of hydrocarbon spills on plankton populations is considered **Low**.			

Table 7.45: Potential risk of LoWC on pelagic fish

General sensitivity to oiling – pelagic fish	
Sensitivity rating of pelagic fish	Low
A description of pelagic fish in the EMBA is provided in:	Section 5.6.7
The behaviours and habitat preferences of fish species determine their potential for exposure to hydrocarbons and the resulting impacts. Demersal species may be susceptible to oiled sediments, particularly site-restricted species. Pelagic species that occupy the water column are more susceptible to entrained and dissolved hydrocarbons; however, generally these species are highly mobile and, as such, are not likely to suffer extended exposure due to their patterns of movement. The exception would be in areas such as reefs and other seabed features, where species are less likely to move into open waters (i.e., they are site-attached). Fish are exposed to hydrocarbon droplets through a variety of pathways, including: • Direct dermal contact (e.g., swimming through oil or waters with elevated dissolved hydrocarbon concentrations and other constituents, with diffusion across their gills (Hook et al., 2016)); • Ingestion (e.g., directly or via food base, fish that have recently ingested contaminated prey may themselves be a source of contamination for their predators); and	

General sensitivity to oiling – pelagic fish

- Inhalation (e.g., elevated dissolved contaminant concentrations in water passing over the gills).

Exposure to hydrocarbons at the surface or entrained or dissolved in the water column can be toxic to fish. Studies have shown a range of impacts including changes in abundance, decreased size, inhibited swimming ability, changes to oxygen consumption and respiration, changes to reproduction, immune system responses, DNA damage, visible skin and organ lesions, and increased parasitism. However, many fish species can metabolise toxic hydrocarbons, which reduces the risk of bioaccumulation of contaminants in the food web (and human exposure to contaminants through the consumption of seafood) (NRDA, 2012).

Sub-lethal impacts in adult fish include altered heart and respiratory rates, gill hyperplasia, enlarged liver, reduced growth, fin erosion, impaired endocrine systems, behavioural modifications and alterations in feeding, migration, reproduction, swimming, schooling and burrowing behaviour (Kennish, 1996). However, fish are high mobile and unlikely to remain in the area of a spill for long enough to be exposed to sub-lethal doses of hydrocarbons.

Fish are most vulnerable to hydrocarbon discharges during their embryonic, larval and juvenile life stages. Eggs and larvae of many fish species are highly sensitive to oil exposure, resulting in decreased spawning success and abnormal larval development (see Table 7.33 'Plankton').

Since fish and sharks do not generally break the sea surface, the impacts of surface hydrocarbons to fish and shark species are unlikely to occur. Near the sea surface, fish are able to detect and avoid contact with surface slicks meaning fish mortalities rarely occur in the event of a hydrocarbon spill in open waters (Volkman et al., 2004). As a result, wide-ranging pelagic fish of the open ocean generally are not highly susceptible to impacts from surface hydrocarbons. Adult fish kills reported after oil spills occur mainly to shallow water, near-shore benthic species (Volkman et al., 2004).

Hydrocarbon in the water column can physically affect reef fish (that have high site fidelity and cannot move out of harm's way) exposed for an extended duration (weeks to months) by coating of gills, leading to lethal and sub-lethal effects from reduced oxygen exchange and coating of body surfaces that may lead to increased incidence of irritation and infection. Fish may also ingest hydrocarbon droplets or contaminated food, leading to reduced growth (Volkman et al., 2004).

The threshold value for species toxicity in the water column is based on global data from French et al. (1999) and French-McCay (2002, 2003), which showed that species sensitivity (fish and invertebrates) to dissolved aromatics exposure >4 days (96-hour LC50) under different environmental conditions varied from 6 to 400 µg/L (ppb), with an average of 50 ppb. This range covered 95% of aquatic organisms tested, which included species during sensitive life stages (eggs and larvae). Based on scientific literature, a minimum threshold of 6 ppb over 96 hours or equivalent was used to assess in-water low exposure zones, respectively (Engelhardt, 1983; Clark, 1984; Geraci and St Aubin, 1988; Jenssen, 1994; Tsvetnenko, 1998). French-McCay (2002) indicates that an average 96-hour LC50 of 50 ppb and 400 ppb could serve as an acute lethal threshold to 50% and 97.5% to biota, respectively.

Studies of oil impacts on bony fishes report that light, volatile oils are likely to be more toxic to fish. Many studies conclude that exposure to PAHs and soluble compounds are responsible for the majority of toxic impacts observed in fish (e.g., Carls et al., 2008; Ramachandran et al., 2004). A range of lethal and sub-lethal effects to fish in the larval stage has been reported at water- accommodated fraction (WAF) hydrocarbon concentrations (48–hour and 96-hour exposures) of 0.001 to 0.018 ppm during laboratory exposures (Carls et al., 2008; Gala, 2001). In contrast, wave tank exposures reported much higher lethal concentrations (14-day LC50) up to 1.9 ppm for herring embryos and up to 4.3 ppm for juvenile cod (Lee et al., 2011).

Toxicity in adult fish has been reported in response to crude oils, HFO, and diesel (Holdway, 2002; Shigenaka, 2011). Uptake of hydrocarbons has been demonstrated in bony fish after exposure to WAF of between 24 and 48 hours. Danion et al. (2011) observed PAH uptake of 148 µg/kg-1 after 48 hours of exposure to PAH from Arabian Crude at a high concentration of 770 ppm. Davis et al (2002) report detectable tainting of fish flesh after a 24-hour exposure at crude concentrations of 0.1 ppm, marine fuel oil concentrations of 0.33 ppm, and diesel concentrations of 0.25 ppm. The majority of studies, either from laboratory trials or of fish collected after spill events (including the

General sensitivity to oiling – pelagic fish

Hebei Spirit, Macondo, and Sea Empress spills) find evidence of elimination of PAHs in fish tissues returning to reference levels within two months of exposure (Challenger and Mauseth, 2011; Davis et al., 2002; Gagnon & Rawson, 2011; Gohlke et al., 2011; Jung, 2011; Law, 1997; Rawson et al., 2011).

During most of their lives, squid are widely distributed; however, when squid reach maturity at 1-2 years, they move inshore to spawn in large numbers and then die after spawning. Where large numbers of squid spawn in small areas, the population could be impacted by the reduction in successful spawns. As squid are generally abundant and reach sexual maturity rapidly, recovery is expected to be rapid (1-2 years) (Minerals Management Service, 1983).

The toxicity of dissolved hydrocarbons and dispersed oil to fish species has been the subject of numerous laboratory studies (AMSA, 1998). Generally, concentrations of dispersed oil in the range of 0.1–0.4 mg/L have been shown to cause fish deaths in laboratory experiments (96-hour LC50). No reported studies of the impacts of oil spills on cartilaginous fish (including sharks, rays, and sawfish) were found in the literature. It is not known how the data on the sensitivity of bony fishes would relate to toxicity in cartilaginous fishes.

The assessment of effects on fish species in the Timor Sea as a result of the Montara well blowout (a light gas condensate), conducted from November 2009 to November 2010 undertaken by Gagnon & Rawson (2011), found that of the species studied (mostly goldband snapper Pristipomoides multidens, red emperor Lutjanus sebae, rainbow runner Elegatis bipinnulata and Spanish mackerel Scomberomorus commerson), all 781 specimens were in good physical health at all sites. Results show that:

- Phase 1 study (November 2009, immediately after the blowout ceased) - indicated that in the short-term, fish were exposed to and metabolised petroleum hydrocarbons, however no consistent adverse effects on fish health or their reproductive activity were detected.
- Phase 2 study (March 2010, 5 months after the blowout ceased) – indicated continuing exposure to petroleum hydrocarbons, as detected by elevated liver detoxification enzymes and PAH biliary metabolites in three out of four species collected close to the MODU, and elevated oxidative DNA damage.
- Phase 3 study (November 2010, 12 months after the blowout ceased) – showed a trend towards a return to reference levels with often, but not always, comparable biomarker levels in fish collected from reference and impacted sites. This evidence of exposure to petroleum hydrocarbons at sites close to the spill location suggest an ongoing trend toward a return to normal biochemistry/physiology (Gagnon & Rawson, 2011).

The main finding of the Gagnon & Rawson (2011) study concluded that there were no detectable petroleum hydrocarbons found in the fish muscle samples, limited ill effects were detected in a small number of individual fish, and no consistent adverse effects of exposure on fish health could be detected within two weeks following the end of the well release. Notwithstanding, fish collected near the Montara well, seven months after discharge began, showed continued exposure to hydrocarbons as indicated by biomarker responses. Two years after the discharge, biomarker levels in fish had mostly returned to reference levels, except for liver size. However, this was potentially attributed to local nutrient enrichment or to past exposure to hydrocarbons. Fishes near Heyward Shoal, approximately 100 km southwest of the Montara well, had elevated biomarker responses indicating exposure to hydrocarbons, but were collected close to the Cornea natural hydrocarbon seep. Studies on the Montara discharge have shown recovery in terms of fish abundance and composition, as well as in toxicological and physiological responses.

Potential risk form LOWC			
Sea Surface	Water column – dissolved phase	Water column – entrained phase	Shoreline
Because the majority of fish tend to remain in the mid-pelagic zone, they are not likely to come into	The maximum extent of exposure for the area affected by dissolved hydrocarbons at the low threshold is a distance of 68.01 km (southeast, winter).	The maximum extent of exposure for the area affected by entrained hydrocarbons at the low threshold is a distance of 552.25 km (northeast, winter). No moderate or high exposure zones predicted.	There is no shoreline contact from LOWC.

General sensitivity to oiling – pelagic fish		
contact with the modelled exposure of low sea surface hydrocarbons. Some syngnathid species associated with rafts of floating seaweed may come into contact with surface oil though the low concentration of hydrocarbons is not sufficient to cause long-term harm to these populations.	Fish exposed to hydrocarbons at this concentration for an extended period may experience sub-lethal or toxic effects. However, hydrocarbons at this threshold do not reach sensitive sites, such as AMPs, coastal marine parks or state waters. Given the highly mobile nature of fish likely to be present in this EMBA (i.e., an absence of site-attached species), significant impacts to pelagic fish from dissolved hydrocarbons are not expected.	
The sea surface area affected by the hydrocarbon release scenario represents a very small percentage of the broader Bass Strait area, and NOAA (2013) and ITOPF (2011a) state that hydrocarbon spills in open water (such as those in Bass Strait) are rapidly diluted, so fish kills are rarely observed. and, when combined with the low hydrocarbon levels in this scenario, the risk to pelagic fish species at the population level is considered **Low**.		

Table 7.46: Potential risk of LoWC on cetaceans

General sensitivity to oiling – cetaceans	
Sensitivity rating of cetaceans	High
A description of cetaceans in the EMBA is provided in:	Section 5.6.5

Whales and dolphins can be exposed to the chemicals in oil through:

- Internal exposure by consuming oil or contaminated prey;
- Inhaling volatile oil compounds when surfacing to breathe;
- Dermal contact, by swimming in oil and having oil directly on the skin and body; and
- Maternal transfer of contaminants to embryos (NRDA, 2012; Hook et al., 2016).

The effects of this exposure include:

- Hypothermia due to conductance changes in skin, resulting in metabolic shock (expected to be more problematic for non-cetaceans in colder waters).
- Toxic effects and secondary organ dysfunction due to ingestion of oil.

General sensitivity to oiling – cetaceans

- Congested lungs.
- Damaged airways.
- Interstitial emphysema due to inhalation of oil droplets and vapour.
- Gastrointestinal ulceration and haemorrhaging due to ingestion of oil during grooming and feeding.
- Eye and skin lesions from continuous exposure to oil.
- Decreased body mass due to restricted diet.
- Stress due to oil exposure and behavioural changes.

French-McCay (2009) identifies that a 10-25 µm oil thickness threshold has the potential to impart a lethal dose on marine species, however also estimates a probability of 0.1% mortality to cetaceans if they encounter these thresholds based on the proportion of the time spent at surface. Direct surface oil contact with hydrocarbons is considered to have little deleterious effect on whales, possibly due to the skin's effectiveness as a barrier to toxicity, and effect of oil on cetacean skin is probably minor and temporary (Geraci & St Aubin, 1988). Cetaceans in particular have mostly smooth skins with limited areas of pelage (hair covered skin) or rough surfaces such as barnacled skin. Oil tends to adhere to rough surfaces, hair or calluses of animals, so contact with hydrocarbons by whales and dolphins may cause only minor hydrocarbon adherence.

The physical impacts from ingested hydrocarbon with subsequent lethal or sub-lethal impacts are both applicable to entrained oil. However, the susceptibility of cetaceans varies with feeding habits. Baleen whales (such as blue, southern right and humpback whales) are not particularly susceptible to ingestion of oil in the water column, but are susceptible to oil at the sea surface as they feed by skimming the surface. Oil may stick to the baleen while they 'filter feed' near slicks. Sticky, tar-like residues are particularly likely to foul the baleen plates.

The inhalation of oil droplets, vapours and fumes is a distinct possibility if whales surface in slicks to breathe. Exposure to hydrocarbons in this way could damage mucous membranes, damage airways or even cause death.

Toothed whales and dolphins may be susceptible to ingestion of dissolved and entrained oil as they gulp feed at depth. There are reports of declines in the health of individual pods of killer whales (a toothed whale species), though not the population as a whole, in Prince William Sound after the Exxon Valdez vessel spill (heavy oil) (Hook et al., 2016 It has been stated that pelagic species will avoid hydrocarbon, mainly because of its noxious odours, but this has not been proven. The strong attraction to specific areas for breeding or feeding (e.g., use of the Warrnambool coastline as a nursery area for southern right whales) may override any tendency for cetaceans to avoid the noxious presence of hydrocarbons. So weathered or tar-like oil residues can still present a problem by fouling baleen whales feeding systems.

Dolphin populations from Barataria Bay, Louisianna, USA, which were exposed to prolonged and continuous oiling from the Macondo oil spill in 2010, had higher incidences of lung and kidney disease than those in the other urbanised environments (Hook et al., 2016). The spill may have also contributed to unusually high perinatal mortality in bottlenose dolphins (Hook et al., 2016).

As highly mobile species, in general it is very unlikely that cetaceans will be constantly exposed to concentrations of hydrocarbons in the water column for continuous durations (e.g., >96 hours) that would lead to chronic toxicity effects.

Potential risk form LOWC			
Sea Surface	Water column – dissolved phase	Water column – entrained phase	Shoreline

General sensitivity to oiling – cetaceans			
The OSTM shows that low zones of exposure to sea surface hydrocarbon will overlap the foraging and distribution BIAs for pygmy blue whales. The maximum residence time for low threshold exposure is 26.25 hr (summer) and up to 59.25 hr (winter). The probability of exposure is; • Pygmy Blue Whale foraging (Bass Strait and coastal waters of Tasmania): 100% probability at low and moderate thresholds. • Southern Right Whale migration and resting on migration (Philip Island area to Wilsons Promontory): 100% probability at **low** threshold. Cetaceans foraging in these BIAs, particularly Pygmy Blue Whales and Southern Right Whales, face high probabilities of exposure to hydrocarbons during both summer and winter conditions. The exposure is immediate, with minimum times as low as 0.01 days, and can persist for extended periods, depending on the concentration and season.	The OSTM shows a large area of dissolved and entrained phase hydrocarbons at low threshold would occur through central Bass Strait. At the low threshold, water quality triggers are exceeded. The extent of area affected by the dissolved hydrocarbons at the moderate threshold is up to 68.01 km from the well site. Highly mobile and transient species such as cetaceans moving through an area of hydrocarbons at the moderate or high exposure makes it unlikely that individual cetaceans would experience any toxicity effects of the oil nor would population level impacts be likely. The area potentially impacted by dissolved hydrocarbons at the moderate threshold and entrained hydrocarbons at the high threshold is a very small area of cetacean BIAs, so the risk of impacting on the health of a population is negligible. The well-mixed waters of central Bass Strait are likely to assist in weathering of the hydrocarbons (non-persistent condensate). The low concentration of hydrocarbons in the water column means the risk to cetaceans populations is **low**.	The maximum extent of exposure for the area affected by entrained hydrocarbons at the low threshold is a distance of 552.25 km (northeast, winter). Under variable wind conditions (1–12 knots or 1.9–23 m/s), 89.4% of the condensate is forecast to evaporate within 24 HOURS, with an additional 9.3% entrained into the water column. This indicates that the majority of the condensate evaporates within the first day, leaving only a small proportion of oil floating on the water surface. Assessment of the risk to cetaceans' population is **low.**	There is no shoreline contact from LOWC.
It is possible that pygmy blue whales may be present in the EMBA depending on the time of year that the spill occurs. If present, these species (and other cetaceans) may be exposed to oil in the manner described in this table. If large quantities of zooplankton (key prey species, though unlikely to occur in such proximity to the shoreline) exposed to the spill were ingested, chronic toxicity impacts may occur.			

Table 7.47: Potential risk of LoWC on pinnipeds

General sensitivity to oiling – pinnipeds	
Sensitivity rating of pinnipeds	High

General sensitivity to oiling – pinnipeds

A description of pinnipeds in the EMBA is provided in: Section 5.6.6

Pinnipeds (Australian fur-seal and New Zealand fur-seal) are potentially impacted by hydrocarbons at the sea surface, water column and shoreline. Sea surface oil

Pinnipeds are vulnerable to sea surface exposures given they spend much of their time on or near the surface of the water, as they need to surface every few minutes to breathe and regularly haul out on to beaches. Pinnipeds are also sensitive as they will stay near established colonies and haul-out areas, meaning they are less likely to practice avoidance behaviours. This is corroborated by Geraci and St. Aubins (1988) who suggest seals, sea-lions and fur-seals have been observed swimming in oil slicks during a number of documented spills.

Exposure to surface oil can result in skin and eye irritations and disruptions to thermal regulation. As a result of exposure to surface oils, pinnipeds, with their relatively large, protruding eyes are particularly vulnerable to effects such as irritation to mucous membranes that surround the eyes and line the oral cavity, respiratory surfaces, and anal and urogenital orifices. Hook *et al* (2016) reports that seals appear not to be very sensitive to contact with oil, but instead to the toxic impacts from the inhalation of volatile components.

For some pinnipeds, fur is an effective thermal barrier because it traps air and repels water. Petroleum stuck to fur reduces its insulative value by removing natural oils that waterproof the pelage. Consequently, the rate of heat transfer through fur seal pelts can double after oiling (Geraci & St. Aubin, 1988), adding an energetic burden to the animal. Kooyman et al (1976) suggest that in fact, fouling of approximately one-third of the body surface resulted in 50% greater heat loss in fur seals immersed in water at various temperatures. Fur-seals are particularly vulnerable due to the likelihood of oil adhering to fur. Heavy oil coating and tar deposits on fur-seals may result in reduced swimming ability and lack of mobility out of the water. Davis and Anderson (1976) observed two gray seal pups drowning, their "flippers stuck to the sides of their bodies such that they were unable to swim".

However, pinnipeds other than fur-seals are less threatened by thermal effects of fouling, if at all. Oil has no effect on the relatively poor insulative capacity of sea-lion and bearded and ringed seal pelts; oiled Weddell seal samples show some increase in conductance (Oritsland, 1975; Kooyman *et al*., 1976; 1977).

In-water oil

Ingested hydrocarbons can irritate or destroy epithelial cells that line the stomach and intestine, thereby affecting motility, digestion and absorption. However, pinnipeds have been found to have the enzyme systems necessary to convert absorbed hydrocarbons into polar metabolites, which can be excreted in urine (Engelhardt, 1982; Addison & Brodie, 1984; Addison *et al*., 1986). Geraci & St. Aubin (1988) suggest that a small phocid weighing 50 kg might have to ingest approximately 1 litre of oil to be at risk.

Volkman et al (1994) report that benzene and naphthalene ingested by seals is quickly absorbed into the blood through the gut, causing acute stress, with damage to the liver considered likely. If ingested in large volumes, hydrocarbons may not be completely metabolised, which may result in death.

Shoreline oil

Breeding colonies (used to birth and nurse until pups are weaned) are particularly sensitive to hydrocarbon spills (Higgins & Gass, 1993). Pinnipeds are further at risk because of their tendency to stay near established colonies and haul-out areas and consequently are unlikely to practice oil avoidance behaviours.

ITOPF (2011a) report that species that rely on fur to regulate their body temperature (such as fur-seals) are the most vulnerable to oil as the animals may die from hypothermia or overheating, depending on the season, if the fur becomes matted with oil.

It is reported that most pinnipeds scratch themselves vigorously with their flippers and do not lick or groom themselves, so are less likely to ingest oil from skin surfaces (Geraci & St. Aubin, 1988). However, mothers trying to clean an oiled pup may ingest oil. All pinnipeds examined to date have the enzyme systems necessary to convert absorbed hydrocarbons into polar metabolites, which can be excreted in urine (Engelhardt, 1982; Addison and Brodie, 1984; Addison et al., 1986).

General sensitivity to oiling – pinnipeds
The long-term Environmental Impact and Recovery report for the Iron Barren oil spill (in Tasmania, 1995) concluded that "The number of seal pups born at Tenth Island in 1995 was reduced when compared to previous years. There was a strong relationship between the productivity of the seal colonies and the proximity of the islands to the oil spill wherein the islands close to the spill showed reduced pup production and those islands more distant to the oil spill did not" (Tasmanian SMPC, 1999). Pinnipeds are further at risk because they appear to rely on scent to establish a mother-pup bond (Sandegren, 1970; Fogden, 1971), and consequently oil-coated pups may not be recognisable to their mothers. This is only theorised, with studies and research indicating interaction between mothers and oiled pups were normal (Davis and Anderson, 1976; Davies, 1949; Shaughnessy & Chapman, 1984). Australian sea-lions have 'naturally poor recovery abilities' due to 'unusual reproductive biology and life history' (TSSC, 2005). Due to the extreme philopatry of females and limited dispersal of males between breeding colonies, the removal of only a few individuals annually may increase the likelihood of decline and potentially lead to the extinction of some of the smaller colonies. Extinction of breeding colonies has the potential to further reduce genetic diversity and the already limited genetic flow between colonies. This, in turn, may weaken the genetic resilience of the species and impact on its ability to cope with other natural or anthropogenic impacts. In addition, the extreme philopatry of females suggests that extinction of breeding colonies may lead to a contraction of the range of the species as re-colonisation of breeding sites via immigration is limited. For the reasons outlined above, small breeding colonies are under particular pressure of survival from even low levels of anthropogenic mortality.

Potential risk form LOWC			
Sea Surface	Water column – dissolved phase	Water column – entrained phase	Shoreline
The foraging range for New Zealand fur-seals and Australian fur-seals may be temporarily exposed to low concentration of hydrocarbons at the sea surface. As fur-seals forage for prey within the water column rather than at the sea surface, exposure to oil at the sea surface will only result when resting at the surface. The EMBA for a LoWC does not reach shorelines where seals are likely to be entering and exiting the water. Depending on the duration of time spent at the sea surface, exposure may result in irritation to mucous membranes that surround the eyes and line the oral cavity, respiratory surfaces, and anal and urogenital orifices. Given the very small area of	The OSTM shows a large area of dissolved and entrained phase hydrocarbons at low threshold would occur through central Bass Strait. At the low threshold, water quality triggers are exceeded. The extent of area affected by the dissolved hydrocarbons at the moderate threshold is up to 68.01 km from the well site. Given that fur-seals forage for prey within the water column, exposure to hydrocarbons (either via ingestion of contaminated prey or direct contact with oil droplets) may occur, however the low concentrations modelled are below those likely to impart permanent injury or mortality to pinniped populations in Bass Strait. The zones of dissolved hydrocarbons meeting the moderate threshold and entrained hydrocarbons meeting the high threshold are small in	The maximum extent of exposure for the area affected by entrained hydrocarbons at the low threshold is a distance of 552.25 km (northeast, winter). Under variable wind conditions (1–12 knots or 1.9–23 m/s), 89.4% of the condensate is forecast to evaporate within 24 hours with an additional 9.3% entrained into the water column. This indicates that the majority of the condensate evaporates within the first day, leaving only a small proportion of oil floating on the water surface. Assessment of the risk to pinnipeds population is **low.**	There is no shoreline contact from LOWC.

General sensitivity to oiling – pinnipeds	
moderate exposure oil threshold at the sea surface, and absence of high exposure, acute or chronic toxicity impacts are not likely for multiple individuals. The highly mobile nature of the pinniped species likely to be present means areas on the sea surface impacted by low hydrocarbon exposure can be avoided.	comparison to the wider area available to pinnipeds for foraging, and these zones are not located close to breeding or haul-out sites. This means there is a low probability that pinnipeds would be feeding exclusively on prey found in these areas of higher hydrocarbon thresholds for long periods of time.
Given the generally brief time spent at the sea surface by pinnipeds and the rapid weathering of the condensate, the risk of permanent injury or mortality to multiple individuals that could impact on the populations present in Bass Strait is **low**.	The area potentially affected by hydrocarbons represents a very small area in which fur-seals are known to forage in Bass Strait and is unlikely to be habitat critical to their survival. The risk to fur-seals for hydrocarbons in the water column is therefore considered to be **low**.

Table 7.48: Potential risk of LoWC on marine reptiles

General sensitivity to oiling – marine reptiles	
Sensitivity rating of marine reptiles	Medium
A description of marine reptiles in the EMBA is provided in:	Section 5.6.8

Marine reptiles can be exposed to hydrocarbon through ingestion of contaminated prey, inhalation or dermal exposure (Hook *et al.*, 2016).

Sea turtles are vulnerable to the effects of oil at all life stages—eggs, post-hatchlings, juveniles, and adults in nearshore waters. Several aspects of sea turtle biology and behaviour place them at particular risk, including a lack of avoidance behaviour, indiscriminate feeding in convergence zones, and large pre-dive inhalations. Effects of oil on turtles include increased egg mortality and developmental defects, direct mortality due to oiling in hatchlings, juveniles, and adults; and negative impacts to the skin, blood, digestive and immune systems, and salt glands. Oil exposure affects different turtle life stages in different ways. Each turtle life stage frequents a habitat with notable potential to be impacted during an oil spill. Thus, information on oil toxicity needs to be organized by life stage. Turtles may be exposed to chemicals in oil in two ways:

7. Internally – eating or swallowing oil, consuming prey containing oil-based chemicals, or inhaling of volatile oil related compounds; and
8. Externally – swimming in oil or dispersants, or oil or dispersants on skin and body.

Records of oiled wildlife during spills rarely include marine turtles, even from areas where they are known to be relatively abundant (Short, 2011). An exception to this was the large number of marine turtles collected (613 dead and 536 live) during the Macondo spill in the GoM, although many of these animals did not show any sign of oil exposure (NOAA, 2013). Of the dead turtles found, 3.4% were visibly oiled and 85% of the live turtles found were oiled (NOAA, 2013). Of the captured animals, 88% of the live turtles were later released, suggesting that oiling does not inevitably lead to mortality.

General sensitivity to oiling – marine reptiles			
Impacts to sea snakes during marine hydrocarbon spills are known from limited assessments, undertaken following the Montara spill in the Timor Sea in 2009. Two dead sea snakes were collected during the incident, one of which was concluded to have died as a result of exposure to the oil, with evidence of inhaled and ingested oil and elevated concentrations of PAHs in muscle tissues. The second snake showed evidence of ingestion by oil but no accumulation in tissues or damage to internal organs and it was concluded that the oil was unlikely to be the cause of death (Curtin University, 2009; 2010). There is potential for contamination of turtle eggs to result in similar toxic impacts to developing embryos as has been observed in birds. Studies on freshwater snapping turtles showed uptake of PAHs from contaminated nest sediments, but no impacts on hatching success or juvenile health following exposure of eggs to dispersed weathered light crude (Rowe *et al.*, 2009). However, other studies found evidence that exposure of freshwater turtle embryos to PAHs results in deformities (Bell *et al.*, 2006, Van Meter *et al.*, 2006). Turtles may experience oiling impacts on nesting beaches and eggs through chemical exposure, resulting in decreased survival to hatching and developmental defects in hatchlings. Turtle hatchlings may be more vulnerable to smothering as they emerge from the nests and make their way over the intertidal area to the open water (AMSA, 2015). Hatchlings that contact oil residues while crossing a beach can exhibit a range of effects including impaired movement and bodily functions (Shigenaka, 2003). Hatchlings sticky with oily residues may also have more difficulty crawling and swimming, rendering them more vulnerable to predation. Ingested oil may cause harm to the internal organs of turtles. Oil covering their bodies may interfere with breathing because they inhale large volumes of air to dive. Oil can enter cavities such as the eyes, nostrils, or mouth. Turtles may experience oiling impacts on nesting beaches when they come ashore to lay their eggs, and their eggs may be exposed during incubation, potentially resulting in increased egg mortality and/or possibly developmental defects in hatchlings.			
Potential risk form LOWC			
Sea Surface	Water column – dissolved phase	Water column – entrained phase	Shoreline
Some individual transient marine reptiles may come into contact with low hydrocarbon exposure on the sea surface and very localised areas of moderate hydrocarbon exposure. This may result in irritation of skin or cavities. Specifically, the marine environment is habitat critical to turtles, however, due to the absence of turtle BIAs in Bass Strait and the low chance of encountering turtles in Bass Strait in general, the risk to marine reptiles (individuals or populations) is considered to be low.		There is no shoreline contact from LOWC.	

Table 7.49: Potential risk of LoWC on seabirds and shorebirds

General sensitivity to oiling – seabirds and shorebirds	
Sensitivity rating of marine seabirds and shorebirds	High
A description of marine seabirds and shorebirds in the EMBA is provided in:	Section 5.6.4

General sensitivity to oiling – seabirds and shorebirds

Seabirds and shorebirds are sensitive to the impacts of oiling, with their vulnerability arising from the fact that they cross the air-water interface to feed, while their shoreline habitats may also be oiled (Hook et al., 2016). Species that raft together in large flocks on the sea surface are particularly at risk (ITOPF, 2011a).

Birds foraging at sea have the potential to directly interact with oil on the sea surface some considerable distance from breeding sites in the course of normal foraging activities. Species most at risk include those that readily rest on the sea surface (such as shearwaters) and surface plunging species such as terns and boobies. As seabirds are top order predators, any impact on other marine life (e.g., pelagic fish) may disrupt and limit food supply both for the maintenance of adults and the provisioning of young.

In the case of seabirds, direct contact with hydrocarbons is likely to foul plumage, which may result in hypothermia due to a reduction in the ability of the bird to thermo-regulate and impair water-proofing (ITOPF, 2011a). A bird suffering from cold, exhaustion and a loss of buoyancy (resulting from fouling of plumage) may dehydrate, drown or starve (ITOPF, 2011a; DSEWPC, 2011; AMSA, 2013). It may also result in impaired navigation and flight performance (Hook et al., 2016). Increased heat loss as a result of a loss of water-proofing results in an increased metabolism of food reserves in the body, which is not countered by a corresponding increase in food intake, and may lead to emaciation (DSEPWC, 2011). The greatest vulnerability in this case occurs when birds are feeding or resting at the sea surface (Peakall et al., 1987). In a review of 45 marine hydrocarbon spills, there was no correlation between the numbers of bird deaths and the volume of the spill (Burger, 1993).

Toxic effects of hydrocarbons on birds may result where the oil is ingested as the bird attempts to preen its feathers, and the preening process may spread the oil over otherwise clean areas of the body (ITOPF, 2011a). Whether this toxicity ultimately results in mortality will depend on the amount of hydrocarbons consumed and other factors relating to the health and sensitivity of the bird. Birds that are coated in oil also suffer from damage to external tissues including skin and eyes, as well as internal tissue irritation in their lungs and stomachs. Studies of contamination of duck eggs by small quantities of crude oil, mimicking the effect of oil transfer by parent birds, have been shown to result in mortality of developing embryos. Engelhardt (1983), Clark (1984), Geraci & St Aubin (1988) and Jenssen (1994) indicated that the threshold thickness of oil that could impart a lethal dose to some intersecting wildlife individual is

10 µm (~10 g/m2). Scholten et al (1996) indicates that a layer 25 µm thick would be harmful for most birds that contact the slick.

Shorebirds are likely to be exposed to oil when it directly impacts the intertidal zone due to their feeding habitats. Shorebird species foraging for invertebrates on exposed sand and mud flats at lower tides will be at potential risk of both direct impacts through contamination of individual birds (ingestion or soiling of feathers) and indirect impacts through the contamination of foraging areas that may result in a reduction in available prey items (Clarke, 2010). Breeding seabirds may be directly exposed to oil via a number of potential pathways. Any direct impact of oil on terrestrial habitats has the potential to contaminate birds present at the breeding sites (Clarke, 2010). Bird eggs may also be damaged if an oiled adult sits on the nest. Fresh crude was shown to be more toxic than weathered crude, which had a medial lethal dose of 21.3 mg/egg (Clarke, 2010).

Penguins may be especially vulnerable to oil because they spend a high portion of their time in the water and readily lose insulation and buoyancy if their feathers are oiled (Hook et al., 2016). The Iron Baron vessel spill (325 tonnes of bunker fuel in Tasmania in 1995) is estimated to have resulted in the death of up to 20,000 penguins (Hook et al., 2016).

Potential risk form LOWC			
Sea Surface	Water column – dissolved phase	Water column – entrained phase	Shoreline
Several bird species are identified as receptors potentially exposed to hydrocarbons during the LOWC event,	The extent of area affected by the dissolved hydrocarbons at the moderate threshold is up to 68.01 km from the well site It is these small areas	The maximum extent of exposure for the area affected by entrained hydrocarbons at the low	There is no shoreline contact from LOWC.

General sensitivity to oiling – seabirds and shorebirds			
foraging over an extensive area and are distributed over a wide geographic area. Seabirds plunge diving through the sea surface for prey are most likely to encounter the low concentration of hydrocarbons. Seabirds rafting, resting, diving or feeding at sea have the potential to come into contact with oil. However, this level of exposure is not expected to result in the lethal impacts of feather matting and hypothermia. Given the extensive ocean foraging habitat available to species such as albatross and petrel, the localised and duration of the hydrocarbon exposure makes it unlikely that a spill will limit their ability to forage for unaffected prey, nor will the unlikely exposure result in permanent injury or mortality. The absence of breeding colonies or nesting areas in the EMBA for albatross and petrel further limits potential exposure to spilled hydrocarbons. Therefore, the overall risk to seabirds is considered **low**.	where sub-lethal or toxic effects to fish may occur in relation to oportunisitc feeding by seabirds. There is a low probability that seabirds would be feeding exclusively or predominantly on fish found in these small areas therefore there is low probability of seabirds themselves experiencing sub-lethal or toxic impacts as a result of consuming hydrocarbon-tainted fish. Assessment of the risk to seabird, given their mobility is **low.**	threshold is a distance of 552.25 km (northeast, winter). Under variable wind conditions (1–12 knots or 1.9–23 m/s), 89.4% of the condensate is forecast to evaporate within 24 HOURS, with an additional 9.3% entrained into the water column. This indicates that the majority of the condensate evaporates within the first day, leaving only a small proportion of oil floating on the water surface. Assessment of the risk to seabird, given their mobility is **low.**	

Table 7.50: Potential risk of LoWC on sandy beaches

General sensitivity to oiling – sandy beaches	
Sensitivity rating of marine sandy beaches (environmental)	Low
Sensitivity rating of marine sandy beaches (socio-economic)	Low
A description of marine sandy beaches is in the EMBA is provided in:	Section 5.4.7

Sandy beaches are regularly cleaned by wave action and have low sediment total organic carbon and therefore a low abundance of marine life (Hook et al., 2016). The low concentration of total organic carbon and large particle size of sand means that any oil deposited on the beach would not be retained. However, sandy beaches are important socio-economically, so an oil spill reaching this type of shoreline may attract attention that is disproportionate to its sensitivity (Hook et al., 2016).

Depth of penetration in sandy sediment is influenced by:

- Particle size – penetration is great in coarser sediments (such as beach sand) compared to mud (in estuaries and tidal flats).
- Oil viscosity – MDO quickly penetrates sandy sediments.
- Drainage – coarse beach sands allow for rapid drainage (it may reach depths greater than one metre in coarse well-drained sediments).
- Animal burrows and root pores – penetration into fine sediments is increased if there are burrows of animals such as worms, or pores left where plant roots have decayed.

Areas with heavy oiling (>1,000 g/m2 threshold) are likely to result in acute toxicity and the death of many invertebrate communities, especially when oil penetrates sediments through animal burrows (IPIECA, 1999). However, these communities are likely to rapidly recover (through recruitment from unaffected individuals and from nearby areas) as oil is removed from the environment. The effects of oil exposure may be acute (e.g., die-off of amphipods and replacement by more tolerant species such as worms) or chronic (i.e., gradual accumulation of oil and genetic damage) (Hook et al., 2016).

For example, following the Sea Empress spill (in west Wales, 1996) many amphipods (sandhoppers), cockles and razor shells were killed. There were mass strandings on many beaches of both intertidal species (such as cockles) and shallow subtidal species. Similar mass strandings occurred after the Amoco Cadiz spill (in Brittany, France, 1978) (IPIECA, 1999). Following the Sea Empress spill, populations of mud snails recovered within a few months, but some amphipod populations had not returned to normal after one year. Opportunists, such as some worm species, may show a dramatic short-term increase following an oil spill (IPIECA, 1999). Long-term depletion of sediment fauna could adversely affect birds or fish that use tidal flats as feeding grounds (IPIECA, 1999).

In March 2014, small volumes of crude oil from an unidentified source (confirmed not to be offshore oil and gas production facilities) washed up along a 7-km section of sandy beach on the Victorian Gippsland coast as small (a few millimetres thick) granular balls (Gippsland Times, 2014; ABC News, 2014). AMSA (2014b) reported that no impacts were observed over the course of two months following the incident.

The Macondo well blowout resulted in oil washing up on the beaches of Alabama's coast. The natural movement of sand and water through the beach system continually transformed and redistributed oil within it, and 18 months after the event, mobile remnant oil remained in various states of weathering, buried at different depths in the beaches (Hayworth et al., 2011). Other results from beach sampling undertaken at Dauphin Island, Alabama, in May (pre-impact) and September 2011 (post-impact) found a large shift in the diversity and abundance of microbial species (e.g., nematodes, annelids, arthropods, polychaetes, protists, fungi, algae and bacteria). Post-spill, sampling indicated that species composition was almost exclusively dominated by a few fungal species. DNA analyses revealed that the 'before' and 'after' communities at the same

General sensitivity to oiling – sandy beaches
sites weren't closely related to each other (Bik et al., 2012). Similar studies found that oil deposited on the beaches caused a shift in the community structure toward a hydrocarbonoclastic consortium (petroleum hydrocarbon-degrading microorganisms) (Lamendella et al., 2014.
Potential risk form LOWC
Shoreline
There is no shoreline contact from LOWC.

Table 7.51: Potential risk of LoWC on commercial fishing

General sensitivity to oiling – commercial fishing	
Sensitivity rating of marine commercial fishing (socio-economic)	Low
A description of marine commercial fishing is in the EMBA is provided in:	Section 5.9.5
Commercial fishing may be affected by exclusion zones associated with the spill, the spill response, and the subsequent reduction in fishing effort. Exclusion zones may temporarily impede access to commercial fishing areas, and nets and lines may become oiled. The impacts to commercial fishing from a public perception perspective, however, may be much more significant and longer-term than the spill itself. Fishing areas may be closed for shorter or longer periods due to the risk of catch contamination by oil. Concentrations of petroleum contaminants in fish, crustacean, and mollusc tissues could pose a significant risk of adverse human health effects, and until these products from nearshore fisheries are cleared by health authorities, they may be restricted for sale and human consumption. Indirectly, the fisheries sector will suffer significant losses if consumers are either prevented from using or unwilling to buy fish and shellfish from the region affected by the spill. Impacts on fish stocks can reduce profits for commercial fisheries, and exclusion zones exclude fishing effort. Davis et al. (2002) report detectable tainting of fish flesh after 24 hours of exposure at crude oil concentrations of 0.1 ppm, marine fuel oil concentrations of 0.33 ppm, and diesel concentrations of 0.25 ppm. The Montara spill (as the most recent [2009] example of a large hydrocarbon spill in Australian waters) occurred over an area fished by the Northern Demersal Scalefish Managed Fishery (with 11 licences held by 7 operators), with goldband snapper, red emperor, saddletail snapper and yellow spotted rockcod being the key species fished (PTTEP, 2013). As a precautionary measure, the WA Department of Fisheries advised the commercial fishing fleet to avoid fishing in oil-affected waters. Testing of fish caught in areas of visible oil slick (November 2009) found that there were no detectable petroleum hydrocarbons in fish muscle samples, suggesting fish were safe for human consumption. In the short term, fish had metabolised petroleum hydrocarbons. Limited ill effects were detected in a small number of individual fish only (PTTEP, 2013). No consistent effects of exposure on fish health were detected within 2 weeks after the end of the well release. Follow-up sampling in areas affected by the spill in 2010 and 2011 (PTTEP, 2013) found negligible ongoing environmental impacts.	

General sensitivity to oiling – commercial fishing

Since testing began in the month after the Macondo well blowout in the Gulf of Mexico (GoM) (2010), levels of oil contamination residue in seafood consistently tested 100 to 1,000 times lower than safety thresholds established by the USA FDA, and every sample tested was found to be far below the FDA's safety threshold for dispersant compounds (BP, 2015). FDA testing of oysters found oil contamination levels 10 to 100 times below safety thresholds (BP, 2014). Sampling data show that post-spill fish populations in the GoM since 2011 were generally consistent with pre-spill ranges, and for many shellfish species, commercial landings in the GoM in 2011 were comparable to pre-spill levels. In 2012, shrimp (prawn) and blue crab landings were within 2.0% of 2007-09 landings. Recreational fishing harvests in 2011, 2012 and 2013 exceeded landings from 2007-09 (BP, 2014).

In the event of an MDO spill, the VFA may put in place a temporary fisheries closure (or the fishers may do so voluntarily). Oil may foul the hulls of fishing vessels and associated equipment, such as gill nets. A temporary fisheries closure, combined with oil tainting of target species (actual or perceived), may result in financial losses for fisheries and economic losses for individual licence holders. Fisheries closures and the flow-on losses from the lack of income from these fisheries are likely to have short-term, but widespread, socio-economic consequences, such as reduced employment (in fisheries service industries, such as tackle and bait supplies, fuel, marine mechanical services, accommodation, and so forth).

Potential risk form LOWC			
Sea Surface	Water column – dissolved phase	Water column – entrained phase	Shoreline
A short-term fishing exclusion zone may be implemented by AFMA or the VFA. Given the temporary nature of any surface hydrocarbons and the low fishing intensity in the EMBA, there are unlikely to be significant impact on fisheries in terms of lost catches.	The predicted maximum distances of dissolved oil exposure are: • Low threshold (10 ppb): Up to 68.01 km (southeast, winter). • Moderate threshold (50 ppb): Up to 59.68 km (southeast, winter). The hydrocarbons are predicted to weather quickly and the area would return to pre-spill conditions rapidly.	The predicted evaporation rate after one day is approximately 92% i.e. predicted to evaporate within 24 hours under calm wind conditions (constant 5 knots or 2.6 m/s) at a water temperature of 15°C. Under variable wind conditions (1–12 knots or 1.9–23 m/s), 89.4% of the condensate is forecast to evaporate within 24 hours, with an additional 9.3% entrained into the water column. This indicates that the majority of the condensate evaporates within the first day, leaving only a small proportion of oil floating on the water surface.	There is no shoreline contact from LOWC Vessels use local ports, which are not included within the EMBA. As such, there are no impacts to vessels in port or associated infrastructure (e.g., marinas and jetties).

A short-term fishing exclusion zone may be implemented by AFMA or the VFA. The areas dissolved and entrained exposure thresholds represent very small areas available to commercial fishing.

No Victorian fisheries with recent intensity occur within the EMBA for this scenario.

Commonwealth fisheries that are known to fish within the LOWC EMBA with recent intensity include:

General sensitivity to oiling – commercial fishing
• Southern squid fishery; and • Shark gillent fishery.

7.15.6 Cumulative Risk Evaluation

There is a low potential for cumulative impacts resulting from a LoWC associated with other activities in the Operational Area or when combined with other marine activities in the region.

There are no other oil and gas operations in close proximity to BassGas or within the LoWC spill EMBA. A LoWC from gas production activities in eastern Bass Strait may overlap with the spill EMBA from a LoWC from the Yolla wells, but the likelihood of concurrent LoWC events occurring from production wells are extremely remote and have never occurred in Bass Strait.

7.15.7 Risk Assessment

A risk assessment for the LoWC is presented in Table 7.52.

Table 7.52: Risk assessment for the LoWC

ALARP decision context			
Impact decision framework context	Type B.		
Activity	New to the organisation, infrequent activity, but good practice is well defined and met by more than one option.		
Level of certainty of risk	Some uncertainty.		
Stakeholder influence	No conflict with company values, some partner interest, may attract local media attention.		
Risk Assessment (inherent)			
Phase	**Likelihood**	**Consequence**	**Risk**
Operations	Remote (A)	Major (4)	Medium
CoP	Remote (A)	Moderate (2)	Low
Preservation	Remote (A)	Moderate (2)	Low
Assessment of Proposed Control Measures			
Control	**Cost/benefit analysis**		**Implemented?**
Commonwealth waters only			
Do not undertake production activities *(Operations phase)*	Production of gas from the Yolla field is required to maintain gas supply to the LLGP and is also a condition of the production licence. While eliminating production would eliminate the source of risk, it would prevent achievement of the activity objectives and production licence requirements. The significant operational and commercial consequences associated with implementing this control are considered grossly disproportionate to the environmental benefit achieved.		No
Real-time leak detection and well shut-in. *(All phases)*	Such a system would allow a leak from the wells to be detected and the well shut in immediately, thereby minimising the volume of hydrocarbons released. However, pressure and temperature instrumentation is ineffective at detecting subsea leaks. Given the limited effectiveness of the proposed control, the costs associated		No

Assessment of Proposed Control Measures		
	with implementing and maintaining such a system would be grossly disproportionate to the environmental benefit achieved.	
NOPSEMA-accepted WOMP is in place. *(All phases)*	An accepted WOMP provides a structured and regulator-endorsed framework for planning and executing well operations that reduces the likelihood of a LOWC. Preparation and maintenance of a WOMP is a regulatory requirement and standard industry practice. The plan is routinely updated to reflect current operational procedures, equipment standards, and emergency response arrangements. Implementation occurs through existing well integrity and operations management processes and represents standard offshore industry practice. The associated costs are not grossly disproportionate to the environmental benefit achieved through reducing the likelihood of a loss of well control event.	Yes **(RSK05-CM01)**
NOPSEMA-accepted Safety Case is in place. *(All phases)*	An accepted Safety Case ensures the facility is being operated and maintained in a manner that reduces the likelihood of a LOWC event occurring. Preparation and maintenance of a Safety Case is a regulatory requirement and standard industry practice. The plan is routinely updated to reflect current operational procedures, equipment standards, and emergency response arrangements. The Safety Case framework is embedded within facility operations and risk management systems. The associated costs are not grossly disproportionate to the environmental benefit achieved through systematic management of major accident event risks, including loss of well control.	Yes **(RSK05-CM02)**
Operations and maintenance personnel are qualified, trained and certified as competent to operate and maintain the BassGas facilities. *(All phases)*	This control measure is essential to ensuring the safe delivery of gas from the wells to the RGP. Operators are trained to perform technical work in accordance with numerous procedures and personnel competency assurance is a fundamental operational requirement and is managed through existing training and competency systems. The associated costs are not grossly disproportionate to the environmental benefit achieved through reducing the likelihood of operational errors that could contribute to a loss of well control.	Yes **(RSK05-CM03)**
The CMMS is used to manage the integrity of the Yolla wells and platform operations and maintenance. *(All phases)*	The CMMS is an established and proven maintenance management tool that forms part of routine operations and has been used effectively on the Yolla-A facility historically to manage the wells and is a proven method of scheduling maintenance and recording maintenance actions. the associated costs are not grossly disproportionate to the environmental benefit achieved through maintaining well and facility integrity.	Yes **(RSK05-CM04)**
Procedures are used for lifting work around the wellheads. *(All phases)*	This control minimises the risk of suspended equipment dropping onto the wellheads or associated production equipment. Lifting procedures have been effectively used for many years and have prevented objects dropping onto the wellheads. Their ongoing use is therefore feasible and warranted. These procedures are implemented through existing lifting management systems and workforce competency requirements.	Yes **(RSK05-CM05)**

Assessment of Proposed Control Measures		
	The associated costs are not grossly disproportionate to the environmental benefit achieved through reducing the likelihood of dropped-object impacts to critical well control equipment.	
An ERP is in place and implemented. Annual testing is undertaken. *(All phases)*	A documented ERP ensures that Beach has considered, planned for and resourced the emergency response measures that would be required in the event of a LOWC. Beach has an ERP response training program in place for relevant personnel. This ensures Beach is well prepared to quickly respond to a LOWC, thereby minimising the extent of the marine environment impacted. Emergency preparedness activities can be delivered through existing response arrangements, training and exercises. The associated costs are not grossly disproportionate to the environmental benefit achieved through improving response effectiveness and reducing potential environmental consequences of a loss of well control event.	Yes **(RSK05-CM07; -CM09)**
An OPEP is in place and implemented. Annual testing is undertaken. *(All phases)*	An OPEP is required under the Environment Regulations and represents standard industry practice. Beach has a spill response training program in place for relevant personnel. This ensures Beach is well prepared to quickly respond to a spill, thereby minimising the extent of the marine environment impacted. The associated costs are not grossly disproportionate to the environmental benefit achieved through improving oil spill response preparedness and reducing environmental impacts.	Yes **(RSK05-CM08, -CM09)**
The OSMP is implemented in the event of a LoWC. *(All phases)*	An OSMP is required under the Environment Regulations and represents standard industry practice, ensuring Beach is well prepared to quickly undertake operational and scientific studies, thereby supporting the future assessment of impacts resulting from the spill.	Yes **(RSK05-CM10)**
Operational and scientific monitoring data will be collected in accordance with the OSMP. *(All phases)*	Specialist consultants maintain availability and training to support Beach in the event the OSMP needs to be implemented and facilitate the collection of operational and scientific monitoring data to support impact assessment, response optimisation and verification of environmental outcomes following a LoWC event. The associated costs are not grossly disproportionate to the environmental benefit achieved through improving environmental understanding and adaptive management following a spill.	Yes **(RSK05-CM11)**
Well integrity monitoring. *(All phases)*	Well integrity is routinely monitored through review of well pressures, annulus pressures, barrier status and integrity performance indicators in accordance with the Well Integrity Management Plan. In doing so, well integrity issues can be identified earlier than they otherwise would. Repairing these issues can avoid a LoWC and avoid associated environmental impacts. Well integrity monitoring is routine offshore practice and incorporated into Beach's Well Integrity Management Plan and PMS. The associated costs are not grossly disproportionate to the environmental benefit achieved through early identification of integrity issues and prevention of a loss of well control event.	Yes **(RSK05-CM06)**
Environmental Controls and Performance Measurement		

Assessment of Proposed Control Measures			
EPO	**Control measure**	**EPS**	**Measurement criteria**
Note that design elements of the wells and production equipment that assist in preventing the uncontrolled release of hydrocarbons are not detailed here. These are addressed in the original EIS. This EP focuses on control measures related to operations activities only.			
RSK05-EPO01 No release of hydrocarbons to the marine environment due to a LOWC.	**Preventative (Platform, Commonwealth waters)**		
	RSK05-CM01 The Yolla wells are operated in accordance with the NOPSEMA-accepted WOMP (CDN/ID 3972817) and Well Integrity Management Plan – Victoria (CDN/ID 19060027). *(All phases)*	**RSK05-EPS01** The management of the wells meets the requirements of the OPGGS (Resource Management and Administration) Regulations 2025 (Cth).	**RSK05-MC01.1** Acceptance letter from NOPSEMA demonstrates acceptance of the WOMP. **RSK05-MC01.2** Well integrity reports (e.g., Process Safety Report and/or the quarterly Well Integrity Report) verify the WOMP is implemented.
	RSK05-CM02 The wells are operated in accordance with the NOPSEMA-accepted Safety Case that: ○ Identified hazards that have the potential to cause a Major Accident Event (MAE). ○ Details assessment of MAE events. ○ Describes the physical barriers, safety critical elements and the safety management systems identified as being required to reduce the risk to personnel associated with a MAE to ALARP. *(All phases)*	**RSK05-EPS02** The management of the wells meets the requirements of the OPGGS (Safety) Regulations 2024 (Cth).	**RSK05-MC02.1** Acceptance letter from NOPSEMA demonstrates acceptance of the Safety Case. **RSK05-MC02.2** NOPSEMA acceptance of the Safety Case is maintained and periodic assurance activities verify implementation of safety critical elements and management systems.
	RSK05-CM03 Operations personnel are qualified, trained and certified as competent to operate and maintain the BassGas facilities. *(All phases)*	**RSK05-EPS03** Only trained and competent personnel operate the BassGas facilities.	**RSK05-MC03** The BassGas Workforce Capability Requirements Matrix is maintained up-to-date and verifies that operators are qualified, trained and certified as capable.
	RSK05-CM04 The CMMS is used to manage (schedule, record and report) the integrity of the Yolla wells and platform	**RSK05-EPS04** Safety-critical elements and well integrity barriers are maintained and	**RSK05-MC04** PMS records verify that wells and platform are

Assessment of Proposed Control Measures			
	operations and maintenance. This includes, but is not limited to: • LOS Gas Detection Systems; • UV/IR Flame Detection; • Fusible loop detection; • ESD systems; • Wellhead maintenance; • SSV leak off tests; and • Last valve off critical function tests. *(All phases)*	tested in accordance with approved maintenance and integrity management systems.	maintained to schedule.
	RSK05-CM05 The Beach Lifting and Load Safety Operations - Australia (CDN/ID 3674901) is used for lifting work around the wellheads. *(All phases)*	**RSK05-EPS05** There are no dropped objects on the wellheads.	**RSK05-MC05** Completed PTWs and/or JSAs verify that the procedure is implemented.
	RSK05-CM06 Well and hydrocarbon-containing infrastructure integrity is maintained in accordance with the Well Integrity Management Plan and asset integrity management system. *(All phases)*	**RSK05-EPS06** Well and hydrocarbon containing infrastructure integrity is maintained such that reservoir fluids remain contained within designed barriers.	**RSK05-MC06** Well Integrity Reports, Process Safety Reports and associated anomaly management records demonstrate review of well integrity status and management of identified issues.
RSK05-EPO02 Respond to a LoWC event in line with pre-determined and approved strategies.	**Response (Platform, Commonwealth waters)**		
	RSK05-CM07 An ERP is in place and tested annually in desktop exercises by those nominated in the plans to be part of the response strategies. *(All phases)*	**RSK05-EPS07** Personnel with responsibilities under the ERP are trained and emergency response arrangements are maintained ready for implementation.	**RSK05-MC07.1** The ERP remains current. **RSK05-MC07.2** ERP training schedule verifies all office-based, LLGP and platform crew requiring training are identified and trained. **RSK05-MC07.3** ERP exercise reports verify that exercises have been undertaken.
	RSK05-CM08 An OPEP is in place and tested annually in desktop exercises by those nominated in the plans to be part of the response strategies. *(All phases)*	**RSK05-EPS08** Oil spill response arrangements remain current and capable of implementation.	**RSK05-MC08.1** The OPEP remain current. **RSK05-MC08.2** OPEP training schedule is available and verifies all office-based, LLGP and platform crew

Assessment of Proposed Control Measures			
			requiring training are identified and trained. **RSK05-MC08.3** OPEP exercise reports verify that exercises have been undertaken.
	RSK05-CM09 The ERP and OPEP are implemented in the event of a LoWC. *(All phases)*	**RSK05-EPS09** The emergency response requirements of the OPGGS(E) Regulations 22(9)(10) are met.	**RSK05-MC09.1** Incident reports verify that the OPEP was implemented. **RSK05-MC09.2** Incident reports verify that the ERP was implemented.
RSK05-EPO03 Characterise the environmental impacts resulting from a LOWC.	**Monitoring (Platform, Commonwealth waters)**		
	RSK05-CM10 Operational and scientific monitoring capability is maintained in accordance with the OSMP. *(All phases)*	**RSK05-EPS10** The requirements of the OPGGS(E) Regulations 22(6)(10) are met.	**RSK05-MC10.1** OSMP contractor monitoring capability is verified via the monthly OSMP report. **RSK05-MC10.2** Quarterly and annual assurance reviews verify OSMP monitoring capability is in place.
	RSK05-CM11 Operational and scientific monitoring data will be collected in accordance with the OSMP. *(All CoP phases)*	**RSK05-EPS11** Operational and scientific monitoring is undertaken in accordance with the OSMP following implementation.	**RSK05-MC11** Daily operations reports and study reports verify that the OSMP was implemented.

Impact Consequence (residual)			
Phase	**Likelihood**	**Consequence**	**Risk**
Operations	Remote (A)	Moderate (2)	Low
CoP	Remote (A)	Minor (1)	Low
Preservation	Remote (A)	Minor (1)	Low

ALARP Decision Justification

With the controls outlined in this table in place, this risk has been assessed as 'Low', with good practice well defined (Decision Context B). Additional or alternative control measures do not lower the residual consequence further or would be grossly disproportionate to the residual consequence. Therefore, a residual risk score ranking of 'Low' is considered to be ALARP.

Acceptability Assessment	
Defined acceptable level	The risk of a LOWC occurring is assessed as having a 'Low' residual risk rating, which is not considered as having the potential to result in serious or irreversible environmental damage.

ALARP Decision Justification		
Internal context	The proposed management of the risk is aligned with the Beach Environment Policy. Activities will be undertaken in accordance with the Implementation Strategy (Section 8).	
External context	The BassGas Offshore Operations SEP is implemented to ensure that stakeholders are aware of operations issues. Stakeholders have not raised concerns about disposal of waste.	
Legislative context	The control measures outlined in this EP align with the requirements of: ○ *OPGGS Act 2006* (Cth): ▪ Section 572A-F (Polluter pays for escape of petroleum). ○ *Navigation Act 2012* (Cth) ▪ AMSA Marine Orders Part 91 (Marine pollution prevention – oil). ○ *Protection of the Sea (Prevention of Pollution from Ships) Act 1983 (Cth):* ▪ Section 11A (Shipboard oil pollution emergency plan) (for Australian-registered vessels). ○ *OPGGS Act 2010* (Vic): ▪ Section 29 (Notifying reportable incidents). ○ *POWBONS Act 1986* (Vic): ▪ Section 10 (Duty to report certain incidents involving oil and oily mixtures). ▪ State Environment Protection Policy (Waters of Victoria): ▪ Clause 38 (Spills, illegal discharges and dumping of waste).	
Industry practice	The control measures outlined in the below-listed guidelines and codes of practice demonstrate that BPEM will be implemented for this activity.	
	Environmental management in the upstream oil and gas industry (IOGP-IPIECA, 2020)	The control measures listed in this table meet the relevant mitigation measures listed for offshore activities with regard to: • Major spills from production facilities – OSTM to be undertaken to determine potential environmental impacts, wellbore hydrostatic pressure to be maintained, well integrity testing to be performed, WOMP to be in place, well control contingency plan to be in place, spill preparedness and emergency response measures are in place, ongoing inspections and maintenance take place **(RSK05-all control measures)**.
	Best Available Techniques Guidance Document on Upstream Hydrocarbon Exploration and Production (European Commission, 2019)	No guidance is provided regarding preventing or managing an offshore LoWC during operations, other than having a spill contingency plan in place. An OPEP is in place for BassGas operations.
	Environmental, Health and Safety Guidelines for Offshore Oil and Gas Development (World Bank Group, 2015)	There are no guidelines regarding minimising the risk of introducing IMS. Guidelines met with regard to: • Section 75 (Spills) - Conducting a spill risk assessment, implementing personnel training and field exercises, ensuring spill response equipment is available **(RSK05-CM08, -CM09)**.

ALARP Decision Justification		
		• Sections 76-79 (Spill response planning) - A spill response plan should be prepared **(RSK05-CM09)**. • Section 115 (Well blowout) - Blowout prevention measures should focus on maintaining wellbore hydrostatic pressure by effectively estimating formation fluid pressures and the strength of subsurface formation **(RSK05-CM01)**. • Section 116 (Well blowout) - A BOP system should be installed that can be closed rapidly. It should be tested at regular intervals (at least every 14 days) **(RSK05-CM01).** • Section 118 (Well blowout) - Contingency plans should be prepared for well operations **(RSK05-CM01)**. • Section 119 (Well blowout) - A dedicated blowout risk analysis and emergency plan should be prepared, detailing the measures in place to prevent a blowout, the provisions for well control in a blowout scenario and the time necessary for intervention **(EP Section 7.19)**.
	Code of Environmental Practice (APPEA, 2008)	The control measures listed in this table meet the following offshore development and production objectives: • To reduce the risk of any unplanned release of material into the marine environment to ALARP and to an acceptable level.
Environmental context	MNES	
	AMPs	The South-east Marine Parks Network Management Plan 2025 (DNP, 2025) identifies marine pollution as a threat to the AMP network. The spill modelling indicates a 5% probability of contact with the Beagle AMP with entrained hydrocarbons at 10 ppb due to a LOWC.
	Ramsar wetlands	No intersection or risks.
	NIWs	No intersection or risks.
	TECs	No intersection or risks.
	Nationally threatened and migratory species	Marine pollution is a threat identified for many fish, marine mammal, turtle and bird species. In general, population monitoring is the suggested action to deal with marine pollution. The OSMP addresses this. The Wildlife Conservation Plan for Seabirds (CoA, 2020) identifies acute pollution (oil spills) as a moderate threat to seabirds. The control measures outlined within this table mitigate the chance of a hydrocarbon release, and therefore, reduce the probability of acute pollution impacts on seabirds.
	Other matters	
	State marine parks	This hazard does not have any impacts on state marine parks.

ALARP Decision Justification		
	Species Conservation Advice/Recovery Plans/Threat Abatement Plans	The National Strategic Plan for Marine Pest Biosecurity (2018-2023) (DAWR, 2018) has five objectives. The control measures listed in this table are aligned with the plan's objective to minimise the risk of marine pest introductions, establishment and spread (noting that the other four objectives do not apply to BassGas operations).
ESD principles	The EIA presented throughout this EP demonstrates that ESD principles (a), (b), (c) and (d) are met (noting that principle (e) is not relevant).	

Environmental Monitoring
Per the OPEP and OSMP.

Record Keeping	
• WOMP and acceptance letter. • Safety Case and acceptance letter. • WIMP and well integrity reports (e.g., Process Safety Report and/or the quarterly Well Integrity Report). • BassGas Workforce Capability Requirements matrix. • PMS records. • CMMS records. • PTWs. • JSAs.	• Incident reports. • OPEP training schedule and exercise reports. • ERP training schedule and exercise reports. • Monthly OSMP report. • Quarterly assurance review. • Annual assurance review. • Daily operations reports. Study reports.

7.16 RISK 6: LoC from Rupture of the Raw Gas Pipeline

7.16.1 Source of Aspect

The IOGP Risk Assessment Data Directory – Riser & Pipeline Release Frequencies Report 434-04 (2019b) estimates the frequency of leaks from subsea steel pipelines in the open sea (in the 10-16" diameter range, noting that the BassGas offshore RGP is 13.7 inches) at 4.8 × 10^{-}4 (0.00051) per pipeline-km per year. This estimate is based on data for pipelines on the UK Continental Shelf for the period 2001 to 2012. IOGP (2019b) states that the frequency of hydrocarbon pipeline failures per 1,000 km-years has decreased from 1.1 in the 1970s to 0.2 in 2014, and between 2014 and 2019, the gross pipeline spillage has averaged 0.00006% of the oil transported.

There have been no spills from the BassGas RGP to date.

During the operation of the offshore RGP, there is the risk that there could be an uncontrolled release of hydrocarbons as a result of:

- Pipeline failure through internal or external corrosion.
- Unsupported pipeline span due to erosion, causing metal fatigue.
- Dropped objects (while carrying out platform crane lifts, etc).

- Vessel anchor drag/trailer net drag.
- Extreme weather.
- Human error, and/or.
- Sabotage.

Over the last five years, there have been no incidents of LoC of hydrocarbons from the RGP.

This aspect is relevant to all phases, noting however that during operations, the LoC is gas and associated condensate, while during CoP and preservation, the loss would be for nitrogen. This is because at CoP, the RGP will be cleaned of residual fluids and filled with inert gas such that during the preservation phase, natural gas and condensate will not be present in the RGP.

Hazard	Source	Operations	CoP	Preservation
RGP	Operations	✓	✓	✓
	IMR	✓	✓	✓

7.16.2 Known and Potential Environmental Risks

The potential surface release is condensate during offshore operations from a rupture of the RCP, during associated BassGas activities are considered credible spill scenarios and form the primary focus for OSM.

Potential environmental risks resulting from a LoC of natural gas, condensate or nitrogen from the RGP are:

- Localised reduction of water quality.

As a result of a change in water quality, further secondary potential impacts that may occur are:

- Injury or death of marine life; pelagic fauna, avifauna.
- Change in ecosystem dynamics.
- Localised air quality reduction due to GHG emissions.
- Change to the conservation, socio-economic, and cultural values and sensitivities, such as temporary access and restriction to coastal marine reserves and recreational coastline.
- Disruption to third-party operations such as shipping and commercial fishing (e.g., potential loss of fisheries, resulting from temporary fisheries closures, mortalities from fish stocks, or tainted catches).
- Damage to third-party infrastructure and business interruption, such as the Victorian desalination plant (at Wonthaggi), contamination of the water supply, and disruption to the supply of water services.

7.16.2.1 Yolla Condensate Properties

See Section 7.15.2.1 for the Yolla Condensate Properties.

7.16.2.2 Condensate Characteristics

See Section 7.15.2.2 for the Yolla Condensate Characteristics.

7.16.2.3 Oil Spill Trajectory Modelling

The scenario based on a subsea pipeline rupture 3 nm from shore (Pipeline Rupture scenario) of Yolla condensate, predicted significant impacts on nearby shorelines and marine receptors, with higher probabilities of exposure and accumulation during winter conditions.

Section 7.15.2.1 and Section 7.15.2.2 and Table 7.39 and Table 7.40 detail the Yolla condensate properties and characteristics.

Based on a spill volume of 14,500 barrels (~2,305 m^3), the release rate for the RGP rupture scenario varies over time, on day 1, the release rate of 24,167 (STB/hour) for condensate, and 23,450 scf/hour for gas for a duration of 36 minutes.

The extent of entrained hydrocarbon exposure from the subsea pipeline rupture varies by season however the maximum distance at the 10 ppb threshold is estimated to be up to 118 km (east-southeast) during winter.

A summary of the modelling results determined the following:

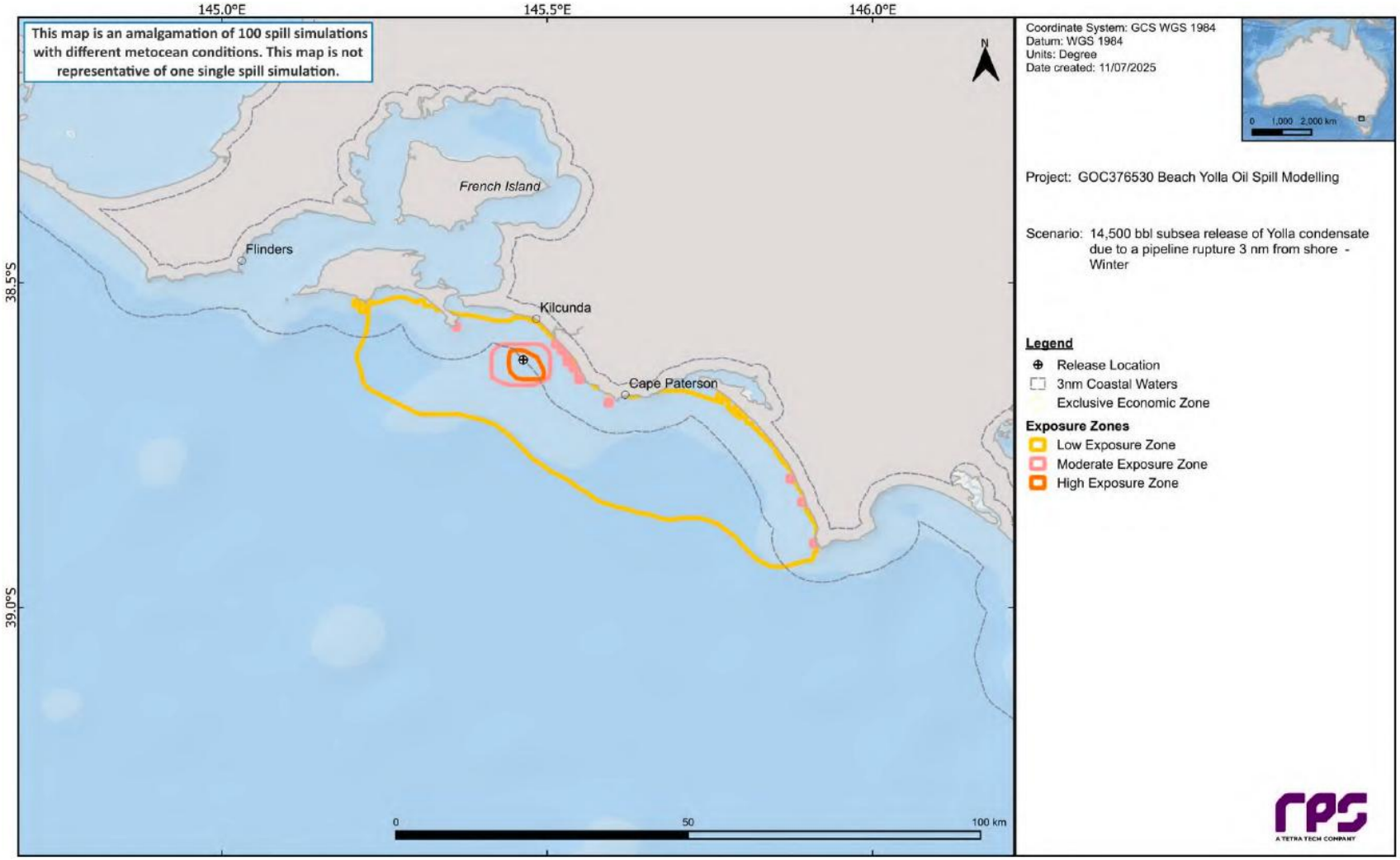
- Floating Oil Exposure:
    - Maximum distances for low, moderate, and high thresholds vary by season, with higher distances in summer.
    - Highest probability of exposure is 100% for Kilcunda nearshore waters and South-east Marine Region in both seasons.
    - Quickest time before exposure is 0.01 days for Kilcunda nearshore waters and South-east Marine Region.
- Shoreline Oil Accumulation:
    - Probability of oil accumulation (≥10 g/m^2) is higher in winter (84%) compared to summer (66%).
    - Maximum oil ashore volume is 24.70 m^3 in summer and 23.71 m^3 in winter.
    - Kilcunda shoreline has the highest probability of accumulation in summer (53%), while Venus Bay shoreline has the highest in winter (60%).
- Dissolved Hydrocarbons:
    - Maximum distances for exposure vary by season, with higher distances in winter.

- Highest probability of exposure (≥10 ppb) is 2% for Little Penguin - Foraging BIA in summer and 1% in winter.
- Quickest time before exposure is 0.18 days in summer and 0.11 days in winter for Little Penguin - Foraging BIA.

- Entrained Hydrocarbons:
  - Highest probability of exposure (≥10 ppb) is 98% for White Shark - Foraging BIA in summer and 99% for Southern Right Whale and White Shark BIAs in winter.
  - Quickest time before exposure is 0.05 days in summer and 0.04 days in winter for Little Penguin - Foraging BIA.

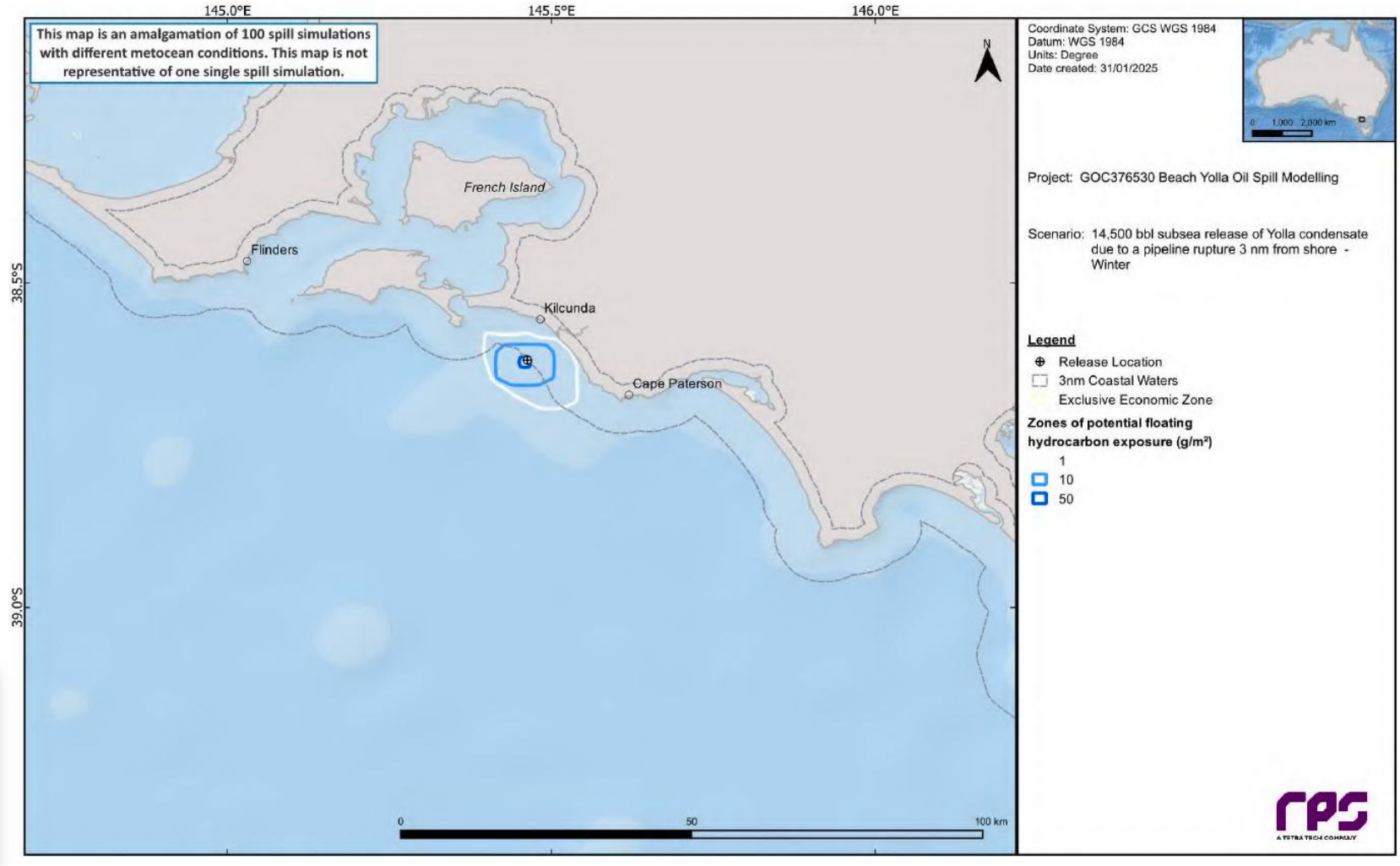
Figure 7.15 and Figure 7.16 in Section 7.16 show that evaporation is the key weathering mechanism.

The OSTM results for surface contact are presented in Figure 7.20, entrained hydrocarbons in Figure 7.21, shoreline loading in Figure 7.22 and dissolved hydrocarbons in Figure 7.23 and **Appendix 14**.



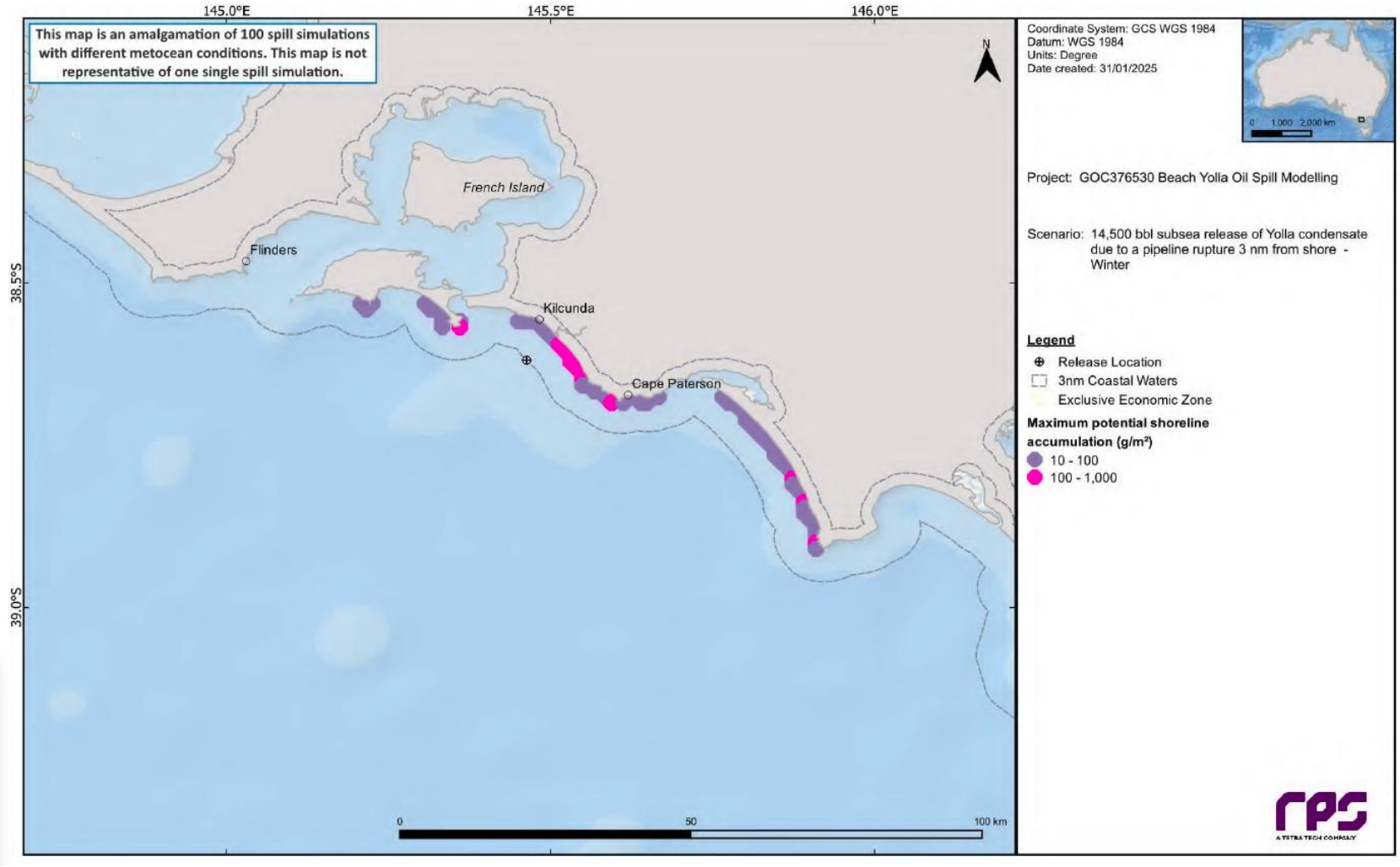
Source RPS, 2025

Figure 7.20: Predicted Area of Exposure for Low, Medium and High Thresholds from 14,500 bbl subsea release of condensate over 36 minutes from pipeline rupture 3 NM from shore during winter conditions.



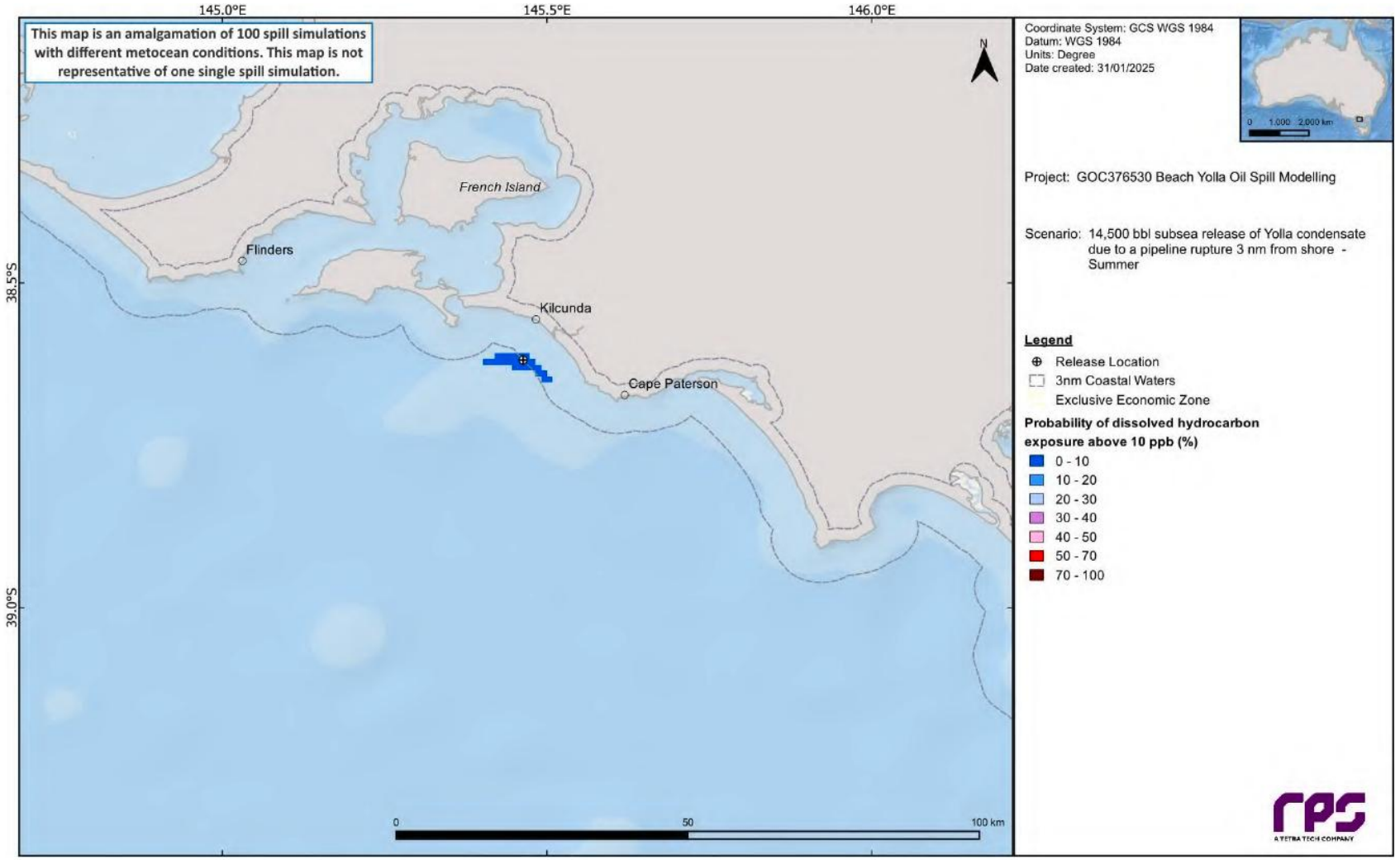
Source RPS, 2025

Figure 7.21: Zone of potential Floating Oil Exposure in the event of a 14,500 bbl subsea release of condensate over 36 minutes from pipeline rupture 3 NM from shore during winter conditions.



Source RPS, 2025

Figure 7.22: Maximum potential shoreline loading in the in the event of a 14,500 bbl subsea release of condensate over 36 minutes from pipeline rupture 3 NM from shore during winter conditions.



Source RPS, 2025

Figure 7.23: Probability of Dissolved Hydrocarbon Exposure above 10 ppb, at 0-10 m below the sea in the in the event of a 14,500 bbl subsea release of condensate over 36 minutes from pipeline rupture 3 NM from shore during winter conditions.

7.16.2.4 Nitrogen

During the CoP and preservation phases, any LoC from the RGP would involve nitrogen rather than hydrocarbons. This is because, following cessation of production, the RGP will be cleaned of residual fluids and filled with inert gas in the form of a nitrogen blanket, such that natural gas and condensate are no longer present within the pipeline. During preservation, the offshore RGP will be maintained under a positive nitrogen blanket pressure to prevent internal corrosion and the ingress of oxygen or moisture. Detailed engineering is expected to determine a nitrogen blanket pressure within the range of approximately 500 to 1,500 kPag, requiring an estimated 90,000 to 260,000 m^3 of nitrogen to purge and fill the pipeline.

In the event of a LoC from the preserved RGP, the released substance would therefore be nitrogen gas rather than hydrocarbons or condensate. Nitrogen is an inert, naturally occurring component of the atmosphere and is non-toxic to the marine environment. Consequently, a release would not be expected to result in direct toxicity, smothering, sediment contamination, bioaccumulation, or other adverse ecological impacts. While the volume of nitrogen contained within the preserved RGP may be substantial, any release would be expected to disperse rapidly within the atmosphere and/or surrounding seawater, resulting in only a short-term and localised effect with no anticipated measurable impact on marine environmental values.

7.16.3 EMBA

As outlined in Table 5.1, the hydrocarbon spill EMBA comprises of the Planning Area extent (Figure 5.1), and is defined as:

> *The amalgamation of the extent of low level hydrocarbon exposure to the sea surface (1 g/m^2), entrained in the water column (10 ppb), dissolved in the water column (10 ppb), and contact to shorelines (10 g/m^2) as a result of a loss of14,500 bbl of gas condensate from a subsea pipeline rupture (over 36 minutes) during annualised metocean conditions.*

This EMBA has been established through hydrocarbon spill modelling scenarios and results as provided in the above Sections 7.16.2.3.

The receptors most at risk from a LoC from rupture of the RGP and the marine BIAs include:

- Black-browed Albatross (Foraging in the South-east Marine Region).
- Bullers Albatross (Foraging in most of the South-east Marine Region).
- Campbell Albatross (Foraging in the South-east Marine Region including Macquarie Island).
- Common Diving-petrel (Foraging in buffer areas around Tasmania and Victoria).
- Indian Yellow-nosed Albatross (Foraging in most of the South-east Marine Region).
- Pygmy Blue Whale (Foraging in the majority of Bass Strait and coastal waters of Tasmania).
- Short-tailed Shearwater (Foraging in buffer areas around Tasmania including Bass Strait).
- Shy Albatross (Foraging likely in the South-east Marine Region).

- Southern Right Whale (Known core range in coastal waters between Sydney and Perth, including off Tasmania).
- Wandering Albatross (Foraging in the South-east Marine Region).
- White Shark (Distribution between the 60-120m depth contour, low density in Australian waters from Barrow Island/Montebello Islands, WA to Yeppoon/Swains Reef, Qld, and known distribution in Coastal/Shelf/Upper Slope waters out to 1000m depth contour).
- White-faced Storm-petrel (Foraging in buffer areas around the northern side of Tasmania into Bass Strait).

Specific receptors with high probabilities of exposure to entrained hydrocarbons:

- Southern Right Whale (Migration and resting on migration in Philip Island area to Wilsons Promontory, with 99-100% probability of exposure during summer and winter).
- White Shark (Foraging in waters off pinniped colonies throughout the Southeast Marine Region, with 96-98% probability of exposure during summer and winter). (Known distribution in Coastal/Shelf/Upper Slope waters out to 1000m depth contour, with 100% probability of exposure during summer and winter).
- Pygmy Blue Whale (Distribution, foraging, and known foraging area, with 100% probability of exposure during summer and winter).
- Shy Albatross (Foraging likely in the South-east Marine Region, with 100% probability of exposure during summer and winter).

These receptors are exposed to floating oil, dissolved hydrocarbons, and entrained hydrocarbons at varying thresholds during both summer and winter conditions, making them most at risk during a LOWC event.

Socio-economic receptors within the EMBA include:

- Commercial fishing
- Beach users.
- Swimmers, divers and others using nearshore shallow waters.
- Recreational fishers.
- Commercial fishers.

Traditional Owners with cultural connections to the shoreline, waters and species, particularly cetaceans which are strongly linked to cultural stories and values, may be impacted in the event of shoreline hydrocarbon loading resulting from a LoC from the RGP.

7.16.4 Jurisdiction of Hazard

The jurisdictions for this hazard are outlined below.

Commonwealth waters	Victorian waters
YES	YES
The OSTM predicts that a LoC from rupture of the RGP of Yolla condensate will contact Commonwealth waters.	The OSTM predicts that a LoC from rupture of the RGP of Yolla condensate will result in surface, shoreline, dissolved phase hydrocarbons or entrained hydrocarbons reaching Victorian state waters

7.16.5 Evaluation of Environmental Risks

7.16.5.1 Cultural values and sensitivities

Beach understands that First Nations people are linked to the marine environment and may be affected by a change in the environment. The potential impact of a LoC event associated with the RGP as modelled by RPS (2025) is described in 7.16.2.3. Although no long term or permanent changes to the marine environment are expected, it is considered that the visual presence of floating oil may impact Sea Country at a spiritual level (i.e. rituals, Songlines, culturally important species) and could affect culturally important activities due to temporarily restricted access or affect culturally important species including whales.

Visible shoreline hydrocarbons have the potential to reduce the visual amenity of Sea Country. Condensate is likely to dissipate rapidly due to substantial wave action and is therefore unlikely to result in significant long-term impacts as tidal action is expected to lead to rapid weathering of any hydrocarbons in the intertidal area allowing populations of exposed communities to recover. Although no long term or permanent changes to marine environment are expected it is considered that the visual presence of shoreline oil may impact Sea Country at a spiritual level (i.e. rituals, songlines) and could affect culturally important activities due to temporarily restricted access.

The relatively low volume of in-water hydrocarbons means there may be short-term and localised consequences. Although no long-term or permanent changes to marine environment are expected the short-term contamination of Sea Country may result in impacts associated at a spiritual level (i.e. rituals, Songlines, culturally important species) and could affect culturally important activities due to temporarily restricted access or affect culturally important species including eels and whales.

Any impacts are anticipated to be short-term and localised. The consequence to cultural values and sensitivities is assessed as **Major (4)** and likelihood as **Remote (A)**, and the residual risk is **Medium** and of an acceptable level.

7.16.5.2 Fauna Groups, Habitats and Commercial Fishing

The evaluation of environmental risks to fauna, habitats and commercial fisheries resulting from a pipeline rupture is presented in Table 7.53, Table 7.54, Table 7.55, Table 7.56, Table 7.57, Table 7.58, Table 7.59, Table 7.60, Table 7.61 and Table 7.62. The criteria used to determine the sensitivity of receptors within the EMBA is outlined in Table 7.41.

Table 7.53: Potential risks of hydrocarbon release from pipeline on benthic fauna

General sensitivity to oiling – benthic fauna			
Sensitivity rating of benthic species and communities:	Low		
A description of benthic fauna in the EMBA is provided in:	Section 5.6.1		
An outline of the sensitivity aspect for benthic fauna is provided in	Section 7.16 Table 7.42		
Potential risk from a pipeline rupture			
Sea Surface	Water column – dissolved phase	Water column – entrained phase	Shoreline
Not applicable	There is predicted to be zones of low to moderate dissolved and entrained hydrocarbon exposure in the benthic layer in the shallow waters along the coast, predominantly between Phillip Island and Cape Paterson	The extent of entrained hydrocarbon exposure from the subsea pipeline rupture varies by season however the maximum distance at the 10 ppb threshold is estimated to be up to 117.97 km (east-Southeast) during winter. 80% of the oil mass is expected to evaporate within the first 12 hours under favourable conditions	Probability of oil accumulation (≥10 g/m^2) is higher in winter (84%) compared to summer (66%). Maximum oil ashore volume is 24.70 m^3 in summer and 23.71 m^3 in winter. Kilcunda shoreline has the highest probability of accumulation in summer (53%), while Venus Bay shoreline has the highest in winter (60%). It is predicted that the risk of toxicity effects on benthic assemblages will be low in the short-term and low in the medium- to long-term.
At this low threshold, the risks of toxic or sub- lethal impacts to benthic fauna or habitats are **Low**.			

Table 7.54: Potential risk of hydrocarbon release from pipeline on macroalgal communities

General sensitivity to oiling – macroalgal	
Sensitivity rating of macroalgal communities:	Low
A description of macroalgal communities in the EMBA is provided in:	Section 5.6.3
An outline of the sensitivity aspect for macroalgal communities is provided in	Section 7.16 Table 7.43
Potential risk from a pipeline rupture	

General sensitivity to oiling – macroalgal			
Sea Surface	Water column – dissolved phase	Water column – entrained phase	Shoreline
Not applicable	Emergent or floating vegetation in the intertidal zone along a ~20 km section of coastline from Kilcunda to Cape Paterson has a probability of exposure above the low threshold (1 g/m^2) during both summer and winter, along with the south-east (Marine). The impacts are likely to be similar to those described in Section 7.15.		
The Giant Kelp Forest TEC is not present in the EMBA for this scenario and will not be affected. Strong wave-action, an exposed coastline and the light characteristics of the Yolla condensate are all likely to assist in the rapid weathering of hydrocarbons and the risk of short- and long-term affects to macroalgal communities is expected to be **low**.			

Table 7.55: Potential risk of hydrocarbon release from pipeline on plankton

General sensitivity to oiling – plankton			
Sensitivity rating of plankton	Low		
A description of plankton in the EMBA is provided in:	Section 5.6.2		
An outline of the sensitivity aspect for plankton is provided in	Section 7.16 Table 7.44		
Potential risk from a pipeline rupture			
Sea Surface	Water column – dissolved phase	Water column – entrained phase	Shoreline
Not applicable	Plankton present in the open waters of the EMBA are expected to be widely distributed throughout the wider Bass Strait region. Those occupying the upper water column are particularly susceptible to direct effects from dissolved and dispersed hydrocarbons, such as through absorption. Any impacts are likely to be similar to those described in Section 7.15.		
Once background water quality conditions return following the rapid natural weathering and dispersion of the hydrocarbons, plankton populations are expected to recover rapidly due to recruitment of plankton from surrounding waters. Strong wave-action, an exposed coastline and the light characteristics of the Yolla condensate are all likely to assist in the rapid weathering of hydrocarbons and the risk of short- and long-term affects to plankton is expected to be **low**.			

Table 7.56: Potential risk of hydrocarbon release from pipeline on pelagic fish

General sensitivity to oiling – pelagic fish	
Sensitivity rating of pelagic fish	Low

General sensitivity to oiling – pelagic fish			
A description of pelagic fish in the EMBA is provided in:		Section 5.6.7	
An outline of the sensitivity aspect for pelagic fish is provided in		Section 7.16 Table 7.45	
Potential risk from a pipeline rupture			
Sea Surface	Water column – dissolved phase	Water column – entrained phase	Shoreline
Not applicable	Entrained Hydrocarbons phase 98% for White Shark - Foraging BIA in summer and winter. The extent of entrained hydrocarbon exposure from the subsea pipeline rupture varies by season however the maximum distance at the 10 ppb threshold is estimated to be up to 118 km (east-Southeast) during winter. 80% of the oil mass is expected to evaporate within the first 12 hours under favourable conditions. Some syngnathid species associated with nearshore reefs and rafts of floating seaweed may come into contact with surface hydrocarbons, however the predominantly low exposure is not expected to result in acute or chronic effects on pelagic fish species. Because the majority of fish tend to remain in the mid- pelagic zone, they are likely to come into contact with areas of low-moderate concentrations of dissolved hydrocarbons. Given the mobile nature of fish and the rapid weathering of Yolla condensate, brief periods of exposure to low-moderate concentrations of hydrocarbons in the water column are unlikely to result in acute or chronic effects to pelagic fish. Any impacts are likely to be similar to those described in Section 7.15.		
Strong wave-action, an exposed coastline and the light characteristics of the Yolla condensate are all likely to assist in the rapid weathering of hydrocarbons and the risk of short- and long-term affects to plankton is expected to be **low**.			

Table 7.57: Potential risk of hydrocarbon release from pipeline on cetaceans

General sensitivity to oiling – cetaceans			
Sensitivity rating of cetaceans		Low	
A description of cetaceans in the EMBA is provided in:		Section 5.6.5	
An outline of the sensitivity aspect for cetaceans is provided in		Section 7.16 Table 7.46	
Potential risk from a pipeline rupture			
Sea Surface	Water column – dissolved phase	Water column – entrained phase	Shoreline

General sensitivity to oiling – cetaceans		
Evaporation of the hydrocarbons is modelled to occur rapidly in this scenario, thus reducing the duration of the hydrocarbons persisting on the sea surface and reducing the risk to cetaceans. In the context of the size of the BIAs of the pygmy blue whales and southern right whales, and the duration and extent of sea surface hydrocarbons, the risk to cetaceans is low and does not represent a long-term threat at the population level of cetaceans migrating through or foraging in the EMBA.	Entrained Hydrocarbons have the highest probability of exposure (≥10 ppb) at 99% for Southern Right Whale in winter. There is a possibility that pygmy blue and southern right whales may be present in the EMBA depending when a LoC occurs. If present, these species (and other cetaceans) may be impacted to hydrocarbons in the manner described in Section 7.15. If large quantities of zooplankton exposed to the spill were ingested, chronic toxicity impacts to some individual cetaceans may occur.	Not Applicable
Strong wave-action, an exposed coastline and the light characteristics of the Yolla condensate are all likely to assist in the rapid weathering of hydrocarbons and the risk of short- and long-term affects to plankton is expected to be **low**.		

Table 7.58: Potential risk of hydrocarbon release from pipeline on pinnipeds

General sensitivity to oiling – pinnipeds			
Sensitivity rating of pinnipeds		Low	
A description of pinnipeds in the EMBA is provided in:		Section 5.6.6	
An outline of the sensitivity aspect for pinnipeds is provided in		Section 7.16 Table 7.47	
Potential risk from a pipeline rupture			
Sea Surface	Water column – dissolved phase	Water column – entrained phase	Shoreline
Evaporation of the hydrocarbons is modelled to occur rapidly in this scenario, thus reducing the duration of the hydrocarbons persisting on the sea surface and reducing the risk to cetaceans. In the context of the size of the area potentially affected by hydrocarbons represents a very small area in which fur-seals are known to forage in Bass Strait and is unlikely to be habitat critical to their survival. The risk to		The extent of entrained hydrocarbon exposure from the subsea pipeline rupture varies by season however the maximum distance at the 10 ppb threshold is estimated to be up to 117.97 km (east-Southeast) during winter. 80% of the oil mass is expected to evaporate within the first 12 hours under favourable conditions. This indicates that the majority of the condensate evaporates within the first day, leaving only a small proportion of oil floating on the water surface. Assessment of the risk to pinnipeds population is **low.**	Not Applicable

General sensitivity to oiling – pinnipeds
fur-seals for hydrocarbons in the water column is therefore considered to be **low**.
Strong wave-action, an exposed coastline and the light characteristics of the Yolla condensate are all likely to assist in the rapid weathering of hydrocarbons and the risk of short- and long-term affects to plankton is expected to be **low**.

Table 7.59: Potential risk of hydrocarbon release from pipeline on marine reptiles

General sensitivity to oiling – marine reptiles			
Sensitivity rating of marine reptiles		Low	
A description of marine reptiles in the EMBA is provided in:		Section 5.6.8	
An outline of the sensitivity aspect for marine reptiles is provided in		Section 7.16 Table 7.48	
Potential risk from a pipeline rupture			
Sea Surface	Water column – dissolved phase	Water column – entrained phase	Shoreline
Some individual transient marine reptiles may come into contact with low hydrocarbon exposure on the sea surface and very localised areas of moderate hydrocarbon exposure. This may result in irritation of skin or cavities. Specifically, the marine environment is habitat critical to turtles, however, due to the absence of turtle BIAs in Bass Strait and the low chance of encountering turtles in Bass Strait in general, the risk to marine reptiles (individuals or populations) is considered to be **low**.			There are no turtle nesting beaches within the EMBA for this scenario, so the risk to turtles from shoreline oiling is **low.**

Table 7.60: Potential risk of hydrocarbon release from pipeline on seabirds and shorebirds

General sensitivity to oiling – seabirds and shorebirds			
Sensitivity rating of seabirds and shorebirds		Low	
A description of seabirds and shorebirds in the EMBA is provided in:		Section 5.6.4	
An outline of the sensitivity aspect for seabirds and shorebirds is provided in		Section 7.16 Table 7.49	
Potential risk from a pipeline rupture			
Sea Surface	Water column – dissolved phase	Water column – entrained phase	Shoreline

General sensitivity to oiling – seabirds and shorebirds			
Several bird species are identified as receptors potentially exposed to hydrocarbons during a pipeline rupture event, foraging over an extensive area and are distributed over a wide geographic area. Seabirds rafting, resting, diving or feeding at sea have the potential to come into contact with oil. However, this level of exposure is not expected to result in the lethal impacts of feather matting and hypothermia. Given the extensive ocean foraging habitat available to species such as albatross and petrel, the localised and duration of the hydrocarbon exposure makes it unlikely that a spill will limit their ability to forage for unaffected prey, nor will the unlikely exposure result in permanent injury or mortality. Therefore, the overall risk to seabirds is considered **low**.	The extent of area affected by the dissolved hydrocarbons at the moderate threshold is up to 68.01 km from the scenario rupture location. It is these areas where sub-lethal or toxic effects to fish may occur, enabling opportunistic feeding by seabirds. Penguins may be especially vulnerable to oil because they spend a high portion of their time in the water and readily lose insulation and buoyancy if their feathers are oiled (Hook et al., 2016). The Little Penguin is known for foraging Northwestern edge of Cape Barren Island. Assessment of the risk to seabird, given their mobility is **low.**	The extent of entrained hydrocarbon exposure from the subsea pipeline rupture varies by season however the maximum distance at the 10 ppb threshold is estimated to be up to 117.97 km (east-Southeast) during winter. 80% of the oil mass is expected to evaporate within the first 12 hours under favourable conditions. This indicates that the majority of the condensate evaporates within the first day, leaving only a small proportion of oil floating on the water surface. Assessment of the risk to seabird, given their mobility is **low.**	The total length of shoreline exposed to oil accumulation at or above the 10 g/m^2 threshold that may have biological impacts on birds is 11.5 km in summer and 12.1 km in winter. This section of coastline comprises wide sandy beaches that provide habitat for shorebird species such as hooded plovers, terns and snipes, and nesting habitat for seabird species. Condensate is unlikely to persist on the surface of sandy beaches because it quickly penetrates porous sediments (NOAA, 2012). This behaviour limits the duration of exposure to birds using the shoreline. Shorebirds foraging for food in intertidal areas or along the high tide mark and splash zone may encounter weathered hydrocarbons that may be brought back to nests. Hydrocarbon entering the sandy nests of hooded plovers, terns or other bird species is likely to percolate through the sand and not accumulate in the feathers of adults or young. Toxicity effects from ingestion of contaminated prey caught in the intertidal zone or from direct exposure or transport back to nests are unlikely, as the volatile components are likely to have flashed off prior to stranding. The populations of seabird and shorebird species within the EMBA have a wide geographic range, meaning that impacts to individuals or a population at one

General sensitivity to oiling – seabirds and shorebirds	
	location will not necessarily extend to populations at other un-impacted locations. Therefore, the risk of such contact is **low**.

Table 7.61: Potential risk of hydrocarbon release from pipeline on sandy beaches

General sensitivity to oiling – sandy beaches	
Sensitivity rating of sandy beaches	Low
A description of sandy beaches in the EMBA is provided in:	Section 5.4.7
An outline of the sensitivity aspect for sandy beaches is provided in	Section 7.16 Table 7.50
Potential risk from a pipeline rupture	
Shoreline	
The probability of oil accumulation (≥10 g/m^2) is higher in winter (84%) compared to summer (66%). Maximum oil ashore volume is 24.70 m^3 in summer and 23.71 m^3 in winter. Kilcunda shoreline has the highest probability of accumulation in summer (53%), while Venus Bay shoreline has the highest in winter (60%). While there is a probability of low exposure of contact to shorelines in the Kilcunda region, this is unlikely to result in significant long-term impacts as tidal action is expected to lead to rapid weathering of any hydrocarbons in the intertidal area and populations of exposed communities would rapidly recover. Short-term impacts to tourism and other human uses of the beach may occur as a result of temporary beach closures to protect human health, but this would be due only to perceptions of a polluted environment rather than a requirement to protect the public from persistent pollution. As such, risks to sandy beaches is **low**.	

Table 7.62: Potential risk of hydrocarbon release from pipeline on commercial fishing

General sensitivity to oiling – commercial fishing	
Sensitivity rating of commercial fishing	Low
A description of commercial fishing in the EMBA is provided in:	Section 5.9.5
An outline of the sensitivity aspect for commercial fishing is provided in	Section 7.16 Table 7.51
Potential risk from a pipeline rupture	

General sensitivity to oiling – commercial fishing			
Sea Surface	Water column – dissolved phase	Water column – entrained phase	Shoreline
A short-term fishing exclusion zone may be implemented by AFMA or the VFA. Given the temporary nature of any surface hydrocarbons and the low fishing intensity in the EMBA, there are unlikely to be significant impact on fisheries in terms of lost catches.	The predicted maximum distances of dissolved oil exposure are: Low threshold (10 ppb): Up to 8.16 km (southeast, winter). Moderate threshold (50 ppb): Up to 1.16 km (southwest, winter).	The extent of entrained hydrocarbon exposure from the subsea pipeline rupture varies by season however the maximum distance at the 10 ppb threshold is estimated to be up to 117.97 km (east-Southeast) during winter.	Vessels use local ports, which are not included within the EMBA. As such, there are no impacts to vessels in port or associated infrastructure (e.g., marinas and jetties).
A short-term fishing exclusion zone may be implemented by AFMA or the VFA. The areas dissolved and entrained exposure thresholds represent very small areas available to commercial fishing. Impacts to fishery areas such as the Rock Lobster fishery know for fish abundance and habitat may be subject to temporary and precautionary exclusion from fishing grounds until water quality monitoring verifies the absence of residual hydrocarbons. The risk to these fisheries is therefore considered **moderate**.			
Commonwealth fisheries that are known to fish within the subsea pipeline rupture EMBA with recent intensity include: • Shark gillnet fishery; and • Danish-seine fishery. Victorian fisheries that occur within the subsea pipeline rupture EMBA with recent intensity include: • Rock lobster fishery; • Wrasse fishery; • Octopus fishery; • Ocean trawl fishery; and • Inshore trawl fishery.			

7.16.6 Cumulative Risk Evaluation

There is a low potential for cumulative impacts resulting from a LoC associated with other activities in the Operational Area or when combined with other marine activities in the region. There are no other gas (or active oil) pipelines in close proximity to the offshore RGP. A LoC from the RGP and other gas pipelines in eastern Bass Strait is extremely unlikely to occur either simultaneously or in consecutive order. Spill modelling undertaken for gas pipelines in eastern Bass Strait indicates no overlap of hydrocarbon loading for affected shorelines, so there would be no cumulative impacts even in the extremely unlikely event that the RGP and another gas pipeline were to rupture simultaneously.

The light nature of Yolla condensate also means that most of any released hydrocarbons evaporates within 24 hours, further minimising the likelihood and severity of cumulative impacts. Despite short-term localised toxicity to shoreline fauna and habitats, strong wave action, the light condensate properties, and limited spill volumes are expected to minimise long-term environmental impacts.

7.16.7 Risk Assessment

A risk assessment for the subsea pipeline rupture is presented in Table 7.63

Table 7.63: Risk assessment for the subsea pipeline rupture

ALARP decision context			
Impact decision framework context	Type B.		
Activity	Nothing new or unusual, represents business as usual, well understood activity, good practice is well defined.		
Level of certainty of risk	Some uncertainty.		
Stakeholder influence	No conflict with company values, no partner interest, no significant media interest.		
Risk Assessment (inherent)			
Phase	**Likelihood**	**Consequence**	**Risk**
Operations	Unlikely (C)	Major (4)	Medium
CoP	Highly unlikely (B)	Serious (3)	Medium
Preservation	Highly unlikely (B)	Moderate (2)	Low
Assessment of Proposed Control Measures			
Control	**Cost/benefit analysis**		**Implemented?**
An Offshore Pipeline Safety Case is in place and implemented. *(All phases)* *(Commonwealth and Victorian state waters)*	A NOPSEMA-accepted Offshore Pipeline Safety Case is a legislative requirement that demonstrates how the risks to the integrity of the pipeline are reduced to ALARP. The Pipeline Integrity Management (CDN/ID 17278891), linked to the Safety Case, is the primary control used to manage the integrity of the RGP. This is feasible and is routine industry practice. The costs associated with maintaining the Offshore Pipeline Safety Case and associated integrity management systems are not grossly disproportionate to the environmental benefit achieved through reducing the likelihood of a pipeline loss of containment event.		Yes **(RSK06-CM01)**

Assessment of Proposed Control Measures		
Maritime navigation charts include pipeline. *(All phases)* *(Commonwealth and Victorian state waters)*	It is an AHO requirement that offshore petroleum titleholders provide pipeline location data so it can be included on navigation charts. This aims to ensure that marine users are aware of the infrastructure and in the case of pipelines, this minimise the risk of impacts from anchor drop and drag on the pipeline. The RGP (and Yolla-A platform) are marked on the navigational charts. Provision of pipeline location data is undertaken through existing regulatory and hydrographic processes and incurs minimal additional cost. The associated costs are not grossly disproportionate to the environmental benefit achieved through reducing the likelihood of third-party interference and external damage.	Yes **(RSK06-CM02)**
Pipeline inspection, maintenance and monitoring program scheduled in CMMS. *(All phases)* *(Commonwealth and Victorian state waters)*	This control reduces the likelihood of pipeline failure through the systematic and timely identification of defects. This control is feasible as it is standard industry practice and reflects established asset integrity management to prevent LoC. The associated costs are not grossly disproportionate to the environmental benefit achieved through reducing the likelihood of pipeline failure.	Yes **(RSK06-CM03)**
Continuous monitoring of pipeline production parameters by qualified and trained operators. *(All phases)* *(Commonwealth and Victorian state waters)*	This control reduces the likelihood of a LoC through timely identification and management of abnormal conditions. This control is feasible as it is standard industry practice and reflects existing controls to maintain safe pipeline operations. The associated costs are not grossly disproportionate to the environmental benefit achieved through early identification and management of abnormal operating conditions.	Yes **(RSK06-CM04; -CM05)**
The OPEP is implemented in the event of a LoC from a pipeline rupture. *(Operations phase)* *(Commonwealth and Victorian state waters)*	This control is required under the OPGGS (Environment) Regulations and represents standard industry practice. Beach has a spill response training program in place for relevant personnel. This ensures Beach is well prepared to quickly respond to a spill, thereby minimising the extent of impacts to the marine environment. Maintenance of response capability and training forms part of routine operations and regulatory compliance. The associated costs are not grossly disproportionate to the environmental benefit achieved through improving preparedness and minimising potential environmental impacts following a pipeline release.	Yes **(RSK06-CM10; -CM11)**
The OSMP is implemented in the event of a LoC from a pipeline rupture. *(Operations phase)* *(Commonwealth and Victorian state waters)*	This control is required under the OPGGS (Environment) Regulations and represents standard industry practice. Specialist consultants maintain availability and training to support Beach in the event the OSMP needs to be implemented. An OSMP ensures Beach is well prepared to quickly undertake operational and scientific studies, thereby supporting the future assessment of impacts resulting from the spill. The OSMP can be implemented through existing specialist response arrangements and regulatory frameworks. The associated costs are not grossly disproportionate to the	Yes **(RSK06-CM012; -CM13)**

Assessment of Proposed Control Measures		
	environmental benefit achieved through supporting environmental impact assessment and adaptive response following a spill.	
Corrosion management. *(All phases)* *(Commonwealth and Victorian state waters)*	Corrosion management reduces the likelihood of loss of containment by ensuring corrosion threats are identified, monitored and managed before pipeline integrity is compromised. Activities such as cathodic protection monitoring, corrosion inhibitor dosing, corrosion monitoring and integrity assessments are established industry practices and form a core component of pipeline integrity management. The control is readily implemented through existing asset integrity systems and provides a significant reduction in the likelihood of pipeline failure. The associated costs are not grossly disproportionate to the environmental and safety benefits achieved through maintaining pipeline integrity.	Yes **(RSK06-CM08)**
Pipeline isolation capability. *(All phases)* *(Commonwealth and Victorian state waters)*	Pipeline isolation systems reduce the potential consequences of a LoC event by limiting the volume of hydrocarbons released following a pipeline failure. Isolation and shutdown systems are established design features of the BassGas facilities and are maintained and tested through existing integrity management and maintenance programs. Maintaining isolation capability is standard industry practice, is readily achievable within existing management systems and provides a substantial environmental benefit by minimising the extent and duration of a release should a LoC occur. The associated costs of maintaining and testing isolation systems are not grossly disproportionate to the environmental benefit achieved through reducing the volume and duration of a release following a loss of containment event.	Yes **(RSK06-CM09)**
Trenching/burial of the RGP for protection from external damage. *(Operations phase)* *(Commonwealth and Victorian state waters)*	The RGP was not buried when it was installed. Retrospective burial of the RGP may reduce the likelihood of external damage and LoC by increasing physical protection. However, this would result in unnecessary seabed disturbance and the loss of habitat that has formed on the pipeline for little benefit, given there has been no third-party interference with the RGP. Given the absence of third-party interference incidents, the relatively low likelihood of future external damage, and the environmental disturbance that would result from retrospective burial, the costs and impacts associated with implementation are considered grossly disproportionate to the incremental reduction in pipeline rupture risk achieved.	No
Real-time leak detection and well shut in. *(Operations and CoP phases only)*	Such a system would allow a LoC from the RGP to be detected and stop gas flow immediately, thereby minimising the volume of hydrocarbons released. There are many variables associated with the pipeline pressure profile, and it is dependent on the gas flow from Yolla-A and export rates from the LLGP. A subsea leak would need to be significant to be immediately detected.	No

Assessment of Proposed Control Measures		
(Commonwealth and Victorian state waters)	A significant leak would already be detected through existing pipeline pressure monitoring systems, making additional real-time leak detection largely redundant. The costs associated with implementing specialist leak detection systems are therefore considered grossly disproportionate to the incremental environmental benefit achieved.	
Install more sacrificial anodes along the RGP. *(All phases)* *(Commonwealth and Victorian state waters)*	The number and type of anodes required to adequately protect the pipeline from corrosion was determined during the design phase. Routine inspections monitor the system for adequate cathodic protection and anode wastage. Unless the anodes have depleted or become inactive and corrosion is found to be occurring, adding more will not dramatically reduce corrosion (and therefore LoC) risk. Given the existing cathodic protection system is performing as designed and inspection data has not identified corrosion issues requiring additional protection, the costs associated with installing further anodes are considered grossly disproportionate to the incremental reduction in risk achieved.	No
Undertake more regular pigging of the pipeline. *(Operations phase)* *(Commonwealth and Victorian state waters)*	Five-yearly pigging is standard for this type of asset and is the frequency required in the integrity management plans. There would need to be a significant driver for an increased frequency, which does not currently exist for the pipeline. There are no significant anomalies detected by ILI that warrant more regular pigging. The high cost of contracting vessels, tooling and personnel for more regular pigging is therefore grossly disproportionate to the low risk of a LoC from the pipeline.	No
Undertake more regular ROV inspections of the pipeline. *(All phases)* *(Commonwealth and Victorian state waters)*	As per pigging described above, five-yearly ROV inspections are a standard requirement unless there is reason to increase inspection frequency. The results of past pipeline ROV inspections have not identified any reason to move to more frequent inspections. The high cost of contracting vessels, tooling and personnel for more regular ROV inspections is therefore grossly disproportionate to the low risk of a pipeline LoC.	No

Environmental Controls and Performance Measurement			
EPO	**Control measure**	**EPS**	**Measurement criteria**
RSK06-EPO01 No release of hydrocarbons or nitrogen to the marine environment due to pipeline LoC.	**Preventative (RGP, Commonwealth and Victorian state waters)**		
	RSK06-CM01 The NOPSEMA-accepted BassGas Offshore Facilities Safety Case (CDN/ID 19061536) is in place, which describes the controls in place to reduce the likelihood of a pipeline LoC. The Safety Case:	**RSK06-EPS01** Pipeline operations meet the requirements of the OPGGS (Safety) Regulations 2024 (Cth).	**RSK06-MC01.1** An acceptance letter from NOPSEMA demonstrates acceptance of the BassGas Offshore Pipeline Safety Case. **RSK06-MC01.2**PMS records verify maintenance of the RGP is undertaken in

Assessment of Proposed Control Measures		
• Identifies hazards that have the potential to a cause a Major Accident Event (MAE) • Details the assessment of MAE risks • Describes the management systems in place to ensure controls are effectively applied • Describes the operation, monitoring, inspection, maintenance and repair of the platform, pipeline and subsea facilities • Describes the leak detection, emergency shutdown and isolation systems to reduce the extent of LoC of hydrocarbons. *(All phases)*		accordance with the Safety Case.
RSK06-CM02 The RGP is marked on maritime navigation charts to ensure pipeline location is communicated to other users. *(All phases)*	**RSK06-EPS02** AHO navigation chart requirements are met.	**RSK06-MC02** Maritime navigation charts verify the RGP is marked.
RSK06-CM03 Pipeline operation, inspection and maintenance activities are scheduled, recorded and reported in the PMS. This includes (but is not limited to): • Glycol dehydration of the well stream (to minimise corrosion) • Corrosion inhibitor injection (continuous) • Online monitoring via corrosion probes • ROV inspections • Intelligent pigging inspections. *(All phases)*	**RSK06-EPS03** All RGP operation, inspection and maintenance activities meet the requirements in CMMS, thereby complying with the Safety Regulations and Environment Regulations with regard to avoiding MAEs.	**RSK06-MC03.1** PMS records verify operation, inspection and maintenance of the RGP is undertaken in accordance with the NOPSEMA-accepted Safety Case. **RSK06-MC03.2** Biannual cathodic protection survey reports verify the Safety Case is implemented. **RSK06-MC03.3** Monitoring reports (e.g., ROV campaigns, intelligent pigging) verify ongoing inspection and maintenance are undertaken as scheduled.

Assessment of Proposed Control Measures			
	RSK06-CM04 Pipeline production parameters, including flows, pressures, temperatures and erosion are monitored on a 24-hr basis by qualified and trained operators so that abnormalities are quickly detected and resolved. *(All phase)*	**RSK06-EPS04** Monitoring systems and trained operators maintain continuous surveillance of pipeline parameters, ensuring abnormal conditions are detected and responded to in time to prevent LoC and comply with Safety and Environment Regulations.	**RSK06-MC04** Electronic records are maintained to verify continuous monitoring of pipeline parameters and are available for review.
	RSK06-CM05 Operations personnel are qualified, trained and certified as competent to operate and maintain the pipeline. *(All phases)*	As per **RSK06-EPS01**	**RSK06-MC05** The BassGas Workforce Capability Requirements Matrix is maintained up-to-date and verifies that operators are qualified, trained and certified as capable.
	RSK06-CM06 The Beach Lifting and Load Safety Operations Procedure (CDN/ID 3674901) is used for all transfers over the RGP to minimise the risk of suspended equipment dropping onto the RGP that could lead to a rupture. *(All phases)*	As per **RSK06-EPS01**	**RSK06-MC06** Completed PTWs and/or JSAs verify that the procedure is implemented.
	RSK06-CM07 Approval from the Yolla PIC (or Field Manager) must be granted to Vessel Masters seeking to work over/alongside the offshore RGP in order to minimise the risk of anchor drag or dropped objects. *(All phases)*	**RSK06-EPS07** The RGP is not damaged by dropped objects or anchor drag as a result of Beach activities.	**RSK06-MC07** The communications log verifies permission is granted for vessels working along the pipeline.
	RSK06-CM08 Corrosion monitoring and control activities are undertaken in accordance with the Pipeline Integrity Management Plan. *(All phases)*	**RSK04-EPS08** The Beach Pipeline Integrity Management Plan is implemented in order to prevent pipeline failure.	**RSK06-MC08** PMS records demonstrate corrosion management requirements are implemented.
	RSK06-CM09 Pipeline isolation and shutdown systems are maintained and tested in accordance with the Pipeline Integrity Management Plan. *(All phases)*	**RSK06-EPS09** The Beach Pipeline Integrity Management Plan is implemented in order to ensure pipeline isolation systems remain functional and capable of limiting hydrocarbon release.	**RSK06-MC09** PMS records and shutdown valve testing reports verify isolation systems are maintained and tested.
RSK06-EPO02	**Response**		

Assessment of Proposed Control Measures			
Respond to a hydrocarbon release in the event of a LoC from the RGP in accordance with the OPEP.	**RSK06-CM10** Emergency spill response capability is maintained, and response actions are implemented in accordance with the NOPSEMA-accepted OPEP, ensuring readiness, adequacy of resources and compliance with regulatory requirements. *(All phases)*	**RSK06-EPS10** Emergency spill response capability is maintained in accordance with the NOPSEMA-accepted OPEP.	**RSK06-MC10.1** A current, approved OPEP is available and accessible. **RSK06-MC10.2** OPEP training schedule is available and verifies all office-based, LLGP and platform crew requiring training are identified and trained. **RSK06-MC10.3** Emergency response training and drill records demonstrate OPEP competency and preparedness.
	RSK06-CM11 The OPEP is implemented in the event of an LoC. *(Operations and CoP phases)*	**RSK06-EPS11** The emergency response requirements of the OPGGS(E) Regulations 22(9)(10) are met.	**RSK06-MC11** Incident reports verify emergency response actions undertaken align with OPEP procedures.
RSK06-EPO03 Characterise the environmental impacts resulting from a pipeline LoC in accordance with the OSMP.	**Monitoring**		
	RSK06-CM12 Operational and scientific monitoring capability is maintained in accordance with the OSMP. *(All phases)*	**RSK06-EPS12** Operational and scientific monitoring capability is maintained in accordance with the NOPSEMA-accepted OSMP.	**RSK06-MC12.1** The OSMP is reviewed and updated at defined intervals, with records demonstrating it remains current, approved and consistent with the NOPSEMA-accepted OPEP. **RSK06-MC12.2** Quarterly and annual assurance reviews verify OSMP monitoring capability is in place.
	RSK05-CM13 Operational and scientific monitoring data will be collected in accordance with the OSMP. *(All phases)*	**RSK06-EPS13** Post-release monitoring is undertaken in accordance with the OSMP.	**RSK06-MC13.1** Emergency response records confirm the OSMP was implemented post-spill. **RSK06-MC13.2** Daily operations reports and study reports verify that the OSMP was implemented.

Risk Assessment (residual)			
Phase	**Likelihood**	**Consequence**	**Risk**
Operations	Remote (A)	Moderate (2)	Low

CoP	Remote (A)	Moderate (2)	Low
Preservation	Remote (A)	Minor (1)	Low

ALARP Decision Justification

With the controls outlined in this table in place, this risk has been assessed as 'Low' and is considered to be good practice (Decision Context A). This means any additional or alternative control measures do not lower the residual consequence further or would be grossly disproportionate to the residual consequence. Therefore, a residual risk score ranking of 'Low' is considered to be ALARP.

Acceptability Assessment

Defined acceptable level	The risk of a pipeline rupture can never be entirely eliminated. However, operating the pipeline in accordance with the NOPSEMA-accepted Safety Case and undertaking regular inspections and maintenance reduces the risk of a rupture.	
Internal context	The proposed management of the risk is aligned with the Beach Environment Policy. Activities will be undertaken in accordance with the Implementation Strategy (Section 8).	
External context	The BassGas Offshore Operations SEP is implemented to ensure that stakeholders are aware of operations issues. Stakeholders have not raised concerns about the unplanned release of hydrocarbons.	
Legislative context	The control measures outlined in this EP align with the requirements of: ○ *OPGGS Act 2006* (Cth) ▪ Section 572A-F (Polluter pays for escape of petroleum) ○ *OPGGS Act 2010* (Vic) ▪ Section 29 (Notifying reportable incidents) ○ *POWBONS Act 1986* (Vic) ▪ Section 10 (Duty to report certain incidents involving oil and oily mixtures) ○ State Environment Protection Policy (Waters of Victoria) ▪ Clause 38 (Spills, illegal discharges and dumping of waste).	
Industry practice	The control measures outlined in the below-listed guidelines and codes of practice demonstrate that BPEM will be implemented for this activity.	
	Environmental management in the upstream oil and gas industry (IOGP-IPIECA, 2020)	The control measures listed in this table meet the relevant mitigation measures listed for offshore activities with regard to: • Pipeline rupture – pipelines are stabilised and protected, periodic monitoring takes place by pigging, corrosion is monitored, SSS and ROV are used for periodic inspections, inspections and maintenance take place, spill preparedness and emergency response measures are in place **(RSK06-CM01; -03)**.
	Best Available Techniques Guidance Document on Upstream Hydrocarbon Exploration and Production (European Commission, 2019)	No guidance is provided regarding preventing or managing an offshore LoC, other than having a spill contingency plan in place. An OPEP is in place for BassGas operations.

ALARP Decision Justification		
	Environmental, Health and Safety Guidelines for Offshore Oil and Gas Development (World Bank Group, 2015)	Guidelines met with regard to: • Section 75 (Spills) - Conducting a spill risk assessment, implementing personnel training and field exercises, ensuring spill response equipment is available **(RSK06-CM10)**. • Sections 76-79 (Spill response planning) - A spill response plan should be prepared **(RSK06-CM10)**.
	Code of Environmental Practice (APPEA, 2008)	The control measures listed in this table meet the following offshore development and production objectives: • To reduce the risk of any unplanned release of material into the marine environment to ALARP and an acceptable level.
Environmental context	MNES	
	AMPs	No intersection or risks.
	Ramsar Wetlands	No intersection or risks.
	NIWs	There is a 7% probability of entrained hydrocarbons at the 10 ppb (low) threshold reaching the Western Port NIW.
	TECs	No intersection or risks.
	Nationally threatened and migratory species	Some nationally threatened species and migratory species have the potential to be present in the EMBA, particularly within their BIAs, but as evaluated in the previous tables in this section, the risks to individuals or populations of threatened and migratory species are mostly minor.
	Other matters	
	State marine parks	There is overlap between the low and moderate exposure thresholds for entrained hydrocarbons to the following Victorian marine parks: • Bunurong MNP • Phillip Island NP • Wilsons Promontory NP • Kilcunda CR. Any overlap at the time of a spill will be temporary and will not have significant effects on the values of these marine parks.
	Species Conservation Advice/Recovery Plans/Threat Abatement Plans	Marine pollution is a threat identified for albatross and giant-petrels in the National recovery plan for threatened albatross and giant petrels 2022 (DCCEEW, 2022). Population monitoring is the suggested action to deal with marine pollution. The conservation advice and management plans for blue, humpback, sei and fin whales identify hydrocarbon spill as threats, though there are no specific aims to address this.
ESD principles	The EIA presented throughout this EP demonstrates that ESD principles (a), (b), (c) and (d) are met (noting that principle (e) is not relevant).	

Environmental Monitoring
As per the OPEP and OSMP

ALARP Decision Justification	
Record Keeping	
• Pipeline Safety Case and acceptance letter. • PMS records. • Monitoring reports. • Audit reports. • CMMS records. • Daily operations reports. • PTWs. • JSAs. • Quarterly assurance review. • Annual assurance review.	• Maritime navigation charts. • Cathodic protection survey reports. • BassGas Workforce Capability Requirements matrix. • OPEP training schedule and exercise reports. • OSMP • Incident reports. • Communications log. • Emergency response records.

7.17 RISK 7: Marine Diesel Oil Release

7.17.1 Source of Aspect

Offshore vessels operating in the area use marine diesel oil (MDO) as their primary fuel. A collision involving a contracted or third-party vessel could result in an MDO fuel spill. Such incidents may stem from various causes, including mechanical failure, loss of dynamic positioning, navigational errors, or floundering in adverse weather. Additionally, poor coordination and communication with third-party vessels, equipment malfunctions, limited visibility, and rough sea conditions can increase the risk of collision. These events can lead not only to fuel or product spills, but also to injuries and asset damage.

An MDO release may occur from the PSV or from vessels undertaking inspection, maintenance and repair activities around the platform or along the RGP. An MDO release may occur as a result of:

- A vessel-to-vessel collision.
- A vessel-to-platform collision.
- Vessel grounding.
- Vessel-to-platform refuelling (e.g., top up of crane pedestal).
- Vessel refuelling.
- Equipment failure.

In the last five years, there have been no MDO spills from vessels associated with the BassGas operations.

This aspect is relevant to all phases. During all phases, MDO may be present onboard vessels and in facility equipment, creating the potential for an MDO spill resulting from vessel collision, bunkering activities, equipment failure or LoC from fuel storage systems. The likelihood and frequency of vessel activities is expected to decrease during the CoP and Preservation phases; however, the hazard remains relevant while MDO inventories and support vessel activities are present.

Hazard	Source	Operations	CoP	Preservation
MDO Spill	Vessel collision	✓	✓	✓
	Vessel refuelling/bunkering	✓	✓	✓
	Vessel operations	✓	✓	✓
	IMR activities	✓	✓	✓
	Platform MDO storage and transfers	✓	✓	✓

7.17.1.1 Spill Location

For this assessment, the spill location chosen was at 3 NM from shore along the RGP, representing the boundary between Victorian and Commonwealth waters. This was chosen as a representative point close to coast to represent worst-case conditions for a shoreline spill for a vessel undertaking inspection or maintenance on the pipeline but also represents an area of shallow water that is subject to more vessel traffic than points further south along the raw gas pipeline. The OSTM results for this location can be considered representative of other locations along the RGP, albeit with the nearshore areas having stronger tidal currents and surface ocean currents than in more open waters. To this effect, for surface oil, the EMBA is displayed as a buffer along the entire length of the RGP rather than just the spill location.

7.17.1.2 Spill Volume

AMSA's Technical Guidelines for preparing Contingency Plans for Marine and Coastal Facilities (AMSA, 2015, pg 24) indicates that an appropriate spill size for a vessel collision (a non-oil tanker) should be based on the volume of the largest tank, while the volume for a non-major grounding should be based on the total fuel volume of one tank. Beach has used this guidance in determining the volume to be modelled for this study. The largest fuel tank on the PSV formerly used regularly by Beach (noting that vessels of opportunity are currently used), the *Tek Ocean Spirit*, is 99 m^3, so the 300 m^3 spill scenario is considered conservative (even for vessels that may undertake inspections and maintenance along the pipeline).

Potential MDO spills from the platform have not been modelled because the volumes are small and will not extend far beyond the platform compared with the worst-case modelled scenario for MDO. These scenarios are:

- Vessel-to-platform MDO refuelling – the quantity held in the transfer hose is 160 litres. If spilled, this would be unlikely to travel more than several hundred metres from the platform before weathering. Such a spill has not occurred at Yolla-A to date.

- Loss of MDO during refuelling the crane pedestal – the pedestal holds 8.4 m^3 of MDO. This would be unlikely to travel more than several kilometres from the platform before weathering. Such a spill has not occurred at Yolla-A to date.

7.17.2 Known and Potential Environmental Risks

The potential surface release of marine diesel oil (MDO) from a vessel collision during associated BassGas activities are considered credible spill scenarios and form the primary focus for OSM.

Potential environmental risks resulting from a surface release of MDO:

- Localised reduction of water quality.

As a result of a change in water quality, further secondary potential impacts that may occur are:

- Injury or death of marine life; pelagic fauna, avifauna.
- Change in ecosystem dynamics.
- Localised air quality reduction due to GHG emissions.
- Change to the conservation, socio-economic, and cultural values and sensitivities, such as temporary access and restriction to coastal marine reserves and recreational coastline.
- Disruption to third-party operations such as shipping and commercial fishing (e.g., potential loss of fisheries, resulting from temporary fisheries closures, mortalities from fish stocks, or tainted catches).
- Damage to third-party infrastructure and business interruption, such as the Victorian desalination plant (at Wonthaggi), contamination of the water supply, and disruption to the supply of water services.

7.17.2.1 MDO Properties

MDO is primarily composed of n-alkane hydrocarbons, which are responsible for diesel's distinctive compression ignition characteristics. These hydrocarbons typically have carbon chains ranging from C11 to C28, although the exact composition may vary depending on specifications, such as winter or summer grades.

Although MDOs are generally regarded as non-persistent oils, many contain a small proportion (approximately 3–7% by volume) of hydrocarbons classified as 'persistent' according to the IOPC Fund definition (i.e., more than 5% boiling above 370°C; see Table 7.64).

7.17.2.2 MDO Characteristics

Table 7.64 Summary of the MDO spill OSTM inputs.

MDO Characteristics	
Density (kg/m^3)	829 at 25°C
API	37.6
Dynamic viscosity (cP)	4.0 at 25°C
Pour point (°C)	-14
Hydrocarbon classification property category	Group II
Hydrocarbon classification	Light persistent oil

Source RPS, 2025

Diesel fuels are light, refined petroleum products with a relatively narrow boiling range. When spilled on water, most of the oil evaporates or disperses naturally within hours to days. Being much lighter than water, diesel cannot sink to accumulate on the seabed as pooled or free oil.

Wind and wave action can disperse 25–50% of hydrocarbons from surface slicks into the sea, while dissolution accounts for an additional 1–10% loss. Although most MDO evaporates rapidly, residues after weathering often contain n-alkanes, iso-alkanes, and naphthenic hydrocarbons.

Minor quantities of polycyclic aromatic hydrocarbons (PAHs) are also present in MDO.

When spilled on water, MDO rapidly spreads to form a thin film. Its low viscosity enables hydrocarbons to become physically dispersed as fine droplets into the water column when winds exceed 10 knots.

Subsurface droplets of MDO, whether naturally or chemically dispersed, behave differently from oil on the sea surface. Underwater, diesel droplets move entirely with currents, whereas on the surface, they are influenced by both wind and currents.

Natural dispersion of MDO reduces the amount of hydrocarbons available to evaporate into the air. While this lowers the volume of hydrocarbons on the water surface, it increases the concentration of inhalable hydrocarbons in the air.

This increased exposure to hydrocarbon vapors can affect any air-breathing animals, including whales, dolphins, seals, and turtles.

Diesel oil exhibits higher aquatic toxicity than many other crude oils due to its high percentage of toxic, water-soluble components (such as BTEX and PAHs), greater tendency to become naturally entrained in the water column (compared to heavy fuel oil), higher solubility in water, and increased potential to bioaccumulate in organisms. Diesel fuel oils are less sticky and less viscous than black oils. When stranded on shorelines, they penetrate porous sediments quickly but are also washed off easily by waves. In open water, diesel oil spills are rapidly diluted, making fish kills rare except in confined or shallow waters (based on NOAA, 2012 and APASA (2012).

7.17.2.3 Oil Spill Trajectory Modelling

The scenario based on a Surface Release of MDO 3 NM from Shore, predicted significant risks of shoreline accumulation and hydrocarbon exposure to marine receptors, with greater impacts observed during winter conditions.

The MDO scenario involves a 300 m^3 surface release over 6 hours (50 m^3 per hour) at a location 3 nm from the shore, with results derived from 200 spill simulations (100 per season) tracked for 100 days during summer (November–March) and winter (April–October).

The maximum distance from the release location to entrained hydrocarbons exposure thresholds varies by season however the maximum distance at the 10 ppb threshold is estimated to be up to 117.97 km (east-Southeast) during winter.

A summary of the modelling results determined the following:

- Floating Oil Exposure:
    - Maximum distances range from 4.27 km to 49.27 km depending on the threshold and season.
    - Highest probability of exposure occurs in the Little Penguin - Foraging BIA, with 69% in summer and 38% in winter.

- Quickest exposure times are 0.06 days in summer and 0.05 days in winter.

- Shoreline Accumulation
  - Probability of oil accumulation is 94% in summer and 100% in winter.
  - Minimum time before accumulation is 0.51 days in summer and 0.48 days in winter.
  - Maximum oil volume ashore is 51.64 m^3 in summer and 98.73 m^3 in winter.
  - Shoreline accumulation lengths vary by threshold and season, with maximum lengths of 58.41 km in winter and 50.81 km in summer at the low threshold.

- Dissolved Hydrocarbons:
  - Maximum distances range from 0.55 km to 12.92 km depending on the threshold and season.
  - Highest probability of exposure occurs in the Little Penguin - Foraging BIA, with 21% in summer and 16% in winter.

- Entrained Hydrocarbons:
  - Maximum distances range from 43.31 km to 117.97 km depending on the threshold and season.
  - Highest probability of exposure occurs for White Shark - Foraging BIA in summer (98%) and Kilcunda nearshore waters in winter (88%).
  - Quickest exposure times are 0.05 days in summer and 0.04 days in winter.

Surface release of MDO modelled results show that Kilkuna nearshore waters have a high probability of shoreline accumulations at the low threshold—82% in summer and 74% in winter. Entrained hydrocarbon exposure (≥10 ppb) is also predicted to be high in Kilkuna nearshore waters, with probabilities of 95% in summer and 99% in winter.

Venus Bay exhibits the highest probability of shoreline accumulation at the low threshold during winter (84%).

The highest probability of floating oil exposure is observed for Little Penguins foraging around Phillip Island, with 69% in summer and 38% in winter. For the same foraging area, dissolved hydrocarbon exposure for Little Penguins reaches a maximum concentration of 25.96 ppb in summer and 25.95 ppb in winter, with exposure probabilities of 21% and 16%, respectively.

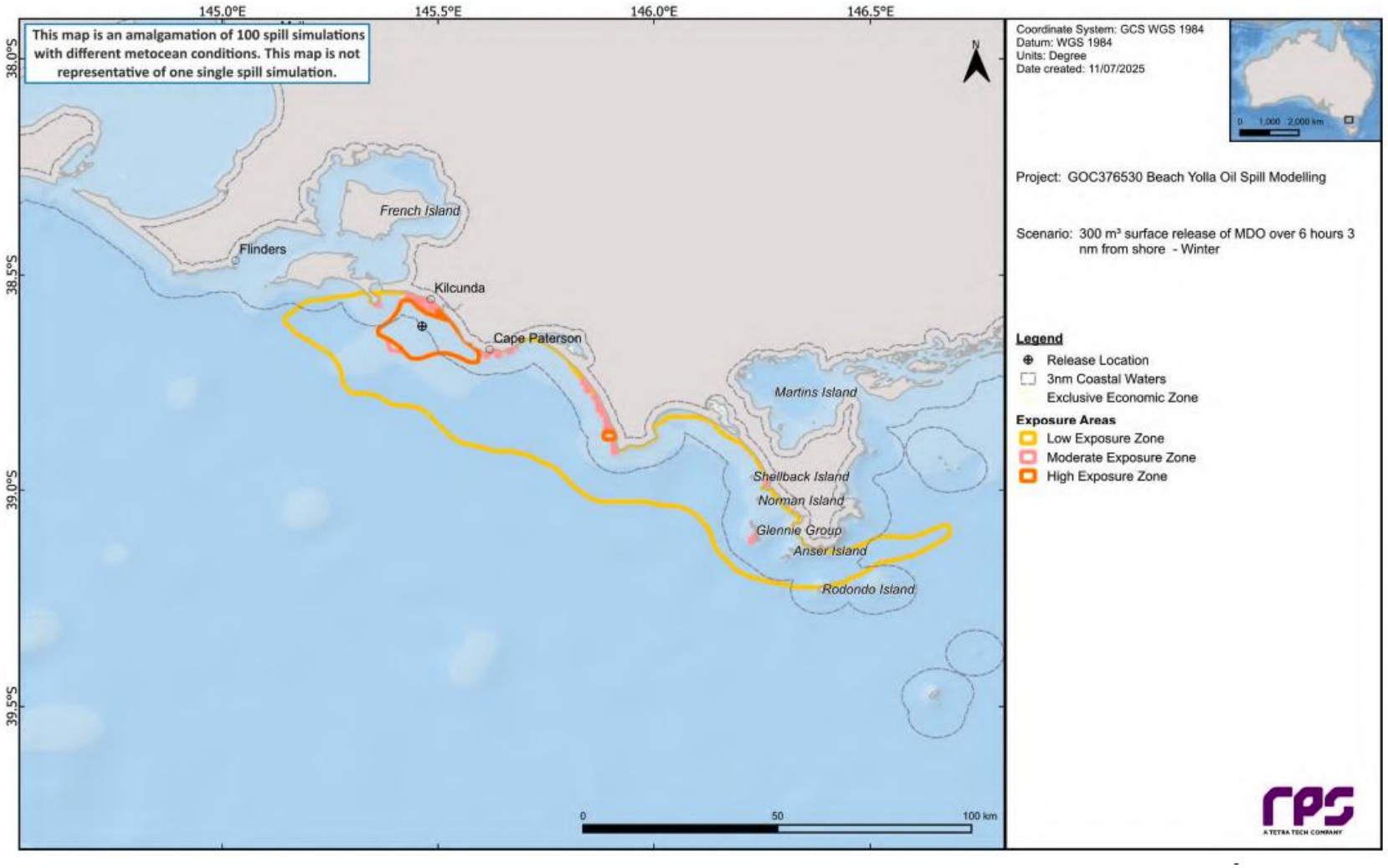
Southern Right Whales, during migration and resting (Phillip Island area to Wilsons Promontory), face the highest probabilities of entrained hydrocarbon exposure (≥10 ppb), with 99% in winter and 77% in summer.

Similarly, White Sharks foraging off pinniped colonies throughout the Southeast Marine Region are exposed at rates of 98% in summer and 99% in winter. Their distribution between the 60–120 m depth contour also sees high probabilities: 81% in summer and 99% in winter.

The quickest time before exposure occurs for Little Penguins foraging around Phillip Island: 0.05 days in summer and 0.04 days in winter.

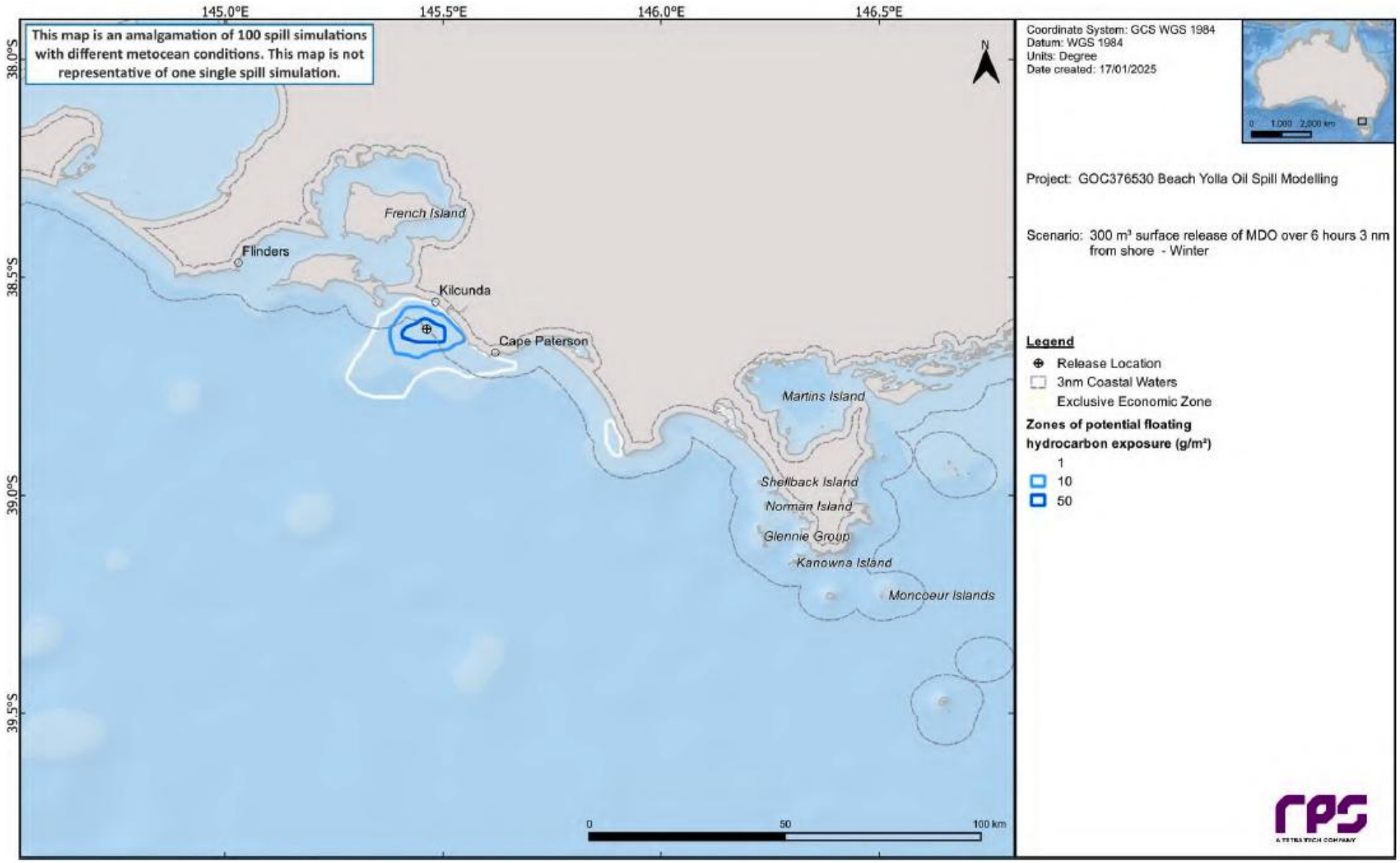
For White Sharks foraging off pinniped colonies, exposure times are 0.07 days in summer and 0.06 days in winter.

The OSTM results for surface contact are presented in Figure 7.24, entrained hydrocarbons in Figure 7.25, Shoreline loading Figure 7.26 and dissolved hydrocarbons in Figure 7.27 and **Appendix 14**.



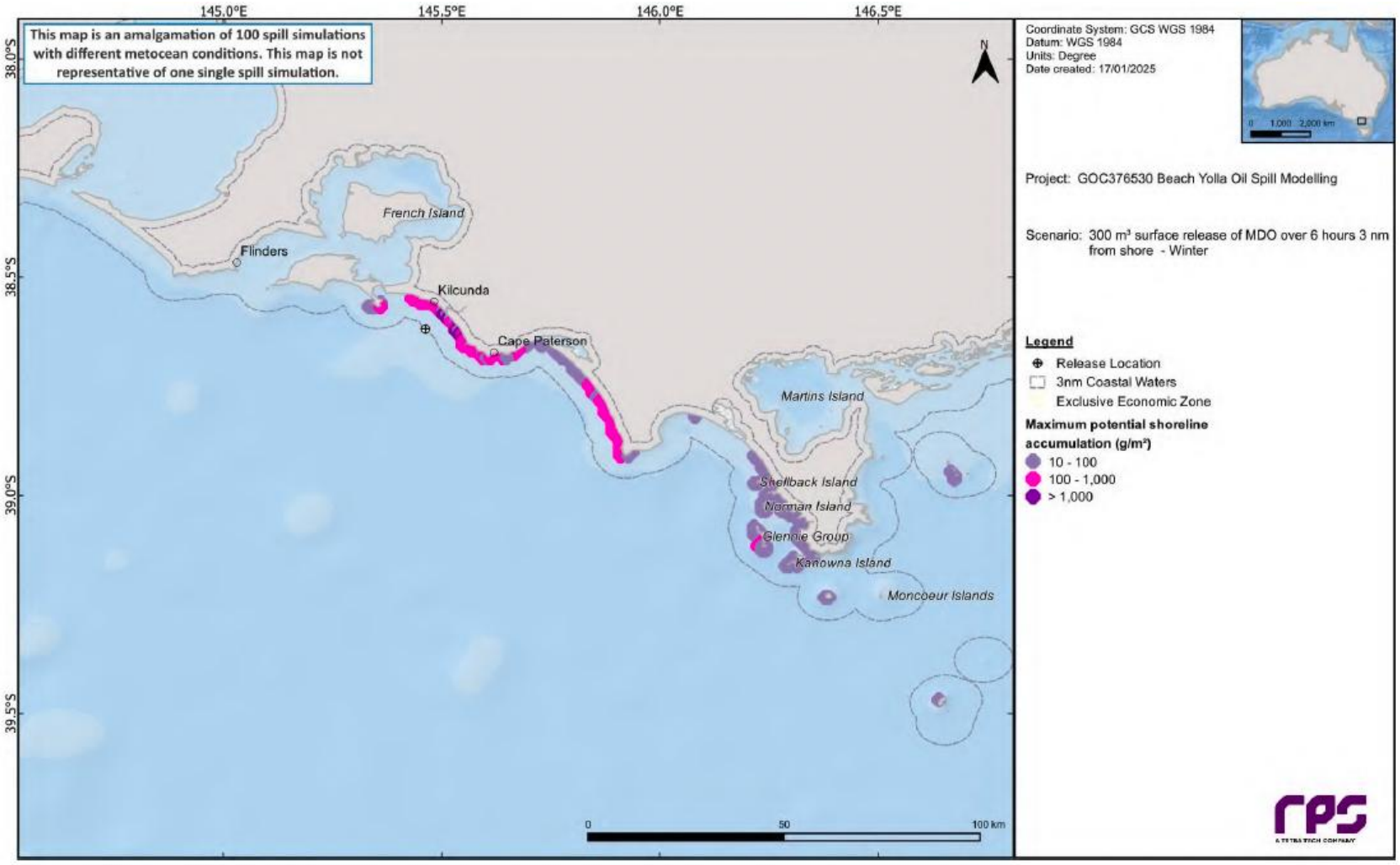
Source RPS, 2025

Figure 7.24: Predicted Area of Exposure for Low, Medium and High Thresholds from 300 m^3 surface release of MDO over 6 hours at a locaton 3 NM away from the shore during winter conditions.



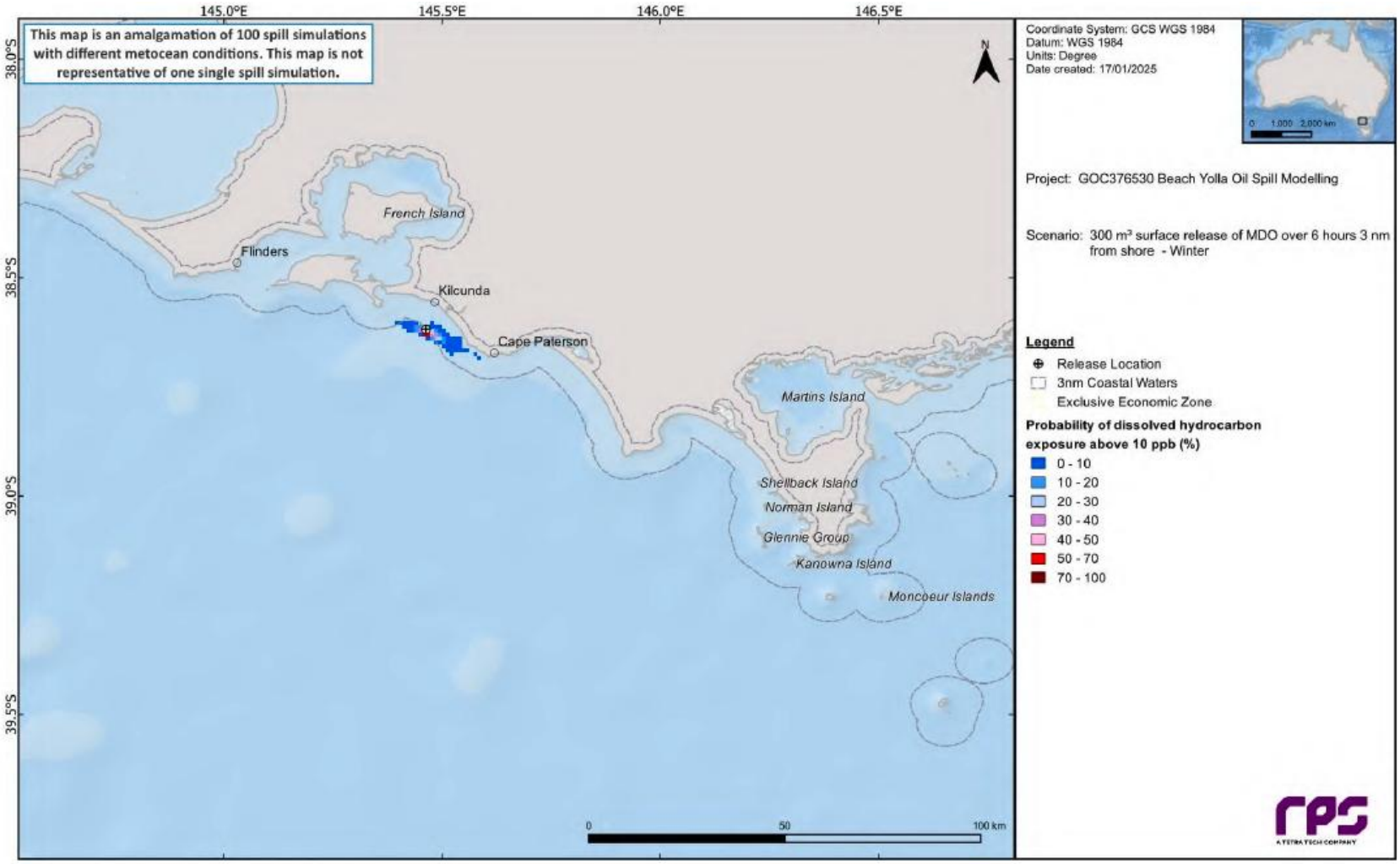
Source RPS, 2025

Figure 7.25: Zone of potential Floating Oil Exposure in the event of a 300 m^3 surface release of MDO over 6 hours at a location 3 NM away from the shore during winter conditions.



Source RPS, 2025

Figure 7.26: Maximum potential Shoreline Loading in the event of a 300 m^3 surface release of MDO over 6 hours at a location 3 NM away from the shore during winter conditions.



Source RPS, 2025

Figure 7.27: Probability of Dissolved Hydrocarbon Exposure above 10 ppb, at 0-10 m below the sea in the event of a 300 m^3 surface release of MDO over 6 hours at a location 3 NM away from the shore during winter conditions.

7.17.3 EMBA

As outlined in Section 5 Table 5.1, the hydrocarbon spill EMBA for an MDO release within the Planning Area extent (Figure 5.1), is defined as:

> *The amalgamation of the extent of low-level hydrocarbon exposure to the sea surface (1 g/m^2), entrained in the water column (10 ppb), dissolved in the water column (10 ppb), and contact to shorelines (10 g/m^2) as a result of the release of 300 m^3 of MDO (over 6 hours) at 3 nm from the coast from a supply vessel during annualised metocean conditions.*

This EMBA has been established through hydrocarbon spill modelling scenarios and results as provided in the above Sections 7.17.2.3.

The receptors most at risk from an MDO release exposure and the marine BIAs include:

- Black-browed Albatross (Foraging in the South-east Marine Region).
- Bullers Albatross (Foraging in most of the South-east Marine Region).
- Campbell Albatross (Foraging in the South-east Marine Region including Macquarie Island).
- Common Diving-petrel (Foraging in buffer areas around Tasmania and Victoria).
- Indian Yellow-nosed Albatross (Foraging in most of the South-east Marine Region).
- Pygmy Blue Whale (Foraging in the majority of Bass Strait and coastal waters of Tasmania).
- Short-tailed Shearwater (Foraging in buffer areas around Tasmania including Bass Strait).
- Shy Albatross (Foraging likely in the South-east Marine Region).
- Southern Right Whale (Known core range in coastal waters between Sydney and Perth, including off Tasmania).
- Wandering Albatross (Foraging in the South-east Marine Region).
- White Shark (Distribution between the 60-120m depth contour, low density in Australian waters from Barrow Island/Montebello Islands, WA to Yeppoon/Swains Reef, Qld, and known distribution in Coastal/Shelf/Upper Slope waters out to 1000m depth contour).
- White-faced Storm-petrel (Foraging in buffer areas around the northern side of Tasmania into Bass Strait).

Specific receptors with high probabilities of exposure to entrained hydrocarbons in the MDO spill EMBA are:

- Southern Right Whale (Migration and resting on migration in Philip Island area to Wilsons Promontory, with 99-100% probability of exposure during summer and winter).
- White Shark (Foraging in waters off pinniped colonies throughout the Southeast Marine Region, with 96-98% probability of exposure during summer and winter). (Known distribution in

Coastal/Shelf/Upper Slope waters out to 1000m depth contour, with 100% probability of exposure during summer and winter).

- Pygmy Blue Whale (Distribution, foraging, and known foraging area, with 100% probability of exposure during summer and winter).
- Shy Albatross (Foraging likely in the South-east Marine Region, with 100% probability of exposure during summer and winter) .

These receptors are exposed to floating oil, dissolved hydrocarbons, and entrained hydrocarbons at varying thresholds during both summer and winter conditions, making them most at risk during a LOWC event.

Socio-economic receptors within the MDO spill EMBA include:

- Potentially affected marine and coastal regions include the Central Bass Strait, the Bass Strait Shelf Province, and the South-east Marine Region. Key marine users and activities in these areas are:
- Commercial fishing
- Merchant shipping

Cultural values and sensitivities within the MDO spill EMBA include:

- Traditional Owners with cultural connections to these waters and species) particularly cetaceans which are strongly linked to cultural stories and values).and sensitivities

7.17.4 Jurisdiction of Hazard

The jurisdictions for this hazard are outlined below.

Commonwealth waters	Victorian waters
YES	YES
The OSTM predicts that an MDO release will contact Commonwealth waters.	The OSTM predicts that an MDO release will result in surface, shoreline, dissolved phase hydrocarbons or entrained hydrocarbons reaching Victorian state waters

7.17.5 Evaluation of Environmental Risks

7.17.5.1 Cultural values and sensitivities

First Nations cultural values and sensitivities may be present within the area exposed to surface, in-water and shoreline hydrocarbons at relevant thresholds following a vessel MDO release. These include values related to marine fauna and benthic species such as seagrass and kelp.

The potential impact of an MDO release associated as modelled by RPS (2025) is described in Section 7.17.2.3. The modelling predicts shoreline exposure at the low, moderate and high threshold along the Bass coast associated with an MDO release. Low to moderate in-water exposure to hydrocarbons are predicted within the EMBA. Beach understands that First nations people are linked to the marine environment and may be affected by a change in the environment. The presence of strong wave-

action, an exposed coastline and the light characteristics of MDO all assist in the rapid dispersal and dilution of the MDO, meaning that there is a low risk of short-term persistence of hydrocarbons.

Therefore, although no long term or permanent changes to marine environment are expected it is considered that the visual presence of floating oil may impact Sea Country at a spiritual level (i.e. rituals, Songlines, culturally important species) and could affect culturally important activities such as mutton birding or affect culturally important species including whales and eels. Any impacts are anticipated to be short-term and localised. The consequence to cultural values and sensitivities is assessed as **Moderate (2)** and likelihood as **Highly Unlikely (B)**, and the residual risk is **Low** and of an acceptable level.

7.17.5.2 Fauna Groups, Habitats and Commercial Fishing

The evaluation of environmental risks to fauna, habitats and commercial fisheries resulting from an MDO release is presented in Table 7.65, Table 7.66, Table 7.67, Table 7.68, Table 7.69, Table 7.70, Table 7.71, Table 7.72, Table 7.73 and Table 7.74. The criteria used to determine the sensitivity of receptors within the EMBA is outlined in Table 7.41.

Table 7.65: Potential risks of MDO release from vessel on benthic assemblages

General sensitivity to oiling – benthic fauna			
Sensitivity rating of benthic assemblages		Low	
A description of benthic assemblages in the EMBA is provided in:		Section 5.6.1	
An outline of the sensitivity aspect for benthic assemblages is provided in		Section 7.16 Table 7.42	
Potential risk frrm a surface release of MDO			
Sea Surface	Water column – dissolved phase	Water column – entrained phase	Shoreline
Not applicable	There is predicted to be zones of low to moderate dissolved and entrained hydrocarbon exposure in the benthic layer in the shallow waters along the coast, predominantly between Phillip Island and Cape Paterson	Dissolved hydrocarbon exposure thresholds at Low (10 ppb) extend 12.92 km (east-southeast, both seasons).	Maximum oil ashore volume is 54.64 m^3 in summer and 98.73 m^3 in winter. Kilcunda shoreline has the highest probability of accumulation in summer (82%), while Venus Bay shoreline has the highest in winter (84%). It is predicted that the risk of toxicity effects on benthic assemblages will be low in the short-term and low in the medium- to long-term.
Strong wave-action, an exposed coastline and the light characteristics of MDO all assist in the rapid dispersal and dilution of the MDO, meaning that there is a low risk of short-term persistence of hydrocarbons to benthic assemblages. At this low threshold, the risks of toxic or sub- lethal impacts to benthic fauna or habitats are **Low**.			

Table 7.66: Potential risks of MDO release from vessel on macroalgal communities

General sensitivity to oiling – benthic fauna			
Sensitivity rating of macroalgal communities		Low	
A description of macroalgal communities in the EMBA is provided in:		Section 5.6.3	
An outline of the sensitivity aspect for macroalgal communities is provided in		Section 7.16 Table 7.43	
Potential risk from a surface release of MDO			
Sea Surface	Water column – dissolved phase	Water column – entrained phase	Shoreline

General sensitivity to oiling – benthic fauna			
Not applicable	There is predicted to be zones of low to moderate dissolved and entrained hydrocarbon exposure in the benthic layer in the shallow waters along the coast, predominantly between Phillip Island and Cape Paterson	The extent of entrained hydrocarbon exposure from the MDO surface release varies by season however the maximum distance at the 10 ppb threshold is estimated to be up to 117.97 km (east-Southeast) during winter.	Probability of oil accumulation (≥10 g/m^2) is higher in winter (100%) compared to summer (94%). Maximum oil ashore volume is 24.70 m^3 in summer and 23.71 m^3 in winter. Kilcunda shoreline has the highest probability of accumulation in summer (53%), while Venus Bay shoreline has the highest in winter (60%).
Emergent or floating vegetation in the intertidal and subtidal zone along the coast from Philip island to Wilsons Promontory may be exposed to varying levels of hydrocarbon concentrations ranging from low to high at the sea surface, low exposure thresholds for dissolved hydrocarbons and low and high exposure thresholds for entrained hydrocarbons. The Giant Kelp Forest TEC is not present in the EMBA for this scenario and will not be affected. Strong wave-action, an exposed coastline and the light characteristics of MDO all assist in the rapid dispersal and dilution of the MDO, meaning that there is a low risk of short-term persistence of hydrocarbons to intertidal macroalgal communities. At this low threshold, the risks of toxic or sub- lethal impacts to macroalgal communities or habitats are **Low**.			

Table 7.67: Potential risks of MDO release from vessel on plankton

General sensitivity to oiling – plankton			
Sensitivity rating of plankton	Low		
A description of plankton in the EMBA is provided in:	Section 5.6.2		
An outline of the sensitivity aspect for plankton is provided in	Section 7.16 Table 7.44		
Potential risk from a surface release of MDO			
Sea Surface	Water column – dissolved phase	Water column – entrained phase	Shoreline
Not applicable	Plankton present in the open waters of the EMBA are expected to be widely distributed throughout the wider Bass Strait region. Those occupying the upper water column are particularly susceptible to direct effects from dissolved and dispersed hydrocarbons, such as through absorption. Any impacts are likely to be similar to those described in Section 7.15.		
Once background water quality conditions return following the rapid natural weathering and dispersion of the hydrocarbons, plankton populations are expected to recover rapidly due to recruitment of plankton from surrounding waters.			

General sensitivity to oiling – plankton
Strong wave-action, an exposed coastline and the light characteristics of MDO all assist in the rapid dispersal and dilution of the MDO, meaning that there is a low risk of short-term persistence of hydrocarbons to intertidal plankton. At this low threshold, the risks of toxic or sub- lethal impacts to plankton or habitats are **Low**.

Table 7.68: Potential risks of MDO release from vessel on pelagic fish

General sensitivity to oiling – pelagic fish			
Sensitivity rating of pelagic fish	Low		
A description of pelagic fish in the EMBA is provided in:	Section 5.6.7		
An outline of the sensitivity aspect for pelagic fish is provided in	Section 7.16 Table 7.45		
Potential risk from a surface release of MDO			
Sea Surface	Water column – dissolved phase	Water column – entrained phase	Shoreline
Not applicable	Entrained Hydrocarbons phase 98% for White Shark – Foraging in waters off pinniped colonies throughout the Southeast Marine Region with a distribution (Between the 60-120m depth contour): 81% (summer), 99% (winter). The extent of entrained hydrocarbon exposure from the surface release of MDO varies by season however the maximum distance at the 10 ppb threshold is estimated to be up to 117.97 km (east-Southeast) during winter. Some syngnathid species associated with nearshore reefs and rafts of floating seaweed may come into contact with surface hydrocarbons, however the predominantly low exposure is not expected to result in acute or chronic effects on pelagic fish species. Because the majority of fish tend to remain in the mid- pelagic zone, they are likely to come into contact with areas of low-moderate concentrations of dissolved hydrocarbons. Given the mobile nature of fish and the rapid weathering of MDO, brief periods of exposure to low-moderate concentrations of hydrocarbons in the water column are unlikely to result in acute or chronic effects to pelagic fish. Any impacts are likely to be similar to those described in Section 7.15.		
Strong wave-action, an exposed coastline and the light characteristics of MDO all assist in the rapid dispersal and dilution of the MDO, meaning that there is a low risk of short-term persistence of hydrocarbons to pelagic fish. At this low threshold, the risks of toxic or sub- lethal impacts to pelagic fish or habitats are **Low**.			

Table 7.69: Potential risks of MDO release from vessel on cetaceans

General sensitivity to oiling – cetaceans	
Sensitivity rating of cetaceans	Low

General sensitivity to oiling – cetaceans			
A description of cetaceans in the EMBA is provided in:		Section 5.6.5	
An outline of the sensitivity aspect for cetaceans is provided in		Section 7.16 Table 7.46	
Potential risk from a surface release of MDO			
Sea Surface	Water column – dissolved phase	Water column – entrained phase	Shoreline
Evaporation of the hydrocarbons is modelled to occur rapidly in this scenario, thus reducing the duration of the hydrocarbons persisting on the sea surface and reducing the risk to cetaceans. A small extent of the predicted area of exposure for medium to high thresholds out from Kilkunda overlaps with foraging, migration and resting BIA of the Southern Right Whale and Pygmy Blue Whale, between Philip Island to Wilsons Promontory. In the context of the size of the BIAs of the pygmy blue whales and southern right whales, and the duration and extent of sea surface hydrocarbons, the risk to cetaceans is low and does not represent a long-term threat at the population level of cetaceans migrating through or foraging in the EMBA.		Entrained Hydrocarbons have the highest probability of exposure (≥10 ppb) at 99% for Southern Right Whale in winter. There is a possibility that pygmy blue and southern right whales may be present in the EMBA. If present, these species (and other cetaceans) may be impacted to hydrocarbons in the manner described in Section 7.15. If large quantities of zooplankton exposed to the spill were ingested, chronic toxicity impacts to some individual cetaceans may occur.	Not Applicable
Strong wave-action, an exposed coastline and the light characteristics of MDO are all likely to assist in the rapid weathering of hydrocarbons and the risk of short- and long-term affects to plankton is expected to be low.			

Table 7.70: Potential risks of MDO release from vessel on pinnipeds

General sensitivity to oiling – pinnipeds			
Sensitivity rating of pinnipeds		Low	
A description of pinnipeds in the EMBA is provided in:		Section 5.6.6	
An outline of the sensitivity aspect for pinnipeds is provided in		Section 7.16 Table 7.47	
Potential risk from a surface release of MDO			
Sea Surface	Water column – dissolved phase	Water column – entrained phase	Shoreline

General sensitivity to oiling – pinnipeds		
Evaporation of the hydrocarbons is modelled to occur rapidly in this scenario, thus reducing the duration of the hydrocarbons persisting on the sea surface and reducing the risk to cetaceans. In the context of the size of the area potentially affected by hydrocarbons represents a very small area in which fur-seals are known to forage in Bass Strait and is unlikely to be habitat critical to their survival. The risk to fur-seals for hydrocarbons in the water column is therefore considered to be **low**.	The extent of entrained hydrocarbon exposure from the subsea pipeline rupture varies by season however the maximum distance at the 10 ppb threshold is estimated to be up to 117.97 km (east-Southeast) during winter. This indicates that the majority of the condensate evaporates within the first day, leaving only a small proportion of oil floating on the water surface. Assessment of the risk to pinnipeds population is **low.**	There is no risk of MDO stranding on shorelines known to be used by Australian and New Zealand fur- seals as breeding or haul-out sites. As such, it is unlikely that oiling of fur-seals will occur on shorelines in the EMBA. The nearest site of significance is Seal Rock off the west coast of Phillip Island (35 km from the release site and outside the MDO surface oil EMBA). Given the generally rocky nature of preferred haul-out sites and their ability to self-clean, the risk of oiling of pinnipeds at shorelines is **low**
Strong wave-action, an exposed coastline and the light characteristics of MDO are all likely to assist in the rapid weathering of hydrocarbons and the risk of short- and long-term affects to plankton is expected to be low.		

Table 7.71: Potential risks of MDO release from vessel on marine reptiles

General sensitivity to oiling – marine reptiles			
Sensitivity rating of marine reptiles	Low		
A description of marine reptiles in the EMBA is provided in:	Section 5.6.8		
An outline of the sensitivity aspect for marine reptiles is provided in	Section 7.16 Table 7.48		
Potential risk from a surface release of MDO			
Sea Surface	Water column – dissolved phase	Water column – entrained phase	Shoreline
Some individual transient marine reptiles may come into contact with low hydrocarbon exposure on the sea surface and very localised areas of moderate hydrocarbon exposure. This may result in irritation of skin or cavities. Specifically, the marine environment is habitat critical to turtles, however, due to the absence of turtle BIAs in Bass Strait and the low chance of encountering turtles in Bass Strait in general, the risk to marine reptiles (individuals or populations) is considered to be low.			There are no turtle nesting beaches within the EMBA for this scenario, so the risk to turtles from shoreline oiling is low.

Table 7.72: Potential risks of MDO release from vessel on seabirds and shorebirds

General sensitivity to oiling – seabirds and shorebirds			
Sensitivity rating of seabirds and shorebirds	Low		
A description of seabirds and shorebirds in the EMBA is provided in:	Section 5.6.4		
An outline of the sensitivity aspect for seabirds and shorebirds is provided in	Section 7.16 Table 7.49		
Potential risk from a surface release of MDO			
Sea Surface	Water column – dissolved phase	Water column – entrained phase	Shoreline
Several bird species are identified as receptors potentially exposed to hydrocarbons during a pipeline rupture event, foraging over an extensive area and are distributed over a wide geographic area, such as Albatross, Short-tailed Shearwater. Seabirds rafting, resting, diving or feeding at sea have the potential to come into contact with oil. However, this level of exposure is not expected to result in the lethal impacts of feather matting and hypothermia. Given the extensive ocean foraging habitat available to species such as albatross and petrel, the localised and duration of the hydrocarbon exposure makes it unlikely that a spill will limit their ability to forage for unaffected prey, nor will the unlikely exposure result in permanent injury or mortality. Therefore, the overall risk to seabirds is considered low.	The extent of area affected by the dissolved hydrocarbons at the low (10 ppb) threshold is 12.92 km from the MDO release site. It is these areas where sub-lethal or toxic effects to fish may occur, enabling opportunistic feeding by seabirds. Little Penguins may be especially vulnerable to oil because they spend a high portion of their time in the water and readily lose insulation and buoyancy if their feathers are oiled (Hook et al., 2016). The Little Penguin is known for foraging around Philip Island and the Northwestern edge of Cape Barren Island. Assessment of the risk to seabird, given their mobility is low.	The extent of entrained hydrocarbon exposure from the subsea pipeline rupture varies by season however the maximum distance at the 10 ppb threshold is estimated to be up to 117.97 km (east-Southeast) during winter. This indicates that the majority of the condensate evaporates within the first day, leaving only a small proportion of oil floating on the water surface. Assessment of the risk to seabird, given their mobility is low.	The total length of shoreline exposed to oil accumulation at or above the 10 g/m^2 threshold that may have biological impacts on birds is 50.81 km in summer and 58.41 km in winter. This section of coastline comprises wide sandy beaches that provide habitat for shorebird species such as hooded plovers, terns and snipes, and nesting habitat for seabird species. Sandy beaches are highly permeable and porous due to the relatively large pore spaces between sand grains. MDO's viscosity and density allow it to penetrate porous sediments rapidly, moving below the surface rather than remaining as a persistent surface layer. This behaviour limits the duration of exposure to birds using the shoreline. Shorebirds foraging for food in intertidal areas or along the high tide mark and splash zone may encounter weathered hydrocarbons that may be brought back to nests. Hydrocarbon entering the sandy nests of hooded plovers, terns or other bird species is likely to percolate through the sand and not accumulate in the feathers of adults or young. Toxicity effects from ingestion of contaminated prey caught in the intertidal zone or from direct exposure or transport back to nests are unlikely, as the volatile components are likely to have flashed off prior to stranding.

General sensitivity to oiling – seabirds and shorebirds	
	The populations of seabird and shorebird species within the EMBA have a wide geographic range, meaning that impacts to individuals or a population at one location will not necessarily extend to populations at other un-impacted locations. Therefore, the risk of such contact is low

Table 7.73: Potential risks of MDO release from vessel on sandy beaches

General sensitivity to oiling – sandy beaches	
Sensitivity rating of sandy beaches	Low
A description of sandy beaches in the EMBA is provided in:	Section 5.4.7
An outline of the sensitivity aspect for sandy beaches is provided in	Section 7.16 Table 7.50
Potential risk from a surface release of MDO	
Shoreline	
The probability of oil accumulation (≥10 g/m^2) is higher in winter (100%) compared to summer (94%). Maximum oil ashore volume is 51.64 m^3 in summer and 98.73 m^3 in winter. Kilcunda shoreline has the highest probability of accumulation in summer (82%), while Venus Bay shoreline has the highest in winter (74%). While there is a probability of low exposure of contact to shorelines in the Kilcunda region, this is unlikely to result in significant long-term impacts as tidal action is expected to lead to rapid weathering of any hydrocarbons in the intertidal area and populations of exposed communities would rapidly recover. Short-term impacts to tourism and other human uses of the beach may occur as a result of temporary beach closures to protect human health, but this would be due only to perceptions of a polluted environment rather than a requirement to protect the public from persistent pollution. As such, risks to sandy beaches is low	

Table 7.74: Potential risks of MDO release from vessel on commercial fishing

General sensitivity to oiling – commercial fishing	
Sensitivity rating of commercial fishing	Low

General sensitivity to oiling – commercial fishing			
A description of commercial fishing in the EMBA is provided in:		Section 5.9.5	
An outline of the sensitivity aspect for commercial fishing is provided in		Section 7.16 Table 7.51	
Potential risk from a surface release of MDO			
Sea Surface	Water column – dissolved phase	Water column – entrained phase	Shoreline
A short-term fishing exclusion zone may be implemented by AFMA or the VFA. Given the temporary nature of any surface hydrocarbons and the low fishing intensity in the EMBA, there are unlikely to be significant impact on fisheries in terms of lost catches.	The predicted maximum distances of dissolved oil exposure are: Low threshold (10 ppb): Up to 12.92 km (southeast, both seasons). Moderate threshold (50 ppb): Up to 1.39 km (southwest, winter).	The extent of entrained hydrocarbon exposure from the surface release of MDO varies by season however the maximum distance at the 10 ppb threshold is estimated to be up to 117.97 km (east-Southeast) during winter.	Vessels use local ports, which are not included within the EMBA. As such, there are no impacts to vessels in port or associated infrastructure (e.g., marinas and jetties).
A short-term fishing exclusion zone may be implemented by AFMA or the VFA. The areas dissolved and entrained exposure thresholds represent very small areas available to commercial fishing. Impacts to fishery areas such as the Rock Lobster fishery know for fish abundance and habitat may be subject to temporary and precautionary exclusion from fishing grounds until water quality monitoring verifies the absence of residual hydrocarbons. The risk to these fishies is therefore considered moderate.			

Commonwealth fisheries that are known to fish within the MDO EMBA with recent intensity include:

- Shark gillnet fishery; and
- Danish-seine fishery.

Victorian fisheries that occur within the MDO EMBA with recent intensity include:

- Rock lobster fishery;
- Wrasse fishery;
- Octopus fishery;
- Ocean trawl fishery; and
- Inshore trawl fishery.

7.17.6 Cumulative Risk Evaluation

There is a low potential for cumulative impacts resulting from an MDO release associated with other activities in the Operational Area or when combined with other marine activities in the region.

There are no other oil and gas operations in close proximity to BassGas or within the MDO spill EMBA. An MDO release from production activities in eastern Bass Strait is unlikely to overlap with the BassGas MDO spill if two such releases were to occur concurrently, which is highly unlikely.

7.17.7 Risk Assessment

A risk assessment for an MDO spill is presented in Table 7.75.

Table 7.75: Risk assessment for an MDO spill

ALARP decision context			
Impact decision framework context	Type B.		
Activity	Nothing new or unusual, represents business as usual, well understood activity, good practice is well defined.		
Level of certainty of risk	Some uncertainty.		
Stakeholder influence	No conflict with company values, no partner interest, no significant media interest.		
Risk Assessment (inherent)			
Phase	**Likelihood**	**Consequence**	**Risk**
Operations	Highly unlikely (B)	Serious (3)	Medium
CoP	Highly unlikely (B)	Serious (3)	Medium
Preservation	Highly unlikely (B)	Serious (3)	Medium
Assessment of Proposed Control Measures			
Control	**Cost/benefit analysis**		**Implemented?**
Eliminate or substitute the use of diesel. *(All phases)* *(Commonwealth and Victorian state waters)*	The use of diesel for fuel for vessels and machinery cannot be eliminated. Substituting for another fuel (i.e., heavy fuel oil or bunker fuel oil), would have a higher environmental impact than diesel. Diesel remains the most appropriate fuel for the vessels and equipment used to support the activity. The operational and environmental consequences associated with eliminating or substituting diesel are considered grossly disproportionate to any incremental environmental benefit that may be achieved.		No
Remove support vessels from activity. *(All phases)* *(Commonwealth and Victorian state waters)*	Vessels are essential in supplying goods to the platform and supporting IMR activities. Thus, there is an increased risk of collision by removing support vessels from the activity. As vessels are essential for platform resupply and IMR activities, implementation of this control is not feasible. The operational and safety consequences associated with removing support vessels are grossly disproportionate to any potential reduction in MDO spill risk.		No

Assessment of Proposed Control Measures		
Require all PSVs and ISVs to be double-hulled. *(All phases)* *(Commonwealth and Victorian state waters)*	This option would reduce the risk of fuel loss in the event of a minor collision that breached the outer hull but not the inner hull. Vessels are subject to their availability on the market and Beach inspects all contracted vessels for flag or class compliance prior to engagement and at least annually. Specifying a double hull on vessels would limit the number of vessels available and requiring vessels to be retrofitted with double hulls would be prohibitively expensive for the vessel contractors. The costs and operational constraints associated with restricting vessel selection or retrofitting vessels are considered grossly disproportionate to the low residual risk of an MDO release.	No
Navigation equipment is in place to prevent vessel collisions. *(All phases)* *(Commonwealth and Victorian state waters)*	Reduces the likelihood of collision and therefore reduces the likelihood of an MDO spill. Navigation equipment is fitted as standard on contracted vessels and forms part of routine maritime operations. The associated costs are not grossly disproportionate to the environmental benefit achieved through reducing the likelihood of vessel collisions and associated MDO releases.	Yes **(RSK07-CM05)**
Continuous bridge watch is in place to prevent vessel collisions. *(All phases)* *(Commonwealth and Victorian state waters)*	Reduces the likelihood of collisions with other marine users or their equipment and therefore reduces the likelihood of MDO spill. Bridge watch training is part of Vessel Master training and it is standard maritime practice that the Vessel Master and bridge crew maintain bridge watch at all times. Continuous bridge watch forms part of standard maritime practice and existing crew responsibilities. The associated costs are not grossly disproportionate to the environmental benefit achieved through reducing the likelihood of vessel collisions.	Yes **(RSK07-CM06)**
Trained and certified personnel crew the vessels. *(All phases)* *(Commonwealth and Victorian state waters)*	Training and certification provide a minimum level of safety training and thereby reduces the risk of vessel collision and reduces the likelihood of MDO spill. Personnel competency requirements are embedded within maritime training and certification frameworks and can be readily implemented through existing systems. The associated costs are not grossly disproportionate to the environmental benefit achieved through reducing the likelihood of incidents resulting in MDO release.	Yes **(RSK07-CM04)**
Reduce the volume of MDO carried. *(All phases)* *(Commonwealth and Victorian state waters)*	May reduce the total volume of MDO released in the event of a spill. Carrying less MDO may increase the frequency of refuelling activities and associated spill risks. The resulting operational impacts are considered grossly disproportionate to the limited environmental benefit achieved.	No
Refuelling procedure. *(All phases)* *(Commonwealth and Victorian state waters)*	Reduces the risk of hydrocarbon release to the sea. The costs of installing and maintaining the equipment, systems and processes for refuelling is factored into day hire rates. Developing and implementing a refuelling procedure is routine industry practice. The associated costs are not grossly disproportionate to the	Yes **(RSK07-CM02)**

Assessment of Proposed Control Measures		
	environmental benefit achieved through reducing the likelihood of hydrocarbon releases during refuelling activities.	
Replace MDO bunkering (via hose from PSV to platform) with transfers via drums/containers. *(All phases)* *(Commonwealth and Victorian state waters)*	While this measure would remove the risk of a fuel spill via hose, it simply substitutes it with the risk of spills through dropped objects. The time taken to transfer the necessary volumes of fuel using this method (compared to the hose transfer method) has more health and safety risks associated with it, given that the longer the PSV remains on location close to the platform, the greater the probability of an incident occurring. The increased number of crane movements to transfer fuel by container results in a higher likelihood of dropped objects occurring. While technically feasible, the increased number of crane lifts, longer transfer durations and heightened safety risks are considered grossly disproportionate to the environmental benefit achieved through eliminating hose transfer risks.	No
Use smaller PSVs or ISVs. *(All phases)* *(Commonwealth and Victorian state waters)*	Smaller vessels store a smaller volume of MDO than larger volumes, thereby limiting the volume of MDO released in the event of a spill. Given the limited vessel market and operational requirements of the activity, the constraints associated with restricting vessel size are considered grossly disproportionate to the reduction in spill volume that might be achieved.	No
Support vessels refuel in port only. *(All phases)* *(Commonwealth and Victorian state waters)*	This reduces the risk of an at-sea spill. Support vessels return to port regularly throughout the activity and therefore have the ability to refuel outside the OA at no additional cost. The environmental benefit associated with avoiding at-sea refuelling can be achieved without material additional cost. Accordingly, the costs associated with implementing this control are not grossly disproportionate to the environmental benefit achieved.	Yes **(RSK07-CM01)**
Vessel SMPEP (or equivalent appropriate to class) is available. *(All phases)* *(Commonwealth and Victorian state waters)*	Ensures vessel crew are well prepared to quickly respond to a spill, thereby minimising the volume spilled. This is a standard maritime practice as required under MARPOL and the Environment Regulations. The associated costs are not grossly disproportionate to the environmental benefit achieved through improving spill preparedness and response capability.	Yes **(RSK07-CM08)**
An OPEP is in place and implemented. *(All phases)* *(Commonwealth and Victorian state waters)*	This control is required under the Environment Regulations and represents standard industry practice. Beach has a spill response training program in place for relevant personnel. This ensures Beach is well prepared to quickly respond to a spill, thereby minimising the extent of the marine environment impacted. Maintenance of spill response capability and training forms part of standard industry practice. The associated costs are not grossly disproportionate to the environmental benefit achieved through reducing the consequences of an MDO spill.	Yes **(RSK07-CM09; -CM10)**
An OSMP is in place and implemented. *(All phases)*	This control is required under the Environment Regulations and represents standard industry practice. Specialist consultants maintain availability and training to support Beach in the event the OSMP needs to be implemented. An OSMP ensures Beach is	Yes **(RSK07-CM13; -CM14)**

Assessment of Proposed Control Measures		
(Commonwealth and Victorian state waters)	well prepared to quickly undertake operational and scientific studies, thereby supporting the future assessment of impacts resulting from the spill. Implementation of the OSMP can be achieved through existing specialist monitoring and response arrangements. The associated costs are not grossly disproportionate to the environmental benefit achieved through supporting spill impact assessment and adaptive management.	
Keep on-water spill response equipment (beyond SOPEP requirements) available on the PSVs/ISVs and on the platform. *(All phases)* *(Commonwealth and Victorian state waters)*	This option may allow for more rapid on-water response in the event of an MDO spill. There is very limited space available on Yolla-A and most vessels to store on-water equipment such as booms and skimmers. There are also significant costs (purchase, maintenance and training) for this equipment for both Beach and contracted vessel operators. Given the limited effectiveness of such equipment in likely sea states and the significant storage, maintenance and training requirements, the costs associated with implementation are considered grossly disproportionate to the environmental benefit achieved.	No
Standby vessel to monitor the 3-km radius cautionary zone and 500-m radius PSZ. *(All phases)* *(Commonwealth and Victorian state waters)*	The platform has AIS and is able to detect third-party vessels that are on a collision course with it. There have been no near-misses to date with regards to third-party vessels entering the cautionary zone or PSZ. The significant cost of retaining a dedicated standby vessel is considered grossly disproportionate to the low residual environmental risk and the incremental reduction in collision risk that would be achieved.	No
Escort/standby vessel at the platform dedicated to collision avoidance. *(All phases)* *(Commonwealth and Victorian state waters)*	A dedicated standby vessel could provide additional monitoring of the PSZ and cautionary zone and reduce the likelihood of third-party vessel interactions. However, AIS monitoring and established communication protocols are already in place and there have been no significant vessel interaction incidents requiring such controls. Maintaining a dedicated standby vessel would incur substantial ongoing vessel charter costs, increased fuel consumption and associated emissions to air and discharges to sea. The incremental reduction in risk is therefore grossly disproportionate to the environmental and financial costs.	No

Environmental Controls and Performance Measurement			
EPO	**Control measure**	**EPS**	**Measurement criteria**
Note that control measures listed for 'physical presence of infrastructure' and 'routine emissions – light' also apply to this hazard but are not repeated here. *Control measures apply to Commonwealth and Victorian state waters.*			
RSK07-EPO01 No MDO is spilled at sea.	**Preparedness**		
	RSK07-CM01 No vessel refuelling is undertaken in the Operational Area (this will be done in port). *(All phases)*	**RSK07-ESP01** Vessel refuelling is not conducted within the OA.	**RSK07-MC01** Bunker log verifies that refuelling was undertaken in port.

Assessment of Proposed Control Measures		
RSK07-CM02 The Yolla-A Bunkering Procedure (CDN/ID 3973929) and Field Support Vessel Operations Procedure (CDN/ID 3974221) are implemented in order to prevent an MDO spill during transfers of MDO between the vessels and the platform (if bulkies are not used). This includes (but is not limited to): • A JSA and PTW is signed off for each bunkering event, taking into account spill response considerations. • Ensuring that the dry-break refuelling hose couplings assembly is in order to minimise the risk of a spill and hose floats are installed on the refuelling hose so that a hose leak is quickly and easily visible. • Ensuring that flotation buoys are fitted to the transfer hoses so that they remain on the sea surface (enabling prompt detection of leaks). *(All phases)*	**RSK07-ESP02** MDO transfers between vessels and the platform are authorised and undertaken in accordance with approved plans to prevent spills.	**RSK07-MC02.1** PTW and JSA records for bunkering verify that spill considerations were taken into account. **RSK07-MC02.2** Completed pre-refuelling checklist verifies that dry-break hose couplings and floats are installed on the refuelling hose assembly. **RSK07-MC02.3** Hose register and CMMS confirm regular replacement of fuel hoses. **RSK07-MC02.4** PTW verifies that communications were tested between both vessels. **RSK07-MC02.5** Visual inspection (as noted in completed bunkering checklist) verifies that bunkering was supervised. **RSK07-MC02.6** A completed bunkering checklist confirms that bunkering commenced in daylight hours and in calm sea conditions. **RSK07-MC02.7** A completed pre-refuelling checklist confirms that the tank level alarms are functional.
RSK07-CM03 The Yolla-A PSZ is monitored at LLGP using AIS. Radio contact is made with vessels breaching the cautionary zone. *All phases)*	**RSK07-EPS03** PSZs are actively monitored to reduce interaction with unauthorised vessels to meet the requirements of Sections 616 and 619 of the OPGGS Act.	**RSK07-MC03** The CMO incident register notes breaches of the PSZ entry protocol when they occur.
RSK07-CM04 Support vessels are crewed by trained, qualified and certified personnel. *(All phases)*	**RSK07-EPS04** The qualifications, certifications and competencies for support vessel crew meet maritime regulatory requirements.	**RSK07-MC04** Vessel audit records and crew competency records verify qualifications and certifications are current.
RSK07-CM05 All contracted vessels maintain required navigation equipment and	**RSK07-EPS05** Vessel navigation systems meet	**RSK07-MC05** Vessel audits and class certification records

Assessment of Proposed Control Measures			
	comply with applicable maritime navigation requirements, including SOLAS, COLREGs and class requirements. *(All phases)*	applicable maritime regulatory requirements.	verify navigation equipment and certifications are current.
	RSK07-CM06 A continuous bridge watch is maintained by qualified personnel while vessels are underway or conducting operations. *(All phases)*	**RSK07-EPS06** Vessel activities are monitored by qualified personnel to minimise collision risk.	**RSK07-MC06** Vessel audit records verify bridge watch arrangements comply with vessel procedures and maritime requirements.
	RSK07-CM07 The Yolla-A PIC must grant permission for all vessels to enter the PSZ in accordance with the Field Support Vessel Operations Procedure (CDN/ID 3974221). *(All phases)*	**RSK07-EPS07** All vessel entries into the PSZ are authorised.	**RSK07-MC07** The radio communications diary verifies permission is granted for vessels entering the PSZ.
RSK07-EPO02 Platform and vessel crews promptly respond to a spill.	**Emergency Response**		
	RSK07-CM08 The Vessel Master will authorise actions in accordance with the vessel-specific SMPEP (or equivalent according to class) in order to stop or reduce the flow of MDO to the sea. *(All phases)*	**RSK07-EPS08** Vessel spill response is undertaken in accordance with the vessel SMPEP (or equivalent, per MARPOL Annex I).	**RSK07-MC08** Daily operations reports verify that the SMPEP (or equivalent) was implemented.
	RSK07-CM09 Emergency spill response capability is maintained in accordance with the NOPSEMA-accepted OPEP to ensure it can be implemented as planned. *(All phases)*	**RSK07-EPS09** OPEP testing is conducted in accordance with the frequency identified in the OPEP, demonstrating that equipment is available and personnel are trained and competent to respond.	**RSK07-MC09** Emergency response training and drill records demonstrate OPEP competency and preparedness.
	RSK07-CM10 The BassGas OPEP is implemented to limit the release of a Level 2 or 3 MDO spill. *(All phases)*	**RSK07-EPS10** All Level 2 and Level 3 MDO spill events are responded to in accordance with the BassGas OPEP, such that the release is contained and impacts are minimised.	**RSK07-MC10** Incident and IMT reports verify that the OPEP was implemented.
RSK07-EPO03 Near-misses and spills are reported to Beach and regulatory	**Recording and reporting**		
	RSK07-CM11 All spill incidents will be reported in the Beach incident management system (CMO).	**RSK07-EPS11** CMO reporting requirements are met.	**RSK07-MC11** CMO captures incident reports.

Assessment of Proposed Control Measures			
authorities in accordance with reporting requirements.	*(All phases)*		
	RSK07-CM12 Beach will report the spill to regulatory authorities within 2 hours of the spill or becoming aware of the spill. *(All phases)*	**RSK07-EPS12** Regulatory authority spill reporting requirements are met (as outlined in Section 8.9.2).	**RSK07-MC12** Incident report verifies that contact with regulatory agencies was made within 2 hours.
RSK07-EPO04 Characterise environmental impacts of a Level 2 or 3 MDO spill.	**Monitoring**		
	RSK07-CM13 Operational and scientific monitoring capability is maintained in accordance with the NOPSEMA-accepted OSMP to ensure it can be implemented as planned. *(All phases)*	**RSK07-EPS13** Operational and scientific contracts and resourcing are capable of implementing the OSMP, as required.	**RSK07-MC13** The OSMP is reviewed and updated as required to ensure it remains current.
	RSK07-CM14 The OSMP is implemented in response to a Level 2 or 3 MDO spill. *(All phases)*	**RSK07-EPS14** Post-release data is obtained in accordance with the monitoring requirements of the OSMP.	**RSK07-MC14** Emergency response records confirm the OSMP was implemented post-spill.

Impact Consequence (residual)			
Phase	**Likelihood**	**Consequence**	**Risk**
Operations	Remote (A)	Serious (3)	Low
CoP	Remote (A)	Serious (3)	Low
Preservation	Remote (A)	Serious (3)	Low

ALARP Decision Justification

With the controls outlined in this table in place, this risk has been assessed as 'Low' and is considered to be good practice (Decision Context A). This means any additional or alternative control measures do not lower the residual consequence further or would be grossly disproportionate to the residual consequence. Therefore, a residual risk score ranking of 'Low' is considered to be ALARP.

Acceptability Assessment	
Defined acceptable level	The risk of an MDO release is assessed as having a 'Low' residual risk rating, which is not considered as having the potential to result in serious or irreversible environmental damage.
Internal context	The proposed management of the risk is aligned with the Beach Environment Policy. Activities will be undertaken in accordance with the Implementation Strategy (Section 8).
External context	The BassGas Offshore Operations SEP is implemented to ensure that stakeholders are aware of operations issues. Stakeholders have not raised concerns about unplanned releases of hydrocarbons.
Legislative context	The control measures outlined in this EP align with the requirements of: ○ *Navigation Act 2012* (Cth) ▪ Chapter 4 (Prevention of Pollution) ▪ Chapter 6 (Safety of Navigation)

ALARP Decision Justification		
	▪ Marine Order 91 (Marine pollution prevention – oil) ○ OPGGS Act 2006 (Cth) ▪ Section 572A-F (Polluter pays for escape of petroleum) • OPGGS(E) ▪ Part 5 (Incidents, reports and records) ○ *Protection of the Sea (Prevention of Pollution by Ships) Act 1983* (Cth): ▪ Section 11A (SOPEP) ○ POWBONS Act 1986 (Vic) ▪ Section 10 (Duty to report certain incidents involving oil and oily mixtures).	
Industry practice	The control measures outlined in the below-listed guidelines and codes of practice demonstrate that BPEM will be implemented for this activity.	
	Environmental management in the upstream oil and gas industry (IOGP-IPIECA, 2020)	The control measures listed in this table meet the relevant mitigation measures listed for offshore activities with regard to: • Section 4.7.2 Spills – Collision ○ Implementing a safety exclusion zone for relevant vessels/facilities **(RSK07-CM03, -CM04)** ○ Vessel movements comply with COLREGS and Chapter V of SOLAS **(RSK07-CM05)** ○ Vessels having radar fitted and maintaining appropriate lighting and navigation systems **(RSK07-CM05)** • Section 4.7.3 Refuelling and bunkering ○ Refuelling to be undertaken by trained personnel using defined procedures and during daylight hours in calm seas **(RSK07-CM02)** ○ Transfer hose integrity is regularly inspected **(RSK07-CM02)** ○ Tank levels are continuously monitored to prevent overflow **(RSK07-CM02)** ○ Dry break or breakaway couplings are used **(RSK07-CM02)** • All vessels have a SOPEP in place **(RSK07-CM08)**.
	Best Available Techniques Guidance Document on Upstream Hydrocarbon Exploration and Production (European Commission, 2019)	There are no guidelines for offshore activities with regard to preventing or managing an offshore MDO spill, other than having a spill contingency plan in place. An OPEP is in place for BassGas operations.
	Environmental, Health and Safety Guidelines for Offshore Oil and Gas Development (World Bank Group, 2015)	The control measures listed in this table meet the relevant mitigation measures listed for offshore activities with regard to: • Section 75 (Spills) - Conducting a spill risk assessment, implementing personnel training and field exercises, ensuring spill response equipment is available **(OPEP)**. • Sections 76-79 (Spill response planning) - A spill response plan should be prepared **(OPEP)**.

ALARP Decision Justification		
	Code of Environmental Practice (APPEA, 2008)	The control measures listed in this table meet the following offshore development and production objectives: • To reduce the risk of any unplanned release of material into the marine environment to ALARP and an acceptable level.
Environmental context	MNES	
	AMPs	No intersection or risks.
	Ramsar Wetlands	No intersection or risks.
	NIWs	No intersection or risks.
	TECs	Entrained hydrocarbons at the low threshold of exposure may intersect the Giant Kelp Forests of South East Australia. At this exposure level, there will be no significant impacts to giant kelp populations.
	Nationally threatened and migratory species	Some nationally threatened species and migratory species have the potential to be present in the MDO spill EMBA, particularly within their BIAs, but as evaluated in the previous tables in this section, the risks to individuals or populations of threatened and migratory species are mostly low.
	Other matters	
	State marine parks	There is overlap between the low and moderate exposure thresholds for entrained hydrocarbons to the following Victorian marine parks: • Bunurong MNP • Phillip Island NP • Wilsons Promontory NP • Kilcunda CR This overlap will be temporary and will not have significant effects on the values of these parks.
	Species Conservation Advice/Recovery Plans/Threat Abatement Plans	Marine pollution is a threat identified for albatross and giant-petrels in the National recovery plan for threatened albatross and giant petrels 2022 (DCCEEW, 2022). Population monitoring is the suggested action to deal with marine pollution. The conservation advice and management plans for blue, humpback, sei and fin whales identify hydrocarbon spill as threats, though there are no specific aims to address this.
ESD principles	The EIA presented throughout this EP demonstrates that ESD principles (a), (b), (c) and (d) are met (noting that principle (e) is not relevant).	

Environmental Monitoring
As per the OPEP and OSMP.

Record Keeping	
Vessels	Platform
• Vessel vetting records.	• Communications diary.
• Vessel assurance reports.	• CMO incident register.

ALARP Decision Justification	
• Vessel audit records. • Class certification records. • Crew competency records, • Incident reports.	• Daily operations log. • OPEP training schedule and exercise reports. • Pre-fuelling checklist. • Completed bunkering checklists. • Bunker log. • Bunkering PTWs/JSAs. • BassGas Bunkering Procedure • Hose register. • CMMS records. • IMT reports. • Incident report. • Emergency response records.

7.18 RISK 8: Hydrocarbon Spill Response Activities (other than relief well drilling)

This section presents the impact assessment for oil spill response strategies.

Beach has developed a regional Offshore OPEP (CDN/ID 3972816) which is the primary reference document and key control measure to be implemented in the highly unlikely event of a hydrocarbon release from the activity. While Beach has operated the BassGas facility, there has been no hydrocarbon or chemical spill necessitating activation of the OPEP.

7.18.1 Response Strategy Selection

Spill response strategies are triggered in the event of a hydrocarbon spill. Not all response strategies are appropriate for every oil spill. Different oil types, spill locations, and volumes require different response strategies, or a combination of response strategies, to form an effective response.

Beach has undertaken a preliminary Net Environmental Benefit Analysis (NEBA) to identify response strategies that will result in the lowest overall impact and maximum protection, or recovery, of environment, socio-economic and cultural values. The NEBA process is undertaken at a strategic level (pre-spill) to identify pre-determined appropriate response strategies. In the event of a spill, an Operational NEBA is undertaken throughout the response, and implementation of specific response strategies is subject to the outcomes of the Operational NEBA.

7.18.1.1 Monitor and Evaluate

Monitoring and evaluation is conducted to assist in identifying resources that are at risk of exposure, directing response efforts and evaluating the effectiveness of response techniques. Monitoring activities are conducted throughout the incident response and include:

- Manual Spill Trajectory Modelling – manual vectoring and software (e.g. ADIOS) to predict the weathering and trajectory of the hydrocarbon.
- Oil Spill Trajectory Modelling (OSTM) – computer models, and computational techniques estimate the speed and direction of movement, weathering, and dispersal patterns.

- Aerial/Vessel Surveillance– observers on aircrafts or vessels use standard references to characterise surface oil type, movement, and behaviour.

- Satellite Tracking Buoys – are heavy duty floating devices designed for deployment from the MODU, support vessel or helicopters to accurately track a surface hydrocarbon spill. Tracking buoys contain a global satellite tracking system and are used to track the leading edge or centre of a spill and provide an oil spill response team with information to plan the incident response.

- Satellite Imagery – a method that uses remote sensing technologies to identify and track surface oil.

7.18.1.2 Protection and Deflection

Protection and deflection response will be under the direction of the relevant State Control Agency (as detailed in the OPEP) and involve using specialist equipment (e.g. nearshore booms and skimmers) to divert floating oil away from sensitive receptors. Techniques vary depending on the location and type of sensitivity being protected.

7.18.1.3 Shoreline Clean-up

Shoreline clean-up will be under the direction of the relevant State Control Agency (as detailed in the OPEP). Shoreline clean-up involves the deployment of personnel to relevant shorelines to identify response priorities, access points and clean-up techniques required. Shoreline clean-up may involve different manual and mechanical recovery techniques to pre-clean shorelines pre-impact and remove oil and contaminated debris from the shoreline post-impact to reduce environmental impact from stranded, typically weathered, hydrocarbons. Resourcing and equipment details are provided in the OPEP.

Shoreline clean-up consists of different manual and mechanical recovery techniques such as:

- Natural recovery – allowing the shoreline to self-clean (no intervention undertaken).

- Manual collection of oil and debris – the use of people to collect oil from the shoreline.

- Mechanical collection – use of machinery to collect and remove stranded oil and contaminated material.

- Sorbents – use of sorbent padding to absorb oil.

- Vacuum recovery, flushing, washing – the use of high volumes of low-pressure water, pumping and/or vacuuming to remove floating oil accumulated at the shoreline.

- Sediment reworking – move sediment to the surf to allow oil to be removed from the sediment and move sand by heavy machinery.

- Vegetation cutting – removing oiled vegetation.

7.18.1.4 Oiled Wildlife Response

The level of oiled wildlife response (OWR) will be determined by data collected via the initial surveillance monitoring. The OWR will be conducted in accordance with the state specific marine oil

and chemical spill contingency plans and relevant wildlife response plans, as directed by the relevant State Control Agency (as detailed in the OPEP).

Typical OWR can be separated into three stages, including:

- Wildlife Reconnaissance - situational awareness / visual observations of species present and identification of species that may potentially be impacted by oil exposure and/or response strategies.
- Preventative Actions:
    - Deterrence strategies e.g. hazing by auditory or visual scarers.
    - Displacement strategies e.g. fencing or barricading techniques.
    - Pre-emptive capture - removal of wildlife from an area and transportation to a staging facility or to an area not expected to be impacted.
- Wildlife Rescue:
    - Capture of oiled wildlife – action only to be completed by trained wildlife handlers at direction of relevant Control Agency.
    - Transportation to field processing facility and / or primary care facility staging.
    - Triage – undertaken by trained veterinarians (euthanasia may be required).
    - Stabilisation – of wildlife prior to cleaning.
    - Cleaning – rinsing, washing, drying to remove contamination.
    - Rehabilitation – feeding, swimming, waterproofing, conditioning, pre-releases assessment.
    - Release – once approved.

7.14.3.6 Waste Management

Hydrocarbon spills to the marine environment can generate significant amounts of waste that need to be collected, stored, and disposed of appropriately, in accordance with MARPOL 73/78 Annex V – Garbage, relevant Commonwealth and State/Territory laws and regulations. The potential waste that may be generated during an oil spill response may include:

- Offshore recovery (i.e. from containment and recovery), and
- Shoreline clean-up operations (i.e. manual or mechanical collection).

Due to the high volatility nature of both hydrocarbon types (MDO and condensate), and their subsequent susceptibility to weathering processes (i.e. evaporation), significant volumes of waste are not anticipated. Furthermore, containment and recovery has not been identified as a primary or secondary strategy for either the condensate or MDO scenario meaning the waste storage capacity required is likely to be small.

Waste management arrangements will be implemented prior to activity commencement and will need ensure a continuous response can be maintained. For example, in the event of a clean-up operation, temporary waste handling bases will be set up at designated staging areas such as Port Welshpool. The transport of waste material may be required at sea, from sea to land and on land to on land. Liquid transport trucks, flatbed trucks, dump trucks and gully suckers can be utilised to transport waste material through Beach's licensed waste contractor.

7.14.3.7 Environmental Monitoring

The Offshore Operational and Scientific Monitoring Plan (OSMP) provides a framework for Beach's environmental monitoring response for Level 2 and Level 3 offshore hydrocarbon spills from their petroleum activities undertaken in the Otway Basin.

The OSMP is the principal tool for determining the extent, severity, and persistence of environmental impacts from an oil spill and allows titleholders to determine whether their environmental protection goals are met. Operational monitoring can be used to assess how effective the oil spill response is in protecting the environment. Whereas scientific monitoring can be used to direct remediation efforts, typically after the spill response activities are completed.

Oil spill monitoring has been divided into two types:

4. Operational monitoring which collects information about the spill and associated response activities to aid planning and decision making during the response or clean-up operations. Operational monitoring typically finishes when the spill response is terminated.

5. Scientific monitoring (also known as Type II or recovery phase monitoring) which is focussed on non-response objectives and evaluating environmental impact and recovery from the spill and response activities. Scientific monitoring may continue for extended periods after a spill response is terminated.

Operational monitoring studies may be implemented in conjunction with relevant response strategies as described in the OPEP (e.g. Monitoring and Evaluation, Protection and Deflection, Shoreline Clean-up, and OWR.

OSMP techniques vary, depending on the type of spill, location, and status of the response. The use of vessels, aircraft, and shoreline responders (on foot, vehicles) may be required to undertake the techniques identified within the OSMP.

7.18.2 Source of Aspect

The following response options outline the potential environmental impacts associated with increased vessel activity and response operations for the purpose of spill response. A hydrocarbon spill necessitating a response may occur during the operations, CoP or preservations phases. The hazards associated with each of these response options are:

- Increased vessel activity (over a greater area than the operational area) - Expanding vessel operations over a larger area than usual leads to more routine pollution—such as air and noise emissions—and more discharges of waste (sewage, food waste, cooling water).

- Helicopter noise and hazing - Noise from helicopters can disturb wildlife. Additionally, efforts to scare away (haze) certain target animals may unintentionally disturb other non-target species, preventing them from normal behaviours like resting, feeding, or breeding.
- Harm to target fauna - Animals that are the focus of response efforts (target fauna) may suffer distress, injury, or even death if not handled or treated properly during rescue or rehabilitation.
- Euthanasia - Some affected animals may need to be euthanized if they can't be treated or rehabilitated successfully. Damage to shoreline areas from the establishment of Oiled Wildlife Response (OWR) response centres.
- Shoreline Damage - Setting up OWR centres on shorelines can cause physical damage to those coastal areas.

7.18.3 Known and Potential Environmental Risks

The impacts and risks associated with these response options are:

- Routine and non-routine impacts and risks associated with vessel operations (outlined in associated Bass Gas documents)
- Disturbance, injury or death of target or non-target wildlife.
- Noise disturbance to marine fauna and shoreline species by aerial flights.
- Traditional Owners with cultural heritage connections to these waters.
- Secondary impacts such as damage to foreshore environments from foot access from response activities.
- Change to the conservation, socio-economic and cultural values and sensitivities.
- Disruption to third-party operations such as shipping and commercial fishing (e.g., potential loss of fisheries. resulting from temporary fisheries closures, mortalities from fish stocks or tainted catches).
- Temporary exclusion of the public from beaches

7.18.4 EMBA

Potential impacts resulting from onshore oil spill response will be limited to shorelines where the Operational NEBA has identified that onshore oil spill response will have a net environmental benefit. It should be noted that the Oil Spill Response Area does not represent a single spill but is the outcome of the oil spill modelling which typically uses 100 different spill scenarios.

The EMBA due to hydrocarbon spill response activities (other than relief well drilling) is the defined BassGas Planning area (Table 5.1) and extent as outlined in Section 5 and shown on Figure 5.1.

The hydrocarbon spill EMBA ('EMBA' for simplicity) is therefore defined as:

> *The amalgamation of the extent of low level hydrocarbon exposure to the sea surface (1 g/m2), entrained in the water column (10 ppb), dissolved in the water column (10 ppb), and contact to*

shorelines (10 g/m2) as a result of a 70,489 bbl subsea release of gas condensate at the Yolla-A location (over 86 days), loss of14,500 bbl of gas condensate from a subsea pipeline rupture (over 36 minutes) and the release of 300 m3 of MDO (over 6 hours) at 3NM from the coast from a supply vessel during annualised metocean conditions.

This EMBA has been established through hydrocarbon spill modelling scenarios and results as provided in the Sections 7.15, 7.16 and 7.17) and **Appendix 14**.

7.18.5 Evaluation of Environmental Risks

The impacts and risks associated with routine and non-routine vessel and helicopter activities are described and assessed throughout this chapter and are not repeated here. Access to beaches on foot is not addressed in the EP and is therefore evaluated below.

Damage to shoreline habitat (such as sand dunes providing shorebird nesting habitat) may be caused if personnel veer from formed tracks. The noise, light, and general disturbance created by shoreline monitoring activities (likely to involve foot traffic only, rather than vehicle traffic) may disturb the feeding, breeding, nesting, or resting activities of resident and migratory fauna species that may be present. This is particularly the case for beach-nesting shorebirds such as hooded plovers, which are known to occur along the coast of the EMBA. For example, the eggs of hooded plovers (which nest only on sandy beaches) are small and very well camouflaged, so they are easily trodden on by accident. If the incubating adult is scared off the nest by passers-by, the eggs may literally bake in the sun or become too cold in the cool weather. Either way, it kills the chick developing in the egg, and the egg will not hatch. Similarly, when people disturb a chick, it quickly runs into the sand dunes and hides. While it is running, the chick uses up valuable energy, and while it is hiding it is unable to feed (they usually forage at the water's edge), so that a chick that is forced to run and hide throughout the day could easily starve (Birdlife Australia, 2016). Any erosion caused by responder access to sandy beaches may also bury nests. In isolated instances, this is unlikely to have impacts at the population level.

The presence of stranded hydrocarbons may necessitate temporary beach closures (likely lasting days, depending on the degree of oiling). This means recreational activities (such as swimming, walking, and fishing) in affected areas will be excluded until access is again granted by DEECA or the local government authority. Given the prevalence of sandy beaches and the sparse nature and small population of towns along the EMBA coastline, the predicted rapid weathering of condensate and MDO on the shoreline is likely to have a minor impact on residents and tourists.

The nature of disturbance to the shoreline from vehicle and foot access (and associated land-use activities such as equipment laydown areas, ablution facilities for responders, etc.) is dependent on the location and scale of activities in any given area.

Beach will prepare an Operational NEBA at the time of a spill if any estuaries in the path of a hydrocarbon spill are open, tailored to the conditions at the time.

The following impacts may eventuate in the event of deploying protection and deflection booming:

- Damage to nearshore habitats (such as seagrass meadows) from inshore shallow draught vessel activities and boom anchoring may temporarily alter the dynamics of local ecosystems. Sandy habitats generally self-repair quickly due to tidal movements that replenish the sand.

- Damage to shoreline environments from vehicle and foot access and associated land use may disturb Aboriginal cultural heritage areas (such as shell middens), and temporarily disturb shoreline bird feeding, nesting, roosting or breeding activities, which may in turn impact on local population dynamics. Coastal vegetation disturbed as a result of gaining access to response sites is likely to regenerate once the disturbance has ceased (or can be actively revegetated if natural regeneration is not successful). Shoreline access may also cause soil compaction and erosion, leading to poor vegetation growth or death.

- As a result of digging trenches along the beach to trap oil, together with vehicle and foot access along the shore, oil may mix deeper into the beach sediments than it would normally. This has the potential to increase exposure to toxic components of the oil by delaying the natural weathering process, though constant wave action along the exposed coastline encourages rapid weathering.

- Secondary contamination of the shoreline may occur through vehicle, equipment and foot access spreading oil along and immediately behind the shoreline in areas not originally oiled. This exposes more habitat, flora and fauna to oiling than originally impacted by the spill itself, with the associated impacts of smothering (toxicity is unlikely with weathered condensate or MDO), together with potentially creating larger recreational activity exclusion zones.

7.18.5.1 Shoreline Clean-up

The risks to shorelines from clean-up activities are as described under 'Monitor and Evaluate' with regard to damage to habitats.

The vertical infiltration of oil into shoreline sediments caused by heavy machinery and equipment can expose fauna to oil that would not otherwise have been exposed. This exposes the base of the foodweb to contamination that may bioaccumulate up through the food chain. It also results in the need for the increased removal of contaminated substrate, exacerbating risks such as beach erosion.

The movement of people, vehicles and equipment through sand dunes may disturb cultural heritage artefacts that occur at the surface or are buried. The most likely cultural heritage artefacts to be present are Aboriginal shell middens, especially where freshwater and brackish water sources occur nearby, such as river mouths.

The influx of shoreline clean-up personnel to a given region will place increased demand on the resources of small coastal towns such as Kilcunda, such as accommodation, meals, vehicle hire, fuel, groceries and other day-to-day consumables. In most instances, the increased activity associated with clean-up operations may provide a temporary increase in money being spent in local towns, however sudden influxes of workers to small Australian towns is often fraught with social unrest as the demand for goods and services can negatively impact on the provision of services to residents and tourists. This is likely to be temporary and localised to one or two towns.

7.18.5.2 Oiled Wildlife Response

It is preferable to have oil-affected animals that have no prospect of surviving or being successfully rehabilitated and released to the environment humanely euthanised than to allow prolonged suffering. The removal of these individuals from the environment has additional benefits in so far as they are not consumed by predators/ scavengers, avoiding secondary contamination of the food web. There are no species within the EMBA with such a small or geographically restricted

population that the death of a small number of individuals would result in population-wide impacts.

Hazing and exclusion of wildlife from known congregation, resting, feeding, breeding or nesting areas may have a short- or long-term impacts on the survival of that group if cannot access preferred resources. These effects may be experienced by target and non-target species. For example, low helicopter passes flown regularly over an beach to deter coastal birds from feeding in an oil-affected area may deter penguins from leaving their burrows to feed at sea, which may impact on their health.

Onshore, the establishment of OWR centres will preferentially avoid locating infrastructure on or in close proximity to native habitat, thereby avoiding impacts associated with vegetation clearing (such as habitat loss, reduction in local native species diversity and abundance). Facilities such as portable toilets and showers may be established to deal with day-to- day requirements of first responders so wastes are not discharged to the environment. Similarly, facilities will be supplied for the collection and/or treatment of oily water and detergents associated with the treatment of oiled wildlife, so these wastes are not inappropriately discharged to the environment. A licensed waste management contractor will coordinate the supply of waste facilities and regular removal of wastes (including animal carcasses) to licensed facilities for disposal and/or treatment.

Untrained resources capturing and handling native fauna may cause distress, injury and death of the fauna. To prevent these impacts, only DEECA-trained oiled wildlife responders will approach and handle fauna. This will eliminate any handling impacts to fauna from untrained personnel and reduce the potential for distress, injury or death of a species.

7.18.5.3 Cultural Values and Sensitivities

First Nations cultural values and sensitivities may be present within the area exposed to surface, in-water and shoreline hydrocarbons at relevant thresholds following a vessel MDO release. These include values related to marine fauna and benthic species such as seagrass and kelp.

The potential impact of a MDO release associated as modelled by RPS (2025) is described in Section 7.18.1.4. The modelling predicts shoreline exposure at the low, moderate and high threshold along the Bass coast associated with a MDO release. Low to moderate in-water exposure to hydrocarbons are predicted within the EMBA. Beach understands that First nations people are linked to the marine environment and may be affected by a change in the environment. The presence of strong wave-action, an exposed coastline and the light characteristics of MDO all assist in the rapid dispersal and dilution of the MDO, meaning that there is a low risk of short-term persistence of hydrocarbons.

Therefore, although no long term or permanent changes to marine environment are expected it is considered that the visual presence of floating oil may impact Sea Country at a spiritual level (i.e. rituals, Songlines, culturally important species) and could affect culturally important activities or affect culturally important species including whales and eels. Any impacts are anticipated to be short-term and localised. The consequence to cultural values and sensitivities is assessed as **Minor (1)** and likelihood as **Highly Unlikely (B)** and this risk has been assessed as **Low** and is of an acceptable level.

7.18.6 Cumulative Risk Evaluation

Cumulative impacts from hydrocarbon spill response activities are anticipated to be localised and largely temporary, despite the diverse range of potential environmental interactions. Increased vessel and helicopter activity, foot and vehicle access to shorelines, and the establishment of OWR infrastructure may lead to noise disturbance, minor habitat disruption, and short-term exclusion of the public from beaches. Disturbance to wildlife (both target and non-target species) may include stress, temporary displacement, or, in isolated cases, injury or death, particularly for beach-nesting shorebirds and other sensitive fauna. Shoreline habitats may experience minor erosion, soil compaction, and temporary vegetation disturbance, though natural regeneration or active restoration measures are expected to mitigate these effects over time.

When considered cumulatively with other offshore and coastal activities, these impacts are not expected to result in significant or long-term ecological consequences. Effective management measures (including trained personnel for wildlife handling, operational monitoring, adherence to ALARP principles, and compliance with environmental protection objectives) further reduce the likelihood of additive or synergistic effects. Consequently, the overall cumulative risk of hydrocarbon spill response activities remains low, with short-term, localised disturbances unlikely to compromise the conservation objectives of threatened species, marine habitats, or culturally significant shorelines within the BassGas EMBA.

7.18.7 Risk Assessment

A risk assessment for hydrocarbon spill response activities (excluding relief well drilling, which is covered in the next section) is presented below in Table 7.76.

Table 7.76: Risk assessment for hydrocarbon spill response activities (excluding relief well drilling)

ALARP decision context			
Impact decision framework context	Type B.		
Activity	Nothing new or unusual, represents business as usual, but good practice is well defined.		
Level of certainty of risk	Uncertainty is minimal.		
Stakeholder influence	No conflict with company values, some partner interest, may attract local media attention.		
Risk Assessment (inherent)			
Phase	**Likelihood**	**Consequence**	**Risk**
Operations	Possible (D)	Moderate (2)	Medium
CoP	Possible (D)	Moderate (2)	Medium
Preservation	Possible (D)	Moderate (2)	Medium
Assessment of Proposed Control Measures			
Control	**Cost/benefit analysis**		**Implemented?**
Source control: SMPEP (or equivalent	This is a regulatory requirement under MARPOL and vessel class. There is minimal additional cost as procedures and training are already embedded in vessel operations. It provides immediate and		Yes **(RSK08-CM01; -CM02)**

ALARP decision context		
appropriate to class). *(All phases)* *(Commonwealth and Victorian state waters)*	critical reduction in spill volume which represents a very high environmental benefit. The requirements are embedded within existing vessel management systems and response arrangements and can be implemented with minimal additional cost. The associated costs are not grossly disproportionate to the environmental benefit achieved through reducing spill volume and associated environmental impacts.	
Environmental protection for individual responses. *(All phases)* *(Commonwealth and Victorian state waters)*	Costs are negligible as controls are procedural (e.g., buffers, access restrictions, briefings, habitat avoidance, boom monitoring). These measures aim to prevent secondary environmental impacts during response activities, such as disturbance to fauna or damage to sensitive habitats. They represent industry standard practice and deliver a high environmental benefit at minimal cost. These controls are implemented through existing response procedures and personnel briefings, requiring minimal additional resources. The associated costs are not grossly disproportionate to the environmental benefit achieved through avoiding secondary environmental impacts during spill response activities.	Yes **(RSK08-CM03, -CM04)**
Oil spill trajectory modelling and operational forecasting. *(All phases)* *(Commonwealth and Victorian state waters)*	Oil spill trajectory modelling operational forecasting undertaken immediately following notification of a spill provides high environmental benefit through improved response prioritisation for the protection of sensitive receptors. Beach has existing contracts in place with consultants to undertake spill modelling and software are already maintained through OPEP arrangements. This represents industry standard practice and the associated costs are not grossly disproportionate to the environmental benefit achieved through improving response effectiveness and prioritising protection of sensitive receptors.	Yes **(RSK08-CM07; -CM08; -CM09)**
Shoreline assessment and shoreline clean-up planning. *(All phases)* *(Commonwealth and Victorian state waters)*	Shoreline assessment activities may involve the deployment of personnel and equipment to coastal environments, resulting in temporary disturbance to shoreline habitats, fauna and cultural heritage values. Activities are limited in duration and extent and would only be undertaken where shoreline impacts are predicted and a net environmental benefit has been identified. Implementation of shoreline assessments in accordance with the Victoria Offshore OPEP, application of exclusion zones, habitat avoidance measures and consultation with relevant agencies would minimise environmental impacts. Residual impacts are expected to be localised, short-term and acceptable. Shoreline assessment and clean-up planning are only undertaken where a net environmental benefit has been identified and where shoreline impacts are predicted. The associated costs are not grossly disproportionate to the environmental benefit achieved through targeted protection and recovery of affected shoreline environments.	Yes **(RSK08-CM05)**)
Monitor and evaluate: autonomous underwater vehicles (AUVs). *(All phases)* *(Commonwealth and Victorian state waters)*	AUVs may be able to provide additional detail on hydrocarbon in the water column. Because there are no practical means for removing hydrocarbons in the water column, this monitoring method does not assist with determining environmentally suitable controls for responding to hydrocarbons on the sea surface or moving towards shorelines. The costs associated with acquiring, maintaining and operating AUV systems are considered grossly disproportionate to the incremental	No

ALARP decision context		
	environmental benefit achieved beyond that available through existing monitoring arrangements. The Beach Offshore Victoria OSMP will be able to be quickly implemented to monitor the environmental impacts of a Level 2 or 3 spill using conventional monitoring techniques using existing contracts.	
Monitor and evaluate: Night-time monitoring – infrared. *(All phases)* *(Commonwealth and Victorian state waters)*	Side looking airborne radar systems are required to be installed on specific aircraft or vessels. The costs of sourcing such vessels/aircraft is approximately $20,000 per day. Infrared may be used to provide aerial monitoring at night-time, however the benefit is minimal given trajectory monitoring (and infield monitoring during daylight hours) will give good operational awareness. In addition to this, satellite imagery may be used at night to provide additional operational awareness. Given the availability of trajectory modelling, daylight monitoring and satellite imagery, the incremental benefit achieved through dedicated infrared monitoring is limited. The costs associated with sourcing specialist aircraft or vessels are therefore considered grossly disproportionate to the environmental benefit achieved.	No
Environmental monitoring program. *(All phases)* *(Commonwealth and Victorian state waters)*	Environmental monitoring undertaken under the OSMP may involve vessel operations, aerial monitoring and environmental sampling. These activities may result in temporary and localised disturbance to marine fauna and habitats. Monitoring activities are targeted, short-term and undertaken using established protocols to minimise environmental disturbance. Residual impacts are expected to be negligible to minor and are acceptable given the environmental benefit of informing adaptive management and recovery assessment following a spill event. Environmental monitoring activities are implemented through the existing OSMP framework and the associated costs are not grossly disproportionate to the environmental benefit achieved through informing adaptive management and recovery assessment following a spill.	Yes **(RSK08-CM10)**
Oiled wildlife response. *(All phases)* *(Commonwealth and Victorian state waters)*	Oiled wildlife response activities may involve the capture, handling, transport and rehabilitation of affected wildlife. While these activities may cause temporary disturbance to individual animals and nearby habitats, they are undertaken by appropriately trained personnel using approved procedures and only where a net environmental benefit exists. Residual impacts are expected to be minor and outweighed by the environmental benefit associated with treatment and rehabilitation of affected fauna. Oiled wildlife response capability is maintained through existing specialist response arrangements and is implemented only where a net environmental benefit exists. The associated costs are not grossly disproportionate to the environmental benefit achieved through treatment and rehabilitation of affected wildlife.	Yes **(RSK08-CM06)**
OWR: Pre-positioning of oiled wildlife response resources. *(All phases)*	Pre-positioning of OWR equipment at the LLGP (or at port) does not present a significant time saving with regards to deploying equipment to shorelines. Although the OSTM indicates that MDO could reach shorelines within 10 hours and condensate from a pipeline rupture could reach	No

ALARP decision context		
(Commonwealth and Victorian state waters)	the shore within 12 hours of release, there are significant benefits in relying on Beach's current oil spill response arrangements: • There are substantial costs associated with purchasing and maintaining OWR equipment. Beach personnel and the vessel contractors are not specialised in this work. • There is no guarantee that Beach or vessel contractor personnel required to deploy and operate this equipment in the event of a spill would be available at this time, as operations and vessel contractor personnel are focussed on day-to-day operations. • Existing AMOSC response arrangements already provide access to maintained equipment and specialist expertise without duplicating capability. The costs associated with purchasing, maintaining and staffing dedicated pre-positioned equipment are considered grossly disproportionate to the incremental environmental benefit achieved.	
Chemical Dispersant: Pre-positioning of dispersant and application equipment. application equipment. *(All phases)* *(Commonwealth and Victorian state waters)*	Chemical dispersant is not recommended for Group I oils such as condensate due to its very low viscosity (i.e., easy spreading) and high volatility (i.e., it evaporates rapidly) and is not always recommended for Group II oils such as MDO due to their moderate viscosity (i.e., increasing resistance to dispersion as weathering occurs), and tendency to form stable emulsions (i.e., reducing dispersant effectiveness over time). Dispersant use will have a net negative effect on the environment. Dispersants push the hydrocarbons into the water column, creating longer lasting impacts in the water column than allowing the condensate to weather naturally from the sea surface. No clear benefit identified as stockpiles of dispersant already available in Melbourne and elsewhere in Australia. Application equipment and dispersant can be readily mobilised to site, with no identified restriction on logistics pathways or response timing. Existing dispersant stockpiles and logistics arrangements provide access to dispersant capability without the need for dedicated pre-positioning. Given the limited applicability of dispersants to the credible spill scenarios and the potential for adverse environmental effects, the costs associated with pre-positioning equipment are considered grossly disproportionate to the environmental benefit achieved.	No

Environmental Controls and Performance Measurement			
EPO	**Control measure**	**EPS**	**Measurement criteria**
Platform, RGP and vessels (Commonwealth and Victorian state waters)			
RSK08-EPO01 Stop or minimise the flow of hydrocarbons to the marine environment as quickly as practicable to reduce	**RSK08-CM01** In the event of a hydrocarbon spill to the marine environment, Beach will activate the Incident Management Team (IMT) and implement the EPS outlined in Section 9 of the Victoria Offshore OPEP (CDN/ID 18986979). *(All phases)*	**RSK08-EPS01** Beach OPEP spill response measures stop the flow of hydrocarbons.	**RSK08-MC01** Incident management records, Incident Action Plans, situation reports and incident reports demonstrate implementation of relevant OPEP response actions.

ALARP decision context			
environmental impacts.	**RSK08-CM02** Activate the IMT and develop Incident Action Plans in accordance with the Victoria Offshore OPEP. *(All phases)*	**RSK08-EPS02** Spill response decisions are guided by a functioning Incident Management Team and documented Incident Action Plans.	**RSK08-MC02** Incident records, Incident Action Plans and Situation Reports demonstrate operation of the Incident Management Team.
RSK08-EPO02 Environmental monitoring and response activities are undertaken in a manner that protects sensitive fauna and habitats.	**RSK08-CM03** Helicopters will maintain a buffer distances of 500 m around cetaceans in accordance with EPBC Regulations 2000 (Part 8). *(All phases)*	**RSK08-EPS03** Aerial monitoring does not disturb cetaceans.	**RSK07-MC03** Flight instructions document these constraints.
	RSK08-CM04 Vessels will maintain buffer distances around whales and dolphins in accordance with the Beach WMP. *(All phases)*	**RSK08-EPS04** Vessel operations do not disturb cetaceans.	**RSK07-MC04** Incident reports note when cetaceans were sighted and actions that were undertaken.
	RSK08-CM05 Undertake shoreline assessment where shoreline impact is predicted and a net environmental benefit exists. *(All phases)*	**RSK08-EPS05** Shoreline assessment undertaken prior to implementation of shoreline clean-up operations.	**RSK07-MC05** Assessment reports and response records verify that shoreline assessment was completed.
	RSK08-CM06 Access oiled wildlife response capability through existing AMOSC arrangements if activation criteria are met. *(All phases)*	**RSK08-EPS06** OWR resources can be mobilised in accordance with OPEP arrangements.	**RSK07-MC06** Incident reports verify that OWR capability was activated when required.
RSK08-EPO03 Spill response activities are informed by current spill behaviour and predicted receptor exposure.	**RSK08-CM07** Oil spill trajectory, weathering and fate modelling is undertaken in accordance with the Victoria Offshore OPEP (CDN/ID 18986979). *(All phases)*	**RSK08-EPS07** Operational OSTM is available to support spill response decision making.	**RSK07-MC07** Incident reports verify that OSTM was initiated and regularly updated during response operations.
	RSK08-CM08 The location, extent and movement of hydrocarbons are identified through aerial and vessel surveillance to support implementation of effective response activities. *(All phases)*	**RSK08-EPS08** Hydrocarbon distribution and movement is verified through surveillance activities.	**RSK07-MC08** Incident reports verify that surveillance activities were implemented.
	RSK08-CM09 Deploy tracking buoys where required to provide real-time OSTM information.	**RSK08-EPS09** Tracking data is used to support IMT decision making.	**RSK07-MC09** Incident reports verify deployment of

ALARP decision context			
	(All phases)		tracking buoy data where required.
RSK08-EPO04 Environmental impacts of a spill are monitored to support adaptive management and recovery assessment.	**RSK08-CM10** Implement the Beach Offshore Victoria OSMP where activation criteria are met. *(All phases)*	**RSK08-EPS10** Monitoring requirements defined in the OSMP are implemented.	**RSK07-MC10** OSMP reports demonstrate implementation of the required monitoring program.

Risk Assessment (residual)			
Phase	**Likelihood**	**Consequence**	**Risk**
Operations	Highly Unlikely (B)	Minor (1)	Low
CoP	Highly Unlikely (B)	Minor (1)	Low
Preservation	Highly Unlikely (B)	Minor (1)	Low

ALARP Decision Justification

With the controls outlined in this table in place, this risk has been assessed as 'Low' and is considered to be good practice (Decision Context A). This means any additional or alternative control measures do not lower the residual consequence further or would be grossly disproportionate to the residual consequence. Therefore, a residual risk score ranking of 'Low' is considered to be ALARP.

Acceptability Assessment	
Defined acceptable level	The risk from hydrocarbon spill response activities (other than relief well drilling) occurring is assessed as having a 'Low' residual risk rating, which is not considered as having the potential to result in serious or irreversible environmental damage.
Internal context	The proposed management of the risk is aligned with the Beach Environment Policy. Activities will be undertaken in accordance with the OPEP, TRPs and OSMP. Activities will be undertaken in accordance with the Implementation Strategy (Chapter 8).
External context	The BassGas Offshore Operations SEP is implemented to ensure that stakeholders are aware of operations issues. Stakeholders have not raised concerns about unplanned releases of hydrocarbons.
Legislative context	The control measures outlined in this EP align with the requirements of: • OPGGS Act 2006 (Cth) and OPGGS(E): ○ Part 6.2 – directs the polluter to take actions in response to an incident and to clean up and monitor impacts ○ Regulation 21(5) (Risk assessment undertaken to demonstrate ALARP) • OPGGS Regulations 2010 (Vic) and OPGGS Regulations: ○ Regulation 15(3) (Risk assessment undertaken to demonstrate ALARP) • EPBC Regulations 2025: ○ Part 8 (Interacting with cetaceans and whale watching) • *Flora and Fauna Guarantee Act 1988* (Vic): ○ Section 47 (Offences relating to protected flora) ○ Section 48 (Authorisation to take, trade in, keep, move or process protected flora) • *Wildlife Act 1975* (Vic):

ALARP decision context		
	○ Sections 41, 42 & 43 (Hunting, taking or destroying endangered, notable or protected wildlife) • *Emergency Management Act 2013* (Vic).	
Industry practice	The control measures outlined in the below-listed guidelines and codes of practice demonstrate that BPEM will be implemented for this activity.	
	Environmental management in the upstream oil and gas industry (IOGP-IPIECA, 2020)	The control measures listed in this table meet the relevant mitigation measures listed for offshore activities with regard to: • Major spills from production facilities – spill preparedness and emergency response measures are in place.
	Best Available Techniques Guidance Document on Upstream Hydrocarbon Exploration and Production (European Commission, 2019)	No guidance is provided regarding oil spill response activities, other than having a spill contingency plan in place. An OPEP is in place for BassGas operations.
	Environmental, Health and Safety Guidelines for Offshore Oil and Gas Development (World Bank Group, 2015)	Guidelines met with regard to: • Sections 76-79 (Spill response planning) - A spill response plan should be prepared (**OPEP**).
	APPEA CoEP (2008)	The control measures listed in this table meet the following offshore development and production objectives: • To reduce the risk of any unplanned release of material into the marine environment to ALARP and to an acceptable level.
	Hydrocarbon-spill specific guidance	
	AMOSPlan (2021)	AMOSC will implement this plan in the event their resources are deployed. The control measures listed in this table complement the AMOSPlan.
	NATPlan (AMSA, 2020)	AMSA will implement this plan in the event their resources are deployed. The control measures listed in this table complement the NatPlan.
	Contingency planning for oil spills on water – Good practice guidelines for incident management and emergency response personnel (IPIECA/IOGP, 2015)	The control measures listed in this table are prepared cognisant of these guidelines, which discuss oil spill scenarios, various response techniques and the requirements for contingency plan preparation (i.e., an OPEP).
	Oil spill training - Good practice guidelines on the development of training programmes for incident management and emergency response personnel (IPIECA/IOGP, 2014)	The control measures listed in this table are prepared cognisant of these guidelines, in so far as training of Beach personnel in oil spill preparedness and response takes place and is overseen by an emergency response specialist.

ALARP decision context		
	Aerial Observations of Marine Oil Spills (ITOPF, 2011)	The control measures listed in this table related to monitoring were prepared cognisant of these guidelines, which describe monitoring techniques and outline the importance of monitoring in guiding on-water and shoreline response activities.
	Aerial Observations of Oil Spills at Sea (IPIECA/OGP, 2016)	
	In-water surveillance of oil spills at sea – Good practice guidelines for incident management and emergency response personnel (IPIECA/IOGP, 2016).	The control measures listed in this table are prepared cognisant of these guidelines, which indicate how specialised in-water oil surveillance is.
	Dispersants: surface application – Good practice guidelines for incident management and emergency response personnel (IPIECA/IOGP, 2016)	The control measures listed in this table are prepared cognisant of these guidelines, which discuss application methods, the limitations of dispersants and indicate that dispersant application is best suited to crude oils (not gas condensate or refined MDO, which is best left to weather naturally).
	Use of dispersants to treat oil spill – technical information paper 4 (ITOPF, 2011)	
	A guide to oiled shoreline assessment (SCAT) surveys (IPIECA/OGP, 2014)	The control measures listed in this table are prepared cognisant of these guidelines, which describe how shoreline assessments should be conducted and what information should be recorded in order to inform shoreline responses.
	Use of booms in oil pollution response – technical information paper 3(ITOPF, 2011)	This guideline has been used to inform the effectiveness and feasibility analysis for booming to determine the appropriateness of this technique taking into consideration the hydrocarbon types and nature of the receiving environment.
	Clean-up of oil from shorelines – technical information paper 7 (ITOPF, 2011)	The control measures listed in this table are prepared cognisant of these guidelines, which describe various shoreline clean-up techniques and the response strategies most suitable for different shoreline types.
	Wildlife response preparedness – Good practice guidelines for incident management and emergency response personnel (IPIECA/IOGP, 2014)	The control measures listed in this table are prepared cognisant of these guidelines, which indicate how specialised OWR is. Beach has rightfully deferred this task to the experts (DEECA, AMOSC personnel and/or Phillip Island Nature Park wildlife clinic oiled wildlife responders) and will cover the cost of their work.
	Key principles for the protection, care and rehabilitation of oiled wildlife (IPIECA/IOGP, 2017)	
Environmental context	MNES	
	AMPs	Oil and chemical spills are a threat identified in the South-east Marine Parks Network Management Plan 2025.

ALARP decision context		
		Spill response will not be undertaken in AMPs given that surface oiling is not predicted. Vessel or aircraft-based monitoring activities will have no significant impacts on AMPs.
	Ramsar wetlands	Spill response will not be undertaken in Ramsar wetlands given that surface oiling is not predicted. Vessel or aircraft-based monitoring activities will have no impacts on these wetlands.
	NIWs	Spill response will not be undertaken in NIWs given that surface oiling is not predicted. Vessel or aircraft-based monitoring activities will have no impacts on NIWs.
	TECs	Spill response will not be undertaken in areas where TECs exist given that surface oiling is not predicted. Vessel or aircraft-based monitoring activities will have no impacts on TECs.
	Nationally threatened and migratory species	Some threatened and migratory species have the potential to be present in spill response areas but given that the key response strategy is centre on monitoring and surveillance because of the volatile nature of the hydrocarbons, vessel or aircraft-based monitoring activities will have no significant impacts on threatened and migratory species.
	Other matters	
	State marine parks	Many of the Victorian marine and coastal reserve management plans list the protection of marine and terrestrial ecological communities and indigenous flora and fauna, particularly threatened species, as a management aim. Spill response may be undertaken in coastal marine parks given that shoreline loading is predicted to contact some parks. Land, vessel or aircraft-based monitoring activities will have no significant impacts on these marine parks or the management objectives of the parks' management plans.
	Species Conservation Advice/Recovery Plans/Threat Abatement Plans	Marine pollution is a threat identified for albatross and giant petrels in the National recovery plan for threatened albatross and giant petrels 2022 (DCCEEW, 2022). Population monitoring is the suggested action to deal with marine pollution. The risks posed by response operations do not impact this action. The conservation advice and management plans for blue, humpback, sei and fin whales identify hydrocarbon spill as threats, though there are no specific aims to address this. Oil spills and crushing or disturbance of eggs, chicks and nesting birds by human activities are identified as threats in the Conservation Advice for the Hooded Plover (TSSC, 2014) and the National Recovery Plan for the Australian Fairy Tern (CoA. 2020). Ensuring this threat is not exacerbated by shoreline clean-up activities has been ddressed within the controls listed in this table. Land, aerial or vessel-based observations will not conflict with the management objectives of these plans.
ESD principles	The EIA presented throughout this EP demonstrates that ESD principles (a), (b), (c) and (d) are met (noting that principle (e) is not relevant).	
Environmental Monitoring		

ALARP decision context
As per the operational studies in the OSMP.

Record Keeping	
• Incident management records. • Inspection/audit reports. • Contracts and agreements with third parties. • SMPEP (or equivalent appropriate to class). • OPEP. • TRP. • Equipment and service provider register. • Monthly OSMP review reports. • Exercise drill reports. • Daily operations reports. • Shoreline assessment reports.	• Incident reports. • IAPs. • SITREPs. • Operational NEBA. • Incident logs. • Helicopter flight instructions. • Briefing records. • Photos. • EPA Waste Transport Certificates. • Oiled wildlife responder licence records OSMP implementation records and reports.

7.19 RISK 9: Hydrocarbon Spill Response Activities - Relief Well Drilling

Beach has developed a regional Offshore OPEP (CDN/ID 3972816) which is the primary reference document and key control measure to be implemented in the highly unlikely event of a hydrocarbon release whilst undertaking Program activities.

7.19.1 Response Strategy - Source Control

Source control responses for consideration in this plan include:

- Relief Well.
- Subsea First Response Toolkit.
- Vessel Source Control.

7.19.1.1 Relief Well

Drilling a relief well is the primary source control strategy for wells in Bass Strait. Each well, or group of similar wells, has a RWP detailing:

- The relief well strategy for each well or group of similar wells;
- Anticipated timeframes to drill a relief well; and
- Resources available to implement the RWP.

The primary method of well control is via a dynamic well kill by intersecting the well bore below the release location via a relief well and circulating kill weight drilling fluid into the well bore, thus controlling the flow of hydrocarbons from the reservoir. This requires the mobilisation of another suitable MODU to the existing well location.

The scope of drilling a relief well is the same as drilling a standard well although it will be a deviated well due to the need to drill at distance from the original flowing well. A relief well is typically drilled as a straight hole down to a planned kick-off point, where it is turned towards the target using directional drilling technology and tools to get within 30-60 m of the original well. The drilling assembly is then pulled from hole and a magnetic proximity ranging tool is run on wireline to determine the relative distance and bearing from the target well. Directional drilling continues with routine magnetic ranging checks to allow for the original well to be intersected. Once the target well is intersected dynamic kill commences by pumping kill weight mud and cement downhole to seal the original well bore.

Initial relief well planning is part of the well planning process, this includes screening of suitable relief well location, relief well design and kill study to optimise planning time required and optimise relief well duration. Should a blowout emergency occur, further planning for the relief well will begin simultaneously with other well intervention options. The SCERP details the process for relief well design with key activities prioritised as part of the immediate response operations:

- Mobilisation of well control and relief well specialists.
- Confirmation of relief well strategy with well specialist to define MODU/vessel requirements:
- Confirm relief well location using geophysical site survey data. This will consider the prevailing weather at the time of the incident, seabed infrastructure in the area and directional drilling requirements for well intersection.
- Validate relief well casing design.
- Screen available MODUs in the region with current Australian Safety Case and select MODU with appropriate technical specifications to execute the strategy. A memorandum of understanding has been established between Australian operators (including Beach) to expediate access to suitable MODUs, equipment, and services for relief well drilling. If required Beach is able to request the use of a MODU, equipment, and services, that may be under contract to another operator. Minimum technical specifications for the well kill have been modelled, and the selected MODU will meet these requirements and be capable of operating in the metocean conditions at the relief well location.
- Prepare and submit regulatory documentation required for relief well activities.
- Mobilise necessary equipment and services such as directional drilling equipment and appropriate ranging tools for relief well strategy.

Relief Well Design

The SCERP and RWP include technical details as to the design and equipment requirements to drill a relief well. Detailed well dynamic kill modelling has demonstrated that the activity wells can be killed via a single relief well. Two relief well sites have been identified for each well location, even though modelling confirms only one relief well is required for the kill operation. This redundancy will give contingency in the event one of the relief well sites is deemed not accessible. Final sites will be chosen based on a risk assessment considering the actual conditions in the event of a loss of containment.

The relief well can be executed using a semi-submersible MODU (moored). Moorings are expected to extend approximately 2 km from the MODU and may therefore extend beyond the distance of the Operational Area, which may expand by approximately 1-2 km radius under emergency conditions. The final anchor layout will be based on mooring analysis and MODU configuration.

At least two Anchor Handling Tug Supply (AHTS) vessels would be required to tow the MODU (if unable to self-propel) and install moorings. An active MODU would already be supported by AHTS vessels and hence would likely be accompanied by those vessels during relief well drilling. AHTS vessels could also be sourced from hubs such as the Northwest shelf and Singapore.

MODU Selection

Bass Strait is considered a remote location and therefore likely to have an impact on the time taken for a suitable MODU to be mobilised to the relief well location. This timeframe has been built into the oil spill modelling. MODU broker reports are used to monitor the MODU market on a monthly basis and, if required, assist in sourcing and contracting a suitable MODU:

- To facilitate timely response, Beach is a signatory to the AEP Memorandum of Understanding: Mutual Assistance for transfer of MODUs between operators in the case of an emergency. A MODU that is not currently in operation, or in transit to the next operating well, will be preferential and result in a reduced period from the 14 days predicted for engaging and selecting suitable MODUs. The full 14 days will be required where there are no suitable MODUs not currently in operation and the selected MODU will be required to safely suspend well operations on its existing well prior to commencing mobilisation to Beach's location.

MODU selection for relief well drilling will be based on the following:

- A MODU mobilised from the North West Shelf (NWS) or Singapore is likely to take 35 days. These periods have been factored into the relief well schedule within the well-specific Relief Well Plans.
- Rating of well control equipment: MODUs considered shall have equipment rated to at least 10,000 psi to perform the required well kill.
- Water depth: MODU being considered for relief well drilling must be rated for a minimum water depth of 60-100 m.
- Pump capacity of MODU: Suitable to execute the dynamic well kill as per modelling.
- Seabed conditions.
- MODU with a valid Australian Safety Case.
- Proximity to the Otway Basin.
- Ability to engage in a mutual aid agreement with the operator.

Relief Well Installation Timeline

The relief well timeline is largely guided by the location of mobilisation of the MODU drilling the relief well. The three mobilisation points considered are outlined previously. Beach anticipates the

mobilisation of an alternate MODU to the Bass Basin and the successful intersection of a flowing well would take approximately 86 days.

Regulatory Approval Timing Considerations

Planning for relief well drilling will occur in parallel to other tertiary well control responses. A key component of the relief well drilling will be the preparation, submission, and approval of the regulatory documents. Generally, for well operations the regulatory and risk management processes fall on critical path hence in an emergency these documents will require a high level of focus immediately to ensure they are in place prior to arrival of the MODU.

The following documents will require consideration:

- Vessel Safety Case – is required for the selected MODU.
- Scope of validation - is required by NOPSEMA for any proposed significant change to an offshore facility (i.e. MODU or vessel) and to be agreed prior to submission of a safety case revision. Depending on the level of changes required, the time to complete and gain approval could possibly affect the response time to have regulatory documentation in place prior to start of relief well operations.
- Safety Case Revision - will require preparation, submission and approval prior to operations and is expected to be on critical path for relief well activities.
- Well Operations Management Plan (WOMP) –is expected to be suitable for relief well drilling and not expected to require a revision and resubmitted.
- Environmental Plan (EP) – Is designed to provide for source control response activities. Significant changes may require resubmission subject to initial change assessment, though is not expected to affect overall response time.
- Well Activity Notice (WAN) - As part of the preparation of the above documentation a number of formal safety assessments will be conducted as part of risk management these include:
    - Hazard Identification (HAZID) workshop (identifies risks, assesses hazards and mitigations to control works site hazards with aim to remove major accident events).
    - Hazard Operations (HAZOP) workshop (risk assesses the operational sequence and place controls to reduce hazards to ALARP).
    - Risk Assessments for safety critical equipment (vessel equipment, BOP, mooring, fluids handling).

Response Agreements:

Beach maintains contracts/agreements with specialists to supply well control expertise and support for drilling a relief well. This includes:

- Beach primary well control support services (Wild Well Control): Well control specialists with experience in relief wells and the coordination of installation activities.

- Technical writing and risk engineering services to support regulatory documentation workflows and submissions is provided by experienced specialists (e.g. ADD Energy).
- Wellhead and casing materials supplier.
- Beach is party to the Industry Memorandum of Understanding (MoU) to share drilling MODUs, equipment and resources (well site services) in the event of an emergency. The MoU provides for the timely transfer of third-party contractual arrangements involved in the release of a MODU and well site services to the Titleholder for relief well drilling.
- Equipment and materials needed to construct a relief well will be able to be sourced either directly from suppliers or through the industry AEP Mutual Aid MoU. All equipment and materials are tracked and identified prior to the commencement of the offshore activity through the "relief well readiness form" process (refer to OPEP). All equipment and materials are expected to be sourced and transported to site during the safety case revision approval timeframe, MODU transit and anchoring phase for the base and mid case response time model estimates. For the local MODU mobilisation case, an operational MODU would also have equipment and services, with additional equipment and services available via AEP MoU.
- Beach will conduct a relief well readiness check and engage titleholders to ascertain and confirm the level of critical equipment inventories during the operational period for the purpose of drilling a relief well.

7.19.1.2 Vessel Source Control

For a vessel spill at sea, the Vessel Master shall implement the Shipboard Marine Pollution Emergency Plan (SMPEP) or Shipboard Oil Pollution Emergency Plan (SOPEP) (equivalent to class).

7.19.2 Source of Aspect

Mobilisation of a MODU and drilling of a relief well has been identified as the preferred response to the remote likelihood of a LoWC for suspended and operational wells. The drilling of a relief well may be during the operations, CoP or preservations phases, though it is more unlikely for the latter two phases than the operations phase.

Oil spill response strategies that could result in environment impacts are:

- ROV Emergency BOP Intervention.
- Relief Well.
- Subsea First Response Toolkit.
- Vessel Source Control.

7.19.3 Known and Potential Environmental Risks

Known and potential environmental risks from mobilising and drilling of a relief well include:

- Localised and temporary impacts to marine users and fishing due to the physical presence of the drilling rig (similar to those described and assessed in Section 7.1).

- Localised and temporary disturbance to marine fauna due to increased light, atmospheric, and noise emissions (similar to those described and assessed in Sections 7.3, 7.3, and 7.5).
- Localised and temporary impacts to water quality due to increased nutrient and turbidity levels from discharge of putrescible wastes, sewage and grey water, cooling and brine water, and bilge water/deck drainage (similar to those described and assessed in Sections 0, 7.8, 7.9, and 7.10).
- Localised and temporary impacts to water quality and the benthic environment due to the discharge of drill muds, cuttings, and cement.
- Localised and temporary disturbance to the benthic environment due to drill rig anchoring.
- Impacts associated with the introduction of IMS (Section 7.13).

7.19.4 EMBA

Predicted impacts resulting from onshore oil spill response will be limited to shorelines where the Operational NEBA has identified that onshore oil spill response will have a net environmental benefit. It should be noted that the Oil Spill Response Area does not represent a single spill but is the outcome of the oil spill modelling which typically uses 100 different spill scenarios.

The EMBA due to hydrocarbon spill response activities - relief well drilling) is the defined BassGas Operations and Planning area (Table 5.1) and extent as outlined in Section 5 and shown on Figure 5.1.

This EMBA has been established through hydrocarbon spill modelling scenarios and results as provided in the above Sections 7.15, 7.16 and 7.17) and **Appendix 10**.

7.19.5 Evaluation of Environmental Risks

7.19.5.1 Physical presence

The physical placement of a drill rig will result in physical disturbance of the sea floor. This impact would result in localised physical disturbance to benthic habitats. Surveys of previous seabed disturbances from drilling activities of the Victorian coast Basin indicate that recovery of benthic fauna in soft sediment substrates occurs within 6 to 12 months of cessation of drilling (Currie, 2004).

A safety exclusion zone would be required around the drill rig, which could affect fisheries and shipping activities. Such impacts are not likely to be any greater than those discussed for the Yolla-A platform (Section 7.1), which are assessed as minor. No significant additional impacts on fishing or maritime activities are expected from relief well drilling.

7.19.5.2 Routine emissions - light, air and noise

Lights are required for the safe operation and navigational safety of a drill rig, with visibility considered one of the key controls to prevent collisions with third-party vessels. The impacts of lighting will be similar to those from the platform and vessels, which are addressed in Section 7.3 and determined to have a minor impact.

Air emissions associated with drilling relate to the combustion of MDO on the drill rig and in support vessels. As with the impacts assessed in Section 7.3, these are considered to have a minor environmental impact.

The noise emitted by a drill rig results from a combination of down-hole drill pipe operations, including conductor driving, and onboard machinery. This typically produces a low intensity but continuous sound throughout the drilling activity. The primary concern arising from drilling-related noise is its potential effect on marine fauna, specifically cetaceans. Impacts on marine fauna from noise from vessels and operations are addressed in Section 7.5 of this EP. The noise generated by a drill rig is unlikely to result in significant physiological or behavioural impacts, either individually or when combined with existing noise sources. It is expected that any impacts on marine fauna will be limited to behavioural changes in individuals near the location and will not result in effects at the species, population, or ecosystem level. The impacts of sound from the drill rig are similar to those of vessels, and as outlined in Section 7.5, these impacts are considered **Minor (1)**.

7.19.5.3 Routine discharges – putrescible waste, sewage and grey water, cooling and brine water, bilge water/deck drainage

Routine discharges from a drill rig are very similar to those as described for vessels and assessed in Sections 0, 7.8, 7.9 and 7.10 of this EP.

The key difference is that a drill rig has a larger POB (typically about 100 people, compared with the Yolla-A platform, predominantly minor personnel), so there is an increased volume of putrescible and sewage and grey water discharges (though for a short time only). As with the routine discharges of waste from Yolla and vessels, the impacts of such discharges from a drill rig are considered minor.

7.19.5.4 Introduction of IMS

The introduction of IMS from vessels is addressed in Section 7.13 of this EP. The same issues apply to the operation of a drill rig and support vessels due to ballast water discharges and hull fouling. The drill rig and support vessels will be required to have relevant biosecurity certifications and be in possession of a ballast water discharge log. This risk is likely to be low to medium.

7.19.5.5 Discharge of drilling muds and cuttings

Drilling fluids are used to transport drilling cuttings to the surface, prevent well-control issues, maintain wellbore stability, and cool and lubricate the drill bit and drill string during drilling. Drill cuttings are rock, gravel, and sand removed from the well during drilling. The characteristics of the cuttings to be discharged can be predicted from the lithology of other wells drilled in the region and are anticipated to be dominated by calcarenite, shale, and sandstone. The cuttings are expected to range in size from fine to coarse, with a mean size no larger than one centimetre.

The most appropriate drilling fluid for the conditions will be used for relief well drilling. It is likely that water-based muds (WBM) would be used, and the assessment of impacts provided below assumes this. Use of synthetic-based muds (SBM), although unlikely, cannot be entirely discounted, as it is not possible to define specific drilling requirements for all scenarios where relief well drilling may be required. All selected drilling products will have the lowest practicable environmental risk ranking based on CHARM and OCNS. It is likely that bulk discharge of muds would occur at the conclusion of a relief well drilling campaign, as per normal offshore drilling practice.

The known impacts arising from the discharge of WBM drilling fluids and cuttings are:

- Increased turbidity in the water column.
- Burial of benthic organisms.
- Alteration of the benthic substrate.

There is substantial literature demonstrating that impacts from discharged cuttings and muds are generally very localised (100 to 250 m from the well), short-lived (less than 24 months), and that concentrations of metals or hydrocarbons are generally not detectable beyond 1,000 m (Hinwood et al., 1994).

Potential impacts to water quality and benthic organisms are discussed in the following sections. Note that the volume of muds used will be minimised by the use of solids control equipment to ensure maximum retention of fluids within the active mud system.

Water quality and turbidity

The dilution of cuttings and drilling fluid plumes is rapid. Data compiled by the US Environmental Protection Agency (USEPA) from numerous studies on the growth and dilution of drilling mud discharge plumes indicated that the mud was diluted approximately 1 million times by the time it reached 1 km from the discharge point (USEPA 1985). Nonetheless, drilling cuttings and suspended muds can impact components of the marine ecosystem entrained in a discharge plume. Such exposure will, in most cases, be short-term, episodic, or pulse-wise, depending on plume behaviour.

Some studies have demonstrated minor adverse impacts of turbidity induced by WBM discharges on hard-bottom fauna abundance (Hyland et al., 1994), scallops (Cranford et al., 1999), and the blue mussel (Bechmann et al., 2006). These studies indicate that the mechanism of action of cuttings and drilling fluid plumes is mainly physical stress, although chemical toxicity cannot be ruled out. The levels of suspended WBM and cuttings causing effects have been above 0.5 mg/L. Such levels are typically restricted to a radius of less than 1-2 km in the water masses (Neff, 1987).

During drilling of a relief, there will be an increase in turbidity in the immediate area of drilling activity as a result of discharges of cuttings and muds. However, this will be a temporary effect. Tidal currents are substantial, and the interaction between surface and oceanic currents facilitates the dispersion and dilution of cuttings and muds discharged from the drill rig, thereby aiding in minimising water-column turbidity. Any reductions in primary productivity (i.e., plankton growth) in the water column resulting from discharges of cuttings and muds will be very localised within the surrounding marine environment. The water depth at the Yolla field is beyond the photic zone (the depth of the ocean that receives sufficient sunlight for photosynthesis to occur). Any shading effect of the discharge plume, therefore, will be very low.

In summary, the environmental impacts of a turbid plume of cuttings and muds in the highly localised area around the drill rig are expected to be minor.

Burial of benthic organisms

Most offshore field studies have shown a minor impact of WBM discharges on benthic fauna, except immediately adjacent to platforms where cuttings piles form and persist. Some changes in the local infaunal community structure will occur due to burial and the altered sediment character.

The increased bottom micro relief afforded by the accumulation of cuttings may also attract fish and other motile animals and alter the character of epibenthic infaunal communities. Bakke et al (1986) found that fauna recolonisation on sediments capped with 10 mm of WBM cuttings differed little in overall diversity from that on natural sediment after 1 year, but the species composition was clearly different, which was thought to be due to the WBM cuttings being classified as 'very fine sand ' as opposed to the natural sediment being 'medium sand'.

Monitoring in the North Sea has not revealed any in situ effects of WBM cuttings on sediment macrofauna community structure, implying that any such effects, if present, will be confined to the innermost stations in these studies (i.e., nearer than 25-250 m from the discharge point) (various studies cited in Bakke et al., 2013).

Environmental studies undertaken at the Fortescue platform at a depth of 70 m in the western Bass Strait showed that effects on benthic communities from the discharge of cuttings and water-based fluids were generally localised and short-lived, with most benthic organisms recovering within four months (Currie et al., 2004). This study showed no detectable trace element indicators when water-based fluids alone were used.

For Apache's East Spar Development in Commonwealth Waters, the area of impact from WBM discharges was not more than 100 m from the drill site and short-lived, with recovery in less than 18 months (SKM, 1996; Kinhill, 1998). Other studies of the effects of WBM cuttings on sediment fauna also suggest that the impact is normally restricted to within 100-250 m and recovery is rapid (various studies cited in Bakke et al., 2013). There is therefore strong evidence to conclude that sedimentation of WBM cuttings onto the seafloor has only local and short-term effects on the sediment fauna.

In summary, impacts to benthic organisms from the discharge of muds and cuttings from drilling of a relief well are expected to be highly localised and short-term. As the seabed sediments in Bass Strait are generally uniform and widespread, any consequences at the ecosystem level due to impacts in the highly localised area of the drilling location are expected to be minor.

Discharge of cement

Cementing of a relief well is required to provide effective isolation of the well, and to abandon the well afterwards. Most cement is pumped downhole, however, a small amount of overfill and cement-contaminated mud is likely to occur during the grouting of the uppermost surface casings. No technology currently exists to prevent cement from the uppermost casing wellbores being fully cemented to surface without cement releasing onto the sea floor.

Cement discharges may result in localised, temporary increases in pH at the discharge site. Discharges on the seabed may result in smothering of benthic organisms and areas where cement is overlying sediments will not be suitable for recolonisation by benthic species. Chemicals in the cement mix may result in localised reductions in water quality at the time of the discharge.

The cement chemicals selected for any relief well drilling will be selected in accordance with the chemical selection process (described in Section 8 of this EP) in order to minimise the impact on the environment of the cement prior to setting as an inert aggregate.

7.19.6 Cumulative Risk Evaluation

The environmental effects of relief well drilling are expected to be highly localised and short-term, with temporary impacts on benthic organisms, water quality, and minor disturbance from light, noise, and routine discharges. Recovery of benthic communities (abundance and diversity) is expected within months, and water-column impacts are transient. When considered alongside ongoing operations at the Yolla-A platform and other regional activities, the contribution from relief well drilling to cumulative environmental effects is minor.

7.19.7 Risk Assessment

A risk assessment for drilling a relief well is presented in Table 7.77.

Table 7.77: Risk assessment for drilling a relief well.

ALARP decision context			
Impact decision framework context	Type B		
Activity	New to the organisation, infrequent activity, may attract media interest.		
Level of certainty of risk	Good practice is defined and uncertainty is minimal.		
Stakeholder influence	No conflict with company values, some partner interest, may attract local media attention.		
Risk Assessment (inherent)			
Phase	**Likelihood**	**Consequence**	**Risk**
Operations	Highly Unlikely (B)	Moderate (2)	Low
CoP	Remote (A)	Moderate (2)	Low
Preservation	Remote (A)	Moderate (2)	Low
Assessment of Proposed Control Measures			
Control	**Cost/benefit analysis**		**Implemented?**
SCERP, inclusive of RWP. *(All phases)* *(Commonwealth waters)*	This option allows for a relief well to be drilled more rapidly in the event of a LoWC, as key planning, engineering design, and operational considerations have already been completed. As Beach has already developed a SCERP, inclusive of RWP, the associated ongoing costs are limited to periodic review and updates. The SCERP and RWP are maintained through existing emergency preparedness arrangements and require only periodic review and updating. The associated costs are not grossly disproportionate to the environmental benefit achieved through reducing relief well mobilisation time and the duration of a loss of well control event.		Yes **(RSK09-CM01)**
Drill top hole of a relief well. *(All phases)* *(Commonwealth waters)*	This option would allow for a relief well to be drilled faster in the event of a LoWC. Given the extremely low probability of a loss of well control event and the substantial upfront cost and environmental impacts associated with drilling and maintaining a top hole, the		No

ALARP decision context		
	costs associated with this control are considered grossly disproportionate to the environmental benefit achieved.	
Retain a MODU on standby in a nearby port for the drilling of a relief well. *(All phases)* *(Commonwealth waters)*	The costs associated with 'warm-stacking' or 'cold-stacking' a MODU nearby to Yolla-A is not financially feasible. This option would cost millions of dollars per week. The MODU would require an accepted Safety Case to be in place, and a suitable Safety Case Revision to be in place for a relief well drilling program. Quickly mobilising a MODU would also be dependent on accessing a heavy lift vessel or specialist tug vessels to transport the MODU to the Yolla location (which are unlikely to be locally available, unless these too are retained on standby with the MODU). Mobilising a MODU from elsewhere in Bass Strait or the North West Shelf would be likely to be quicker than awaiting a heavy lift vessel to mobilise a cold- or warm-stacked MODU to the Yolla location. The costs associated with retaining a MODU on standby are considered grossly disproportionate to the residual environmental risk and the incremental reduction in source control response time that would be achieved.	No
Use a well capping stack prior to cap a well blowout. *(All phases)* *(Commonwealth waters)*	Section 3.10.1.1 discusses the well capping stack response option and why this is not a suitable option at Yolla-A. Given the facility configuration and the response characteristics of the credible loss of well control scenarios, implementation of a well capping stack would provide limited additional environmental benefit. The associated costs and operational requirements are considered grossly disproportionate to the incremental environmental benefit achieved.	No
Implement the Beach Drilling and Completions Technical Standards when drilling the relief well. *(All phases)* *(Commonwealth waters)*	Relief well operations will be undertaken in accordance with Beach's Drilling and Completions Technical Standards to ensure the well is designed, drilled and completed using established well integrity and risk management practices. Implementation occurs through existing drilling management systems and the associated costs are not grossly disproportionate to the environmental benefit achieved through reducing the likelihood of further well control incidents during relief well operations.	Yes **(RSK09-CM02)**
Have a NOPSEMA-accepted Safety Case (or Safety Case Revision) in place for the MODU. *(All phases)* *(Commonwealth waters)*	An accepted Safety Case Revision ensures the MODU is being operated and maintained safely. Preparation and maintenance of a Safety Case is a regulatory requirement and standard industry practice for a MODU to operate in Australian waters. The associated costs are not grossly disproportionate to the environmental benefit achieved through ensuring safe operation of the relief well drilling facility.	Yes **(RSK09-CM03)**
A NOPSEMA-accepted WOMP will be in place for the relief well design. *(All phases)*	An accepted WOMP provides a structured and regulator-endorsed framework for planning and executing well operations that reduces the likelihood of a LOWC. Preparation and maintenance of a WOMP is a regulatory requirement and standard industry practice. The plan is	Yes **(RSK09-CM04)**

ALARP decision context		
(Commonwealth waters)	routinely updated to reflect current operational procedures, equipment standards, and emergency response arrangements. Implementation is feasible within the existing management system. Preparation and maintenance of a WOMP is a regulatory requirement and standard industry practice. The associated costs are not grossly disproportionate to the environmental benefit achieved through reducing the likelihood of a loss of well control event during relief well drilling.	
Accepted OPEP is in place. *(All phases)* *(Commonwealth waters)*	An OPEP ensures the titleholder has considered risks and planned for a response, which may reduce impacts to marine fauna and sensitive shoreline habitats. Although implementation and maintenance of response capability involves significant cost, the associated costs are not grossly disproportionate to the environmental benefit achieved through reducing the consequences of a spill event and supporting an effective emergency response.	Yes **(RSK09-CM05)**
Base fluids along with mud and cement additives used in the drilling fluid system are limited to low toxicity OCNS-rated mud additives. *(All phases)* *(Commonwealth waters)*	The use of low-toxicity base mud fluids, mud additives and cement additives eliminates ecotoxicity impacts to marine fauna, particularly benthic fauna. This represents standard industry practice in Australia and the associated costs are not grossly disproportionate to the environmental benefit achieved through reducing potential ecotoxicity impacts to marine receptors.	Yes **(RSK09-CM08)**
Cuttings and mud discharges to the marine environment are kept to the minimum possible through effective optimisation of separation and treatment processes. *(All phases)* *(Commonwealth waters)*	Optimisation fluids system minimises the volume of muds adhered to cuttings discharged overboard, in turn minimising water column turbidity and mud deposits at the seabed. This is established industry practice and can be implemented through existing drilling operations. The associated costs are not grossly disproportionate to the environmental benefit achieved through reducing seabed deposition and water column impacts.	Yes **(RSK09-CM97)**
Cement losses to the seabed during top hole cementing operations are kept to the minimum possible. *(All phases)* *(Commonwealth waters)*	Minimising the volume of cement losses to the seabed minimises turbidity near the seabed and minimise impacts to benthic fauna. Established operational controls and industry practices are used to minimise cement losses during drilling activities. The associated costs are not grossly disproportionate to the environmental benefit achieved through reducing impacts to benthic habitats and fauna.	Yes **(RSK09-CM10)**

ALARP decision context		
Monitor availability of suitable MODUs. *(All phases)* *(Commonwealth waters)*	Routine monitoring of MODU availability provides potential environmental benefit by reducing mobilisation time for relief well drilling and therefore reducing the duration of a LoWC event. The cost is low and involves periodic review of drilling activity and contractor information. The associated costs are not grossly disproportionate to the environmental benefit achieved through reducing potential relief well mobilisation delays.	Yes **(RSK09-CM06)**
Maintain arrangements with appropriately qualified well control specialists and maintain relief well equipment, consumables, logistics requirements and mobilisation planning within the SCERP. *(All phases)* *(Commonwealth waters)*	Maintaining access to appropriately qualified well control specialists and pre-planning relief well equipment, consumables and logistics requirements reduces delays associated with response planning, mobilisation and sourcing of critical relief well resources during a LoWC event. These arrangements improve preparedness and support faster implementation of relief well operations, reducing the duration of an uncontrolled release and associated environmental impacts. Costs are limited to maintaining contractual arrangements, specialist resource agreements and planning documentation within the SCERP. The environmental benefits associated with reducing source control response time and spill duration outweigh these relatively minor ongoing costs. Consistent with industry practice, maintaining current response arrangements is considered a practicable and effective control measure. The associated costs are not grossly disproportionate to the environmental benefit achieved through reducing source control response time and minimising the duration of an uncontrolled release.	Yes **(RSK09-CM07)**

Environmental Controls and Performance Measurement			
EPO	**Control measure**	**EPS**	**Measurement criteria**
RSK09-EPO01 Well control is regained in the shortest time possible in line with pre-determined plans.	**Platform only (Commonwealth waters)**		
	RSK09-CM01 The SCERP (including the RWP) is in place (developed in line with the Subsea Well Source Control Emergency Response Planning Guide for Subsea Wells Report 594 (IOGP, 2019)) and implemented in the event of a LoWC. The plan outlines the resources (equipment and people) available to respond to a well blowout (sourcing, mobilising and positioning a MODU, drilling and intercepting the well, and killing the well) and is regularly reviewed for currency. *(All phases)*	**RSK09-EPS01** Relief well drilling is undertaken in accordance with the pre-determined methods outlined in the SCERP.	**RSK09-MC01.1** The SCERP is current. **RSK09-MC01.2** Contracts/agreements are in place with well control specialists. **RSK09-MC01.3** SCERP review reports are available and verify the arrangements remain current. **RSK09-MC01.4** Incident reports verify that the RWP was implemented in the event of a LoWC.

ALARP decision context		
RSK09-CM02 The Beach Drilling and Completions Technical Standards will be implemented to ensure that the relief well design and operations are fit for purpose and that changes are made in a controlled manner, that appropriate standards are adhered to and that a sufficiently resourced and competent organisation is in place. *(All phases)*	**RSK09-EPS02** Relief well design meets the requirements outlined in Drilling and Completions Technical Standards.	**RSK09-MC02** Operational logs verify that the Drilling and Completions Technical Standards was implemented.
RSK09-CM03 A NOPSEMA-accepted Safety Case (or Safety Case Revision) will be in place for the MODU selected to undertake the relief well drilling. The Safety Case identifies the controls in place to prevent a major accident event. *(All phases)*	**RSK09-EPS03** Relief well drilling meets the requirements of the OPGGS (Safety) Regulations 2024 (Cth).	**RSK09-MC03** The Safety Case (or Safety Case Revision) is available, together with the NOPSEMA letter of acceptance.
RSK09-CM04 A NOPSEMA-accepted WOMP will be in place for the relief well design. The WOMP identifies the well barriers and integrity testing in place for the drilling program. *(All phases)*	**RSK09-EPS04** The management of the wells meets the requirements of the OPGGS (Resource Management and Administration) Regulations 2025 (Cth).	**RSK09-MC04** The WOMP is available, together with the NOPSEMA letter of acceptance.
RSK09-CM05 Beach will implement the performance standards outlined in Section 9 of the Victoria Offshore OPEP (CDN/ID 18986979). *(All phases)*	**RSK09-EPS05** The emergency response requirements of the OPGGS(E) Regulations 22(9)(10) are met.	**RSK09-MC05** Incident reports verify the OPEP was implemented.
RSK09-CM06 On-call availability of MODUs in the region is accessible to Beach at all times via an online rig monitoring subscription. *(All phases)*	**RSK09-EPS06** A suitable MODU can be mobilised in accordance with the SCERP.	**RSK09-MC06.1** Online MODU monitoring subscription remains live. **RSK09-MC06.2** SCERP review records demonstrate that mobilisation assumptions remain current.
RSK09-CM07 Maintain arrangements with appropriately qualified well control specialists and maintain relief well equipment, consumables, logistics requirements and mobilisation planning within the SCERP. *(All phases)*	**RSK09-EPS07** The resources specified in the SCERP remain current.	**RSK09-MC07.1** Contracts or agreements with well control specialists are current. **RSK09-MC07.2** SCERP review records verify specialist personnel and response

ALARP decision context			
			arrangements remain valid. **RSK09-MC07.3** SCERP review records verify relief well equipment, logistics and mobilisation assumptions remain current. **RSK09-MC07.4** Incident records verify the SCERP was implemented in the event of a LoWC.
RSK09-EPO02 No toxic chemical mud or cement additives are released to the marine environment.	**Drilling-specific controls** **RSK09-CM08** Base fluids and mud and cement additives used in the drilling fluid system are assessed prior to use to ensure the lowest toxicity, most biodegradable and least accumulative chemicals are selected, in line with the Beach Chemical Management Procedure (CDN/ID S4000AD719917) such that they are: • PLONOR • 'D/E' (non-CHARM) • 'Gold/Silver' (CHARM). *(All phases)*	**RSK09-EPS08** Chemicals that are discharged to the marine environment are low toxicity.	**RSK09-MC08.1** Chemical Assessment Records verify that only low toxicity base fluids and cement additives are used in the drilling fluid system. **RSK09-MC08.2** Chemical Inventories verify that only low toxicity base fluids and cement additives are approved for use in the drilling fluid system. **RSK09-MC08.3** MOC records confirm that the introduction of new base fluids and cement additives is assessed and approved in accordance with OEMS MOC requirements prior to use in the drilling fluid system.
RSK09-EPO03 Environmental impacts associated with cuttings and drilling fluid discharges are minimised through effective optimisation of separation and	**RSK09-CM09** Operation and optimisation of the drilling fluid separation and treatment system is maintained through: • Continuous monitoring of the separation treatment system by the Derrickman/Shaker Hand to ensure optimal performance • Routine drilling fluid testing conducted by the Mud Engineer under the supervision of the Drilling	**RSK09-EPS09** The separation treatment system is operated and maintained to maximise solids removal efficiency and minimise residual mud content in discharged cuttings, supported by routine monitoring and drilling fluid testing.	**RSK09-MC09.1** Daily Fluids Reports document system performance, including solids control efficiency and fluid properties. **RSK09-MC09.2** Daily Fluids Reports verify that drilling fluid properties are tested at the required frequency and that system

ALARP decision context			
treatment systems.	Supervisor at a minimum of twice per day. *(All phases)*		optimisation actions are implemented where required.
RSK09-EPO04 Cement losses to the seabed during top hole cementing operations at kept to the minim possible.	**RSK09-CM10** Top hole cementing operations are managed to minimise excessive cement losses through: • Monitoring of cement returns at the seabed using ROV visual observation. • Controlled pumping of cement volumes in accordance with the cementing programme. • Immediate cessation of cement mixing and pumping once adequate returns are observed, followed by displacement of the string with drilling fluid. *(All phases)*	**RSK09-EPS10** Cement placement is controlled such that when adequate cement returns are confirmed at the seabed, further discharge of cement is prevented by stopping cement pumping and initiating displacement with drilling fluid.	**RSK09-MC10.1** Cement Job Reports verify that visual confirmation of cement returns at the seabed was achieved via ROV observation. **RSK09-MC10.2** Cement Job Reports verify that cement pumping ceased upon confirmation of adequate returns and that displacement was initiated in accordance with the cementing programme. **RSK09-MC10.3** Recorded pumping schedules and volumes demonstrate alignment with the planned cementing programme and confirm controlled cement placement.

Risk Assessment (residual)			
Phase	**Likelihood**	**Consequence**	**Risk**
Operations	Highly Unlikely (B)	Minor (1)	Low
CoP	Remote (A)	Minor (1)	Low
Preservation	Remote (A)	Minor (1)	Low

ALARP Decision Justification
With the controls outlined in this table in place, this risk has been assessed as 'Low' and is considered to be good practice (Decision Context A). This means any additional or alternative control measures do not lower the residual consequence further or would be grossly disproportionate to the residual consequence. Therefore, a residual risk score ranking of 'Low' is considered to be ALARP.

Acceptability Assessment	
Defined acceptable level	The risk from relief well drilling response activities occurring is assessed as having a 'Low' residual risk rating, which is not considered as having the potential to result in serious or irreversible environmental damage.
Internal context	The proposed management of the risk is aligned with the Beach Environment Policy.

ALARP decision context		
	Activities will be undertaken in accordance with the Implementation Strategy (Section 8).	
External context	The BassGas Offshore Operations SEP is implemented to ensure that stakeholders are aware of operations issues. Stakeholders have not raised concerns about unplanned releases of hydrocarbons.	
Legislative context	The control measures outlined in this EP align with the requirements of: • OPGGS Act 2006 (Cth) and OPGGS(E): ○ Part 6.2 – directs the polluter to take actions in response to an incident and to clean up and monitor impacts • EPBC Regulations 2000: ○ Part 8 (Interacting with cetaceans and whale watching) • *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* (Cth): ○ Part II - Prevention of Pollution by Oil	
Industry practice	The control measures outlined in the below-listed guidelines and codes of practice demonstrate that BPEM will be implemented for this activity.	
	Environmental management in the upstream oil and gas industry (IOGP-IPIECA, 2020)	The control measures listed in this table meet the relevant mitigation measures listed for offshore activities with regard to: • Major spills from production facilities – well control contingency plan to be in place, spill preparedness and emergency response measures are in place.
	Best Available Techniques Guidance Document on Upstream Hydrocarbon Exploration and Production (European Commission, 2019)	No guidance is provided regarding relief well drilling.
	Environmental, Health and Safety Guidelines for Offshore Oil and Gas Development (World Bank Group, 2015)	Guidelines met with regard to: • Sections 78 (Spill response planning): Arrangements and procedures to mobilise external resources in responding to larger spills and strategies for their deployment
	Code of Environmental Practice (APPEA, 2008)	The control measures listed in this table meet the following offshore drilling objectives: • To reduce the risk of release of material into the marine environment to ALARP and to an acceptable level.
	Relief well-specific guidance	
	Health, Safety and Environmental Case Guidelines for mobile Offshore Drilling Units (IADC, 2015)	There is no specific guidance regarding relief well drilling. Section 3.3 (drilling and well control operations) states that drilling and well control procedures should be in place.
	Source Control Emergency Response Planning Guide for Subsea Wells (IOGP, 2019)	Beach applies the Source Control Emergency Response Planning Guide for Subsea Wells (IOGP, 2019) to the structure and contents of the RWP, and the relief well design itself, to meet international best practice.

ALARP decision context		
Environmental context	MNES	
	AMPs	No intersection or risks. Routine activities associated with relief well drilling will not have any impacts on nearby AMPs.
	Ramsar wetlands	No intersection or risks. Routine activities associated with relief well drilling will not have any impacts on Ramsar wetlands.
	NIWs	No intersection or risks. Routine activities associated with relief well drilling will not have any impacts on NIWs.
	TECs	No intersection or risks. Routine activities associated with relief well drilling will not have any impacts on TECs
	Nationally threatened and migratory species	Routine activities associated with relief well drilling will not have any significant impacts on threatened or migratory species.
	Other matters	
	State marine parks	Routine activities associated with relief well drilling will not have any impacts on state marine parks. Many of the Victorian marine and coastal reserve management plans list the protection of marine and terrestrial ecological communities and indigenous flora and fauna, particularly threatened species, as a management aim. Land, vessel or aircraft-based monitoring activities will have no significant impacts on these marine parks or the management objectives of the parks' management plans.
	Species Conservation Advice/Recovery Plans/Threat Abatement Plans	Routine activities associated with relief well drilling will not have any impacts on the management aims of threatened species plans.
ESD principles	The EIA presented throughout this EP demonstrates that ESD principles (a), (b), (c) and (d) are met (noting that principle (e) is not relevant).	

Environmental Monitoring

As per the operational studies in the OSMP.

Record Keeping

- Incident records.
- SCERP review records.
- Contracts and agreements with third parties.
- Valid online MODU monitoring subscription.
- Incident reports.
- OPEP.
- RWP.
- Chemical assessment records.
- Daily fluids reports.
- Cement job reports.
- Pumping schedules.
- Pumping volume records.
- Cementing programme.
- ROV records.
- WOMP and acceptance letter.
- Safety case and acceptance letter.

ALARP decision context	
• Chemical inventories. • MoC records.	• Operational logs. • Exercise drill reports.

8 Implementation Strategy

Regulation 22(1) of the OPGGS(E)R requires that an EP must contain an implementation strategy for the activity. The implementation strategy for the activities within the scope of this EP is detailed in the following sections.

8.1 Environmental Management System

Regulation 22(2) of the OPGGS(E)R requires the that the implementation strategy describe the environmental management system that will be used to ensure that:

- Risks and impacts are identified and reduced to ALARP;
- Control measures are effective in reducing risks and impacts to ALARP and an acceptable level; and
- EPO and EPS are being met.

The Beach Operations Excellence Management System (OEMS) is an integrated health, safety and environment (HSE) management system and includes all HSE management plans and procedures. The OEMS provides guidance on how Beach will meet the requirements of its Environment Policy (see Figure 8.1) and has been developed using the principles of the IOGP Report 510 (see Figure 8.2).

The OEMS consists of 5 Management Standards Table 8.1 that detail specific performance requirements to ensure the effective management of HSE risks and impacts. The Management Standards are complemented by asset and activity specific environmental management procedures and plans, including this EP.

The application of OEMS Management Standards relevant to the activity and the requirements of the OPGGS(E)R are described in the following sections. The implementation strategy for the activities within the scope of this EP is detailed in the following sections.

Environment Policy

Objective

Beach is committed to conducting operations in an environmentally responsible and sustainable manner.

Strategy

To achieve this, Beach will:

- Comply with relevant environmental laws, regulations, and the Beach Operations Excellence Management System which is the method by which Beach identifies and manages environmental risk.
- Establish environmental objectives and targets, and implement programs to achieve them that will support continuous improvement;
- Identify, assess and control environmental impacts of our operations by proactive management of activities and mitigation of impacts;
- Ensure that incidents, near misses, concerns and complaints are reported, investigated and lessons learnt are implemented;
- Inform all employees and contractors of their environmental responsibilities including consultation and distribution of appropriate environmental management guidelines, regulations and publications for all relevant activities;
- Efficiently use natural resources and energy, and engage with stakeholders on environmental issues; and
- Publicly report on our environmental performance.

Application

This policy applies to all personnel associated with Beach activities.

April 2023

Figure 8.1: Beach Energy's Environment Policy



Figure 8.2: Beach OEMS

Table 8.1: Beach OEMS Standards

OEMS Management Standards	
Standard 1: Core management practices	1.1 OEMS leadership
	1.2 Asset risk management
	1.3 Management of change
	1.4 Incident management
	1.5 Emergency management
	1.6 Assurance and improvement
Standard 2: Integrity and process safety	2.1 Well lifecycle management
	2.2 Plant and pipeline lifecycle management
	2.3 Safety critical elements
	2.4 Pre-startup safety review (PSSR)
	2.5 Safe operating envelope
	2.6 Asset information
Standard 3: People, transport and readiness	3.1 Induction, training and competency
	3.2 Fitness for work
	3.3 Driving
	3.4 Aviation
Standard 4: Safe systems of work	4.1 Permit to work
	4.2 Hot work
	4.3 Energy isolation
	4.4 Confined space
	4.5 Working at height
	4.6 Lifting and load safety
	4.7 Electrical safety
	4.8 Excavation
	4.9 Occupational exposure
Standard 5: Environment and heritage	5.1 Environment permissions documents
	5.2 Cultural heritage
	5.3 Emissions monitoring and reporting

8.2 OEMS STANDARD 1: Core Management Practices

Core management practices apply to each of the other four management standards and make the OEMS work as a total system. They are fundamental to achieving successful HSE outcomes. Central to this is leaders embedding the OEMS, reinforcing behaviours and driving continuous improvement. It also includes managing risk, managing change, preparing for emergencies, and learning from incidents. The application of OEMS Standard 1 to the activities within the scope of this EP is described below.

8.2.1 OEMS 1.1 OEMS leadership

OEMS 1.1 requires leaders to demonstrate commitment to the OEMS through specific actions and behaviours. Roles and responsibilities for the activity are described in Section 8.8.

8.2.2 OEMS 1.2 Asset risk management

OEMS 1.2 ensures that HSE risks are identified and minimised so far as reasonably practicable through the identification, management and ongoing review of risks associated with Beach activities. This process is supported by the Beach Risk Management Procedure (CDN/ID 18985371) and is as described in Section 2 of this EP.

8.2.3 OEMS 1.3 Management of Change

OEMS 1.3 ensures that changes are assessed to prevent unwanted consequences. This process is supported by the Beach Management of Change Procedure (CDN/ID 3675087) and is described further in Section 8.9.5.

8.2.4 OEMS 1.4 Incident Management

OEMS 1.4 ensures that incidents are reported and where appropriate investigated to prevent recurrence. This process is supported by the Beach Incident Management Procedure (CDN/ID 18985406) and is described further in Section 8.9.1.

8.2.5 OEMS 1.5 Emergency Management

OEMS 1.5 aims to minimise incident escalation through the deployment of effective emergency plans. It requires that emergency plans are in place to effectively manage credible emergency and security events, and to enable an efficient recovery to normal operations following such an event.

Beach's Crisis and Emergency Management Framework defines the prevention, preparedness, response, and recovery principles to be applied, the organisational structures to support emergency and security measures, and the training and testing protocols that must be in place to assure Beach maintains a state of readiness.

The emergency response framework for the activity is detailed in Section 8.10.

8.2.6 OEMS 1.6 Assurance and Improvement

OEMS 1.6 aims to sustain and improve the effectiveness of the OEMS through the establishment of and reporting against HSE outcomes. It requires that each standard within the 5 OEMS standards establish specific performance metrics. The performance metrics for the activities are described in Section 2 of this EP and monitoring, reporting and auditing activities are described in Section 8.9.3 and 8.9.4.

8.3 OEMS STANDARD 2: Integrity and Process Safety

Integrity and process safety is fundamental in preventing high consequence incidents. This standard ensures that critical controls are in place and continue to function as intended through regular inspections, testing and maintenance and that essential asset information is current and accessible.

The application of OEMS Standard 2 to the activities is described below.

8.3.1 OEMS 2.6 Asset information

OEMS 2.6 ensures that critical information necessary to the information necessary for the operation, integrity and maintenance of plant and infrastructure is controlled and subject to processes to ensure that the critical information is reviewed and updated in accordance with operational and regulatory requirements. This is supported by the Beach document management system as discussed in Section 8.11.3.

8.4 OEMS STANDARD 3: People Transport and Readiness

Standard 3 is concerned with people arriving at the work location safely and ready to commence activities. It covers management of safe transportation options for people needing to access remote areas and outlines requirements for training and competency and ensures that employees are physically and mentally ready through health and fitness monitoring and assessment.

The application of OEMS Standard 3 to the activities is described below.

8.4.1 OEMS 3.1 Induction, training and competency

OEMS 3.1 ensures that Beach staff and contractor personnel have the appropriate competence to perform the tasks required of their roles. This requires that competencies for specific roles are defined, that adequate training and supervision is provided, and appropriate induction is provided commensurate with specific activities as detailed in Section 8.8.2.

8.5 OEMS STANDARD 4: Safe systems of work

Standard 4 is concerned with high-risk activities and hazardous exposures have the potential to cause serious harm to our people and the environment. The standard ensures:

- the application of procedures and/or work permits to manage these activities,
- that appropriate controls are in place, and
- only authorized and trained personnel perform high-risk activities.

The application of OEMS Standard 4 to the activities is described below.

8.5.1 OEMS 4.9 Occupational exposure

OEMS 4.9 ensures that the appropriate controls are in place to minimise the exposure of personnel and the environment to hazardous materials. This is supported by the Beach Hazardous Chemicals Management Procedure (CDN/ID 18985401) as discussed in Section 8.7.

8.6 OEMS STANDARD 5: Environment and heritage

Standard 5 outlines the requirements that Beach must implement to ensure that it manages all aspects of the environment in accordance with its regulatory requirements. Beach operates in environmentally sensitive areas and in close proximity to communities, with potential impacts on stakeholders. Beach has an obligation to ensure that potential impacts from its activities are clearly identified, minimised to ALARP and are acceptable.

The application of OEMS Standard 5 to the activities is described below.

8.6.1 OEMS 5.1 Environment permissions documents

OEMS 5.1 requires that all permission documents (i.e. this EP) must meet all statutory and regulatory compliance requirements and, where appropriate, management plans be developed, implemented and maintained to define, control and monitor and minimise adverse environmental effects. Environmental aspects covered by this standard included those as defined in the OPGGS (E)R (refer to Section 2)

This EP is an integral part of the OEMS for the activity and is a key document in satisfying OEMS 5.1 as it identifies legislative requirements, impacts and risks and associated management measures to ensure that risks and impacts associated with the activity are ALARP and at an acceptable level.

OEMS 5.1 requires the development and implementation of management plans or procedures to conduct its operations in an environmentally responsible and sustainable manner whether that be through the implementation of existing OEMS procedures and plans, or the identification of activity specific requirements within the EP itself. Beach management plans and procedures for the management of key impacts and risks associated with the activity are detailed in Section 8.7.

8.6.2 OEMS 5.2 Cultural heritage

OEMS 5.2 aims to prevent impacts to cultural heritage whilst undertaking activities. It requires that cultural heritage assessments be undertaken to identify and evaluate potential to impact on cultural heritage places and values and to put in place control measures to ensure that to prevent and minimise potential impacts.

8.6.3 OEMS 5.3 Emissions monitoring and reporting

OEMS 5.3 aims to ensure compliance with obligations associated with air emissions. It requires that emissions are managed in accordance with regulatory obligations, that control measures are in place to minimise and manage emissions, and the monitoring is implemented as appropriate. Emissions monitoring for the activities within the scope of this EP are detailed in Section 8.9.9.

8.7 OEMS Plans and Procedures

In addition to this EP, there are a number of specific plans and procedures that are essential for the management of key impacts and risks and are considered important components of the OEMS for the for the activity. These plans and procedures are summarised below.

8.7.1 Introduced Marine Species Management Plan (CDN/ID S4000AH719916)

Beach's Introduced Species Management Plan will be applied to all vessels and submersible equipment mobilised from domestic waters to undertake the activities within the Operational Area. This includes the completion of Beach's Domestic IMS Biofouling Risk Assessment Process as outlined in Table 8.2 prior to the initial mobilisation into the Operational Area. It should be noted that this domestic IMS biofouling risk assessment process does not include an evaluation of potential risks associated with ballast water exchange. Vessel operators contracted to Beach must comply with the most recent version of the Australian Ballast Water Management Requirements (Australian Ballast Water Management Requirements – Department of Agriculture and Water Resources 2017).

Table 8.2: Beach IMS risk assessment process

Section	Description
Purpose	Validate compliance with regulatory requirements (Commonwealth and State) in relation to biosecurity prior to commencing activities within the Operational Area. Identify the potential IMS risk profile of the vessels and submersible equipment prior to deployment within the Operational Area. Identify potential deficiencies of IMS controls prior to entering the Operational Area. Identify additional controls to manage IMS risk. Prevent the translocation and potential establishment of IMS into non-affected environments (either to or from the Operational Area).
Basis of Detailed IMS Biofouling Risk Assessment	The basis by which an independent IMS expert evaluates the risk profile of the vessel / submersible equipment includes consideration of: Vessel/submersible equipment details including age, type and condition Previous inspections Anti-fouling coating Seawater intakes Internal marine growth protection system Vessel operational history Number and region of stationary/slow periods Vessel/submersible equipment mobilisation by land or freight Ballast water

8.7.2 Chemical Management Plan

All chemicals and hazardous materials are managed as per the Chemical Management Plan (CDN/ID 19062047), which details the procedure to be followed by Beach staff and their contractors for the selection, evaluation and approval of chemicals that are planned to be discharged during BassGas operations. Chemical selection, evaluation and approval is undertaken prior to an activity commencing by the Beach Environmental Advisor, with input from subject matter experts.

The Hazardous Chemicals Management Procedure (CDN/ID 18985401) is Beach's procedure to eliminate or minimise incidents arising from the storage and handling of hazardous chemicals at Beach controlled sites/facilities.

Complying with the Chemical Management Plan ensures that those chemicals that will be, or have the potential to be, discharged to the marine environment are assessed prior to use to ensure that lower toxicity, biodegradable and non-accumulative chemicals are used that also meet the technical requirements of the application.

The following principles guide the selection of chemicals that may be discharged offshore:

- Use chemical hazard assessment and risk management techniques to evaluate chemicals and their effects.
- Select preferentially those chemicals that have been previously tested for environmental hazards.
- Select chemicals based on the OSPAR harmonised offshore chemical notification format or similar internationally recognised system.

- Select chemicals with the least hazard and lowest potential environmental and health risks, whenever possible.
- Avoid chemicals suspected to cause taint or known endocrine disruptors.
- Avoid chemicals known to contain heavy metals of concern, in greater than trace quantities.

The process outlined in Beach's Chemical Management Plan includes the chemical screening process and, where applicable, a risk assessment process to ensure that the impacts and risks associated with offshore discharge are reduced to ALARP.

The chemical screening process uses the OCNS (the OSPAR framework and CHARM risk assessment model) to evaluate the environmental impact of chemicals used offshore. Under this system, organic-based compounds are subject to the Chemical Hazard Assessment and Risk Management (CHARM) model which calculates the ratio of the Predicted Effect Concentration against the No Effect Concentration. This is expressed as a Hazard Quotient (HQ) and associated with a colour to rank the product and the level of hazard. Chemicals that are not applicable to the CHARM model (i.e. inorganic products, hydraulic fluid) are assigned an OCNS grouping A-E, with A having the greatest potential for environmental harm. Data used for both assessment models includes toxicity, biodegradation and bioaccumulation. Testing is carried out on the effect of the product on three different groups of aquatic organisms: algae, crustaceans and fish. Grouping/Banding is shown in Figure 8.3.

Results of the CHARM assessment / OCNS assessment are published on the Definitive Ranked Lists of Approved Products by the OCNS and are used by Beach to screen chemicals for use. The Definitive Ranked Lists of Approved Products also includes product warnings (e.g. if a chemical contains heavy metals or has a substitution warning indicating that alternatives should be sought).

Figure 8.3: CHARM banding / OCNS hazard groupings for chemical products

CHARM / HQ Colour Band	Gold	Silver	White	Blue	Orange	Purple
OCNS Grouping	E	D	C	B		A
	Lowest Hazard Hazard	→				Highest

The chemical screening and risk assessment process uses the following steps (depicted in Figure 8.4) to ensure that the impacts and risks associated with offshore discharge are reduced to ALARP and meet the acceptability criteria:

- Determine whether discharge will or may occur
- Screen product for prohibited materials (including IChEMS Schedule 7 Register from DCCEEW), validity of SDS / MSDS and presence of PLONOR components
- Identify whether product is listed on the OCNS Definitive Ranked List of Registered Substances:

- If so, record the HQ band or OCNS Group, and the presence of substitution or product warnings. Checmicals can be accepted for use if they satisfy the EP-specific acceptability criteria described below.
- if not, gather data on biodegradation, bioaccumulation and toxicity from other sources.

- For products that do not pass the screening steps above, consider whether there is a health and safety and/or technical justification for using the product.
- If there is, conduct a risk assessment on the use and discharge of the product. As a minimum, this risk assessment will consider whether volumes, concentrations and discharge conditions are ALARP, whether alternative chemicals exist and are available for use, and whether the use and discharge of the chemical has an unacceptable level of environmental consequence (as per the Impact and Risk Assessment Methodology in Chapter 6).
- If there is no justification for use, or if the risk assessment determines that use or discharge of the chemical is unacceptable, then the chemical will not be used, and an alternative must be selected.

Approval is recorded in the Hazardous Chemicals Register within the Electronic Chemical Management System ((ECMS) (or ChemAlert).

As outlined in Figure 8.4, chemicals are approved for discharge if they adhere to the following acceptance criteria:

- CHARM Gold or Silver or OCNS Category E (PLONOR) or D.
- No product warnings or substitution warnings listed in the OCNS Definitive Ranked List of Registered Substances.
- Chemical is listed on the Australian Inventory of Industrial Chemicals (Inventory) under the Australian Industrial Chemicals Introduction Scheme (AICIS), or is not listed on the IChEMS Schedule 7 Register.
- Or, if a risk assessment has determined that the planned discharge is ALARP and Acceptable.

The Beach HSE Advisor, along with the Environmental Advisor and other subject matter experts, are responsible for the review of chemical information and risk assessments, chemical approvals, and updating and maintaining the Hazardous Chemicals Register. The Hazardous Chemicals Register is reviewed on an annual basis, and this includes a review of ICheMS for those chemicals in use. This review is prompted by and recorded in CMMS.

These records are accessed by the Logistics Team and no chemicals that are not on the chemical list shall be allowed offshore or shall be quarantined. The HSE Advisor monitors compliance at the supply base and on the facility and vessels.

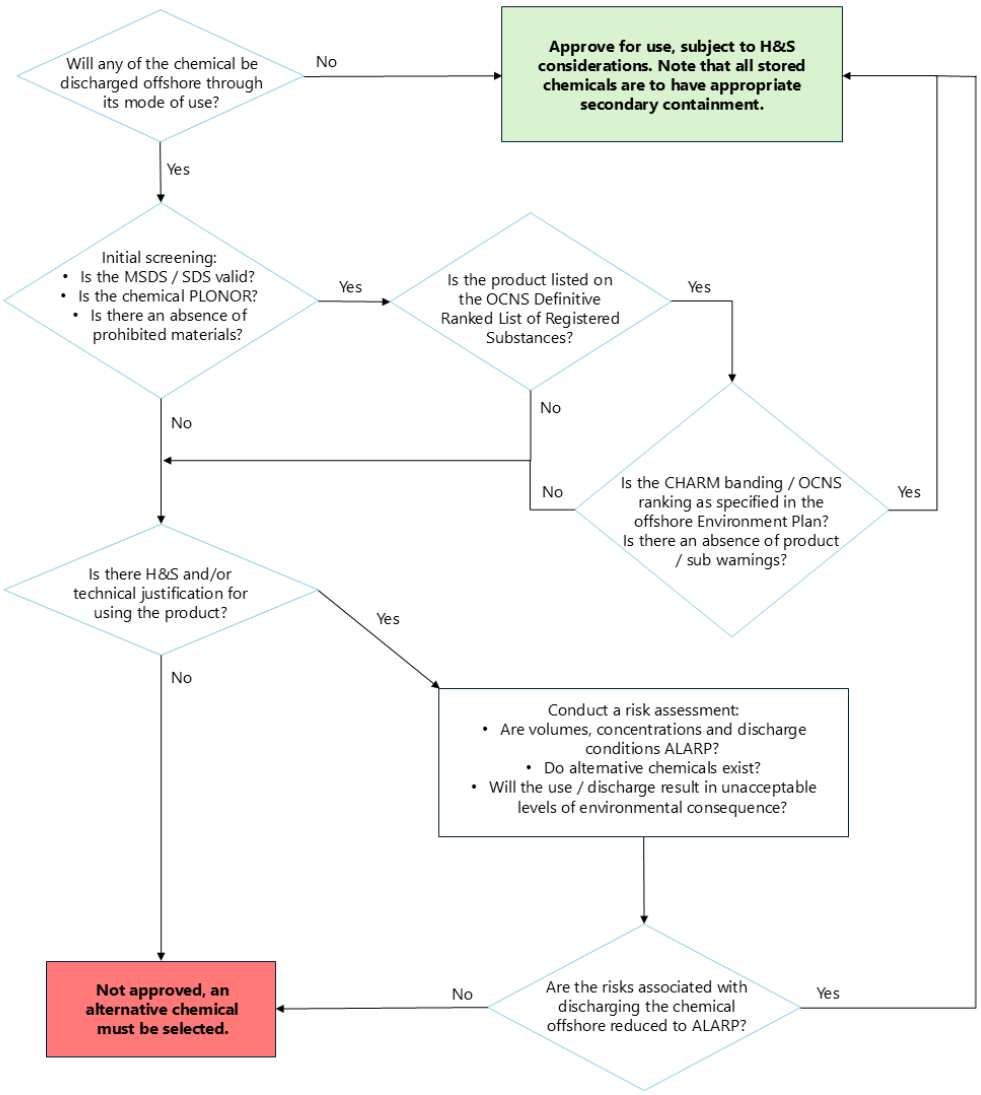


Figure 8.4: Summary of the offshore chemical selection and environmental risk assessment process

8.7.3 Waste Management

Waste generated by the activities will include waste from the operation of the platform and vessels which will include discharge to the marine environment where appropriate, or storage and transport to onshore facilities for recycling and/or disposal as described in Sections 7.7 to 7.11 (waste management RA).

Beach's approach to waste management requires that the lifecycle HSE impacts of Beach's products and services are assessed to enable responsible usage so that the consumption of resources and materials is minimised as far as reasonably practicable, and production of wastes are minimised. As per Beach's Waste Management Plan – Otway and Bass Strait Offshore (CDN/ID S4000AD719914), all wastes from the activities will be managed in accordance with regulatory requirements and the waste hierarchy i.e. wastes are eliminated, reduced, recycled and/or reused as far as reasonably practicable or disposed of appropriately.

- Liquid and putrescible wastes will be discharge to the marine environment in accordance with the Bass Waste Management Plan (CDN/ID 3974553) and vessel Garbage Management Plans, which have been developed to meet regulatory requirements including MARPOL.

- General and hazardous waste streams will be segregated and stored on board prior to backloading to port for disposal to an appropriately licenced waste facility by an appropriately licenced waste transporter in accordance with the Bass Waste Management Plan (CDN/ID 3974553) and vessel Garbage Management Plans, which have been developed to meet regulatory requirements including MARPOL. Segregated materials will be recycled where practical. Where options to recycle do not exist, wastes will be disposed of in an appropriately licenced waste management facility.

- Monitoring and measurement of the various waste streams associated with the activity are described in Section 8.9.9.

The implementation of these plans and procedures will ensure that wastes from the activities within the scope of this EP are appropriately managed and where appropriate controls as identified in Section 0 to 7.15 are implemented.

8.7.4 Whale Management Procedure

The WMP for Bass Offshore Operations (CDN/ID 19063285) details how Beach avoids and minimise anthropogenic noise to whales undertaking biologically important behaviours during the BassGas operations.

The WMP outlines roles and responsibilities, competency requirements for Marine Fauna Observers and Officers of the Watch, reporting requirements and a decision tree to guide decisions when undertaking whale observations.

Implementation of the WMP ensures that the EPOs for the activities are achieved and sets out specific roles and responsibilities, details the methods to be used to observe for cetaceans during the activities and the mitigations to be implemented in the event that a cetacean is observed within proximity to the activities.

The WMP will be updated on an as-required basis, such as learnings from its implementation, information from new science and/or updates to legislation, regulations and guidelines.

8.7.5 Light Management Plan Implementation Requirements

The Offshore Victoria Light Management Plan (LMP) Implementation Requirements (V-1000-01-MP-0003) details the requirements for:

- The development of vessel-specific LMPs to mitigate the risk of impacts to marine birds while undertaking activities for Beach.

- Beach to ensure that contracted vessels have developed and implemented specific Light Management Plans.

Operators of all vessels utilised for the activities are required to develop specific LMPs using the template provided.

8.8 Responsibilities of Employees and Contractors

Regulation 22(3) of the OPGGS(E)R requires the that the implementation strategy establish a clear chain of command, that sets out the roles and responsibilities of employees and contractors working on the activities. Further, regulation 22(4) requires that the implementation strategy includes measures to ensure that all employees and contractors working on the activities are aware of their responsibilities and have the appropriate competencies and training.

8.8.1 Roles and Responsibilities

Beach aims to ensure that the organisation is equipped, structured, and supported to ensure a healthy, efficient, and successful company. Communications with internal and external bodies, including joint venture partners, is essential to delivering successful projects and operations. The leadership styles and actions demonstrated within Beach will influence the performance of all staff and contractors. Clear levels of authority are necessary to remove organisational ambiguity and to support effective decision making.

Beach's Executive Vice President Onshore and Offshore has the ultimate responsibility for ensuring that Beach has the appropriate organisation in place to meet the commitments within this EP. However, the General Manager Drilling and Completions has the responsibility and delegated authority to ensure that adequate and appropriate resources are allocated to comply with OEMS and this EP.

The roles responsible for the implementation, management and review of this EP are detailed in Table 8.3.

Roles and responsibilities for an oil pollution emergency response are described in the OPEP.

Table 8.3: Roles and responsibilities for key role for the EP implementation

Role	Responsibilities
Onshore	
Chief Operating Officer	• Responsible for HSE performance of all activities within Beach's assets. • Ensures policies and systems are in place to guide the company's environmental performance. • Ensures adequate resources are available for the safe operation of all facilities and operations. • Ensures that the OEMS continues to meet the evolving needs of the company. • Sets overall corporate strategy, risk appetite, and capital alignment for decommissioning across the business
Executive Vice President – Technical and Safety	• Responsible for engineering and safety management strategies of all Beach Energy operated assets and their associated pipelines. • Responsible for maintaining Operational Excellence Management System (OEMS) • Accountable for technical governance and portfolio-level decision-making, including endorsement of decommissioning strategy and major investment decisions.
Head of Production and Engineering	• Responsible for portfolio-level production & engineering strategies & systems across all of Beach's operated assets. • Steward long-term decommissioning planning across all of Beach's assets, including holding key technical assumptions & target end-states.

Role	Responsibilities
General Manager - Health, Safety & Environment)	• Responsible for HSE performance of all Beach operational assets and their activities. • Ensures policies and systems are in place to guide the company's environmental performance. • Ensures adequate resources are available for the safe operation of all facilities and operations. • Ensures that the OEMS continues to meet the evolving needs of the company.
General Manager Offshore	Ensures: • Compliance with the Environment Policy, regulatory and other requirements, and this EP. • Communication regarding HSE issues as per Section 8.8.4. • Whale Management Procedure is implemented, records obtained, and reporting undertaken. • Records associated with activities are maintained as per Section 8.11.3. • Personnel who have specific responsibilities pertaining to the implementation of this EP or Oil Pollution Emergency Plan (OPEP) know their responsibilities and are competent to fulfil their designated role. • Assurance processes as detailed in Section 8.9.3 are undertaken to confirm that control measures detailed in the EP are effective in reducing the environmental risks of activities to ALARP and acceptable levels, and EPOs and EPSs are continually met. • Environmental impacts and risks associated with activities have been identified and any new or increased impacts or risks are managed via the Management of Change (MoC) process detailed in Section 8.9.5. • Incidents are managed and reported as per Section 8.9.1. • Leads the investigation and reporting of any environmental incidents. • EP Performance Report is submitted to NOPSEMA as per Section 8.9.11. • Changes to equipment, systems, and documentation where there may be a new or change to an environmental impact or risk or a change that may impact the EP are assessed using the MoC process detailed in Section 8.9.5. • Oil spill response arrangements are tested as per the OPEP. • Audits and inspections are undertaken in accordance with Section 8.9.4. • Provides asset-level direction & oversight for decommissioning strategy & plans. Endorse initiation of decommissioning studies & projects as required.
Bass Gas Production Manager	Ensures: • Activities are carried out in accordance with regulatory requirements and this EP. • OEMS plans and procedures are implemented for Bas Gas offshore operations. • All personnel are competent to fulfil their designated role. • HSE issues are communicated via systems such as the daily report and daily pre-start meetings. • Environmental incidents are managed and reported as per Section 8.9.1. • Emissions and discharges identified in Section 8.9.9 are recorded and reviewed. • General Manager Offshore is informed of any changes to equipment, systems, and documentation where there may be a new or change to an environmental impact or risk or a change that may impact the EP as per Section 8.9.5. • Inspections and monitoring are undertaken to ensure ongoing compliance with the EP as per Section 8.9.4 and communicate outcome and any non-conformance to General Manager Offshore.

Role	Responsibilities
	• Ensure safe transition from production phase, through cessation of production activities, and into preservation & decommissioning phases.
Activity Manager (Geophysical survey or IMR campaign / Resupply)	Ensures: • Activity is carried out in accordance with regulatory requirements and this EP. • Vessel personnel are competent to fulfil their designated role. • HSE issues are communicated via systems such as the daily report and daily prestart meetings. • Emissions and discharges identified in Section 8.9.9 are recorded and provided to the Senior Environment Advisor. • Personnel who have specific responsibilities pertaining to the implementation of this EP or Oil Pollution Emergency Plan (OPEP) know their responsibilities and are competent to fulfil their designated role. • Assurance Processes as detailed in Section 8.9.3 are undertaken to confirm that control measures detailed in the EP are effective in reducing the environmental risks of the activity to ALARP and acceptable levels, and the EPOs and EPSs are continually met. • Environmental impacts and risks associated with the activity have been identified and any new or increased impacts or risks are managed via the Management of Change process detailed in Section 8.9.5. • Incidents are managed and reported as per Section 8.9.1 Changes to equipment, systems and documentation where there may be a new or change to an environmental impact or risk or a change that may impact the EP are assessed using the Management of Change process detailed in Section 8.9.5.
General Manager Health, Safety and environment	• Responsible for HSE performance of all Beach operational assets and their activities. • Ensures this EP is revised as required. • Owner of the OEMS environmental plans and procedures. • Accountable to define the requirements of the business process, ensures appropriate performance metrics are defined and reviewed, tracks lessons learned, and drives continuous improvement. • Reviews EP audits. • Reviews and approves reportable incident reports to the regulators. • Reviews changes to operations for their environmental and regulatory implications.
Team Leader Environment	• Reviews EP audits. • Leads the investigation and reporting of any environmental incidents. • Reviews and approves reportable incident reports to the regulators. • Reviews changes to operations for their environmental and regulatory implications.
Senior Environmental Advisor	Ensures: • Ongoing communications with the Bass Gas Production Manager regarding regulatory requirements and environmental management in general. • Prepares environmental inductions and training packages. • Monitors environmental performance against this EP. • Undertakes assurance processes as detailed in Section 8.9.3 to confirm that control measures detailed in the EP are effective in reducing the environmental risks of activities to ALARP and acceptable levels, and the EPOs and EPSs are continually met. • In relation to the Whale Management Procedure:

Role	Responsibilities
	Coordinate the training and implementation of the Whale Management Procedure offshore. Ensures the requirements for the implementation of the Whale Management Procedure are in place prior to the commencement of activities. Reviews the MMO daily report to ensure detection and actions meet the requirements of the Whale Management Procedure. Coordinates and documents the review of effectiveness and compliance with the Whale Management Procedure. Forwards report detailing marine mammal sightings, actions taken as per the Whale Management Procedure, and reasons actions not taken to relevant persons who requested access to this information. Forwards record of marine mammal sightings to DCCEEW Australian Marine Mammal Centre Division. • Prepares and submits monthly recordable incident reports to the regulators. • Prepares reportable incident reports for submission to the regulators. • Supports the MoC process with regard to environmental issues. • Supports the investigation and reporting of any environmental incidents. • Prepares and submits reportable incident reports to the regulators. • Reviews changes to activities with the Team Lead Environment.
Senior Manager Community and Land (Offshore)	• Ensure that relevant persons (as defined in Section 4 have been consulted about the activities to enable the relevant person to make an informed assessment of the possible consequences of the activity on their functions, interests, or activities. • Ensure that any requests for updates about the activity that were identified during the EP preparation consultation phase are implemented. • Ensure consultation for implementation of the EP (refer Section 8.11.1) is undertaken. • Maintains a record of stakeholder consultation including how any objection or claim relevant to the activities was assessed and communicated to the relevant person. • Reports stakeholder objections or claims to the Bass Gas Production Manager and Environmental Advisor for assessment. • Keeps relevant persons informed of emergency events that may impact their functions, interests or activities.
Offshore Operations	
Bass PIC	Ensures: • Activities are carried out in accordance with regulatory requirements and this EP. • Personnel complete the induction • Personnel are competent to fulfil their designated role. • HSE issues are communicated via systems such as the daily report and daily pre-start meetings. • Environmental incidents are managed and reported as per Section 8.9.1. • Emissions and discharges identified in Section 8.9.9 are recorded and provided to the Bass Gas Production Manager. • Bass Gas Production Manager is informed of any changes to equipment, systems, and documentation where there may be a new or change to an environmental impact or risk or a change that may impact the EP as per Section 8.9.5.

Role	Responsibilities
	• Inspections are undertaken to ensure ongoing compliance with the EP as per Section 8.9.4.
Vessel Masters	Ensure: • Vessel operations are carried out in accordance with regulatory requirements and this EP. • Personnel complete the induction. • Vessel personnel are competent to fulfil their designated role. • HSE issues are communicated via systems such as the daily report and daily pre-start meetings. • Plans and procedures are implemented on the vessel. • Emissions and discharges identified in Section 8.9.9 are recorded and provided to Activity Manager. • Environmental incidents are reported to Activity Manger within required timeframes as per Section 8.9.1. • Activity Manager is informed of any changes to equipment, systems, and documentation where there may be a new or change to an environmental impact or risk or a change that may impact the EP as per Section 8.9.5. • Oil spill response arrangements are in place and tested as per the vessel's SMPEP or equivalent.
Vessel and platform personnel	• Complete project induction. • Report hazards and/or incidents via company reporting procedures. • Stop any task that they believe to be unsafe or will impact on the environment. • Immediately communicate whale sighting to vessel master/PIC/MMO (where appropriate).
Marine Mammal Observers (MMOs) (where required)	• Undertake observations and reporting in accordance with the Whale Management Procedure. • Provide advice to the PIC, Vessel Master (or delegate) on the requirements of the Whale Management Procedure. • Provide input into the review of effectiveness and compliance with the Whale Management Procedure.

8.8.2 Competencies and Training

Beach implements processes to ensure that staff and contractors within the business are fully equipped with the competencies required to perform their assigned duties and are physically and mentally prepared.

Each employee or contractor with responsibilities pertaining to the implementation of this EP shall have the appropriate training and competencies to fulfil their designated role.

To ensure that personnel are aware of the EP requirements to complete a general induction, as a minimum. Records of completion of the induction will be recorded and maintained as per Section 8.11.3. Inductions will at a minimum cover:

- Description of the environmental sensitivities and conservation values of the Operational Area and surrounding waters.
- Controls to be implemented to ensure impacts and risks are of an ALARP and acceptable.

- Requirement to follow procedures and use risk assessments/ job hazard assessments to identify environmental impacts and risks and appropriate controls.
- Requirements for interactions with fishers and/or fishing equipment.
- Requirement for responding to and reporting environmental hazards or incidents.
- Locations of known maritime and cultural heritage sites and the process to follow if a maritime and cultural heritage site is identified.
- Cultural heritage sensitivities relating to the Operational Area.
- Whale Management Procedure requirements.
- Lighting requirements as per relevant light management plans
- Procedure for handling grounded birds and reporting requirements.
- Overview of emergency response and spill management plans.

In addition to the activity specific induction, each employee or contractor with specific responsibilities pertaining to the implementation of this EP shall be made aware of their responsibilities, and the specific control measures required to maintain environmental performance and legislative compliance.

8.8.3 Contracts and Procurement

Whilst Beach is the titleholder and proponent for the activities, vessel contractors maintain operational control as per the requirements of their management system. To ensure contractors have the capabilities and competencies to implement the control measures identified in Section 7 of this EP, Beach implements processes for the acquisition of external services and materials, and the transportation of those materials to ensure Beach's business interests are met while maintaining compliance with all legal obligations and retaining HSE performance as the top priority.

Beach undertakes a pre-qualification of all contractors in which their HSE systems are reviewed to ensure that their HSE management system (HSEMS) is adequate for meeting their legal obligations and has identified the significant risks and control measures related to the scope of work being undertaken for Beach. This process includes verifying evidence of their HSEMS implementation.

Training and competency of contractor personal engaged to work on Beach activities shall be managed in accordance with the contractor's HSEMS (or equivalent).

Beach will implement control measures that may rely on various suitably qualified persons to provide expert evaluation and recommendations.

Where the requirements for a suitably qualified person are provided in regulations or guidelines, Beach will comply with these requirements. A suitably qualified person is a professional that has the necessary qualification and experience to assess the environment and to ensure risks and impacts are appropriately managed. Examples for assessing criteria for a suitably qualified persons may include:

- Recognised relevant certification, qualification or credentials relevant to the subject / discipline

- Proven competency and experience
- Membership of a relevant professional organisation
- Independence
- Assessments and selection of a suitably qualified person will be carried out by Beach under its OEMS standards

8.8.4 Communications

The General Manager Offshore has responsibility for ensuring that systems are in place to facilitate the communication of HSE issues. Communication is typically via the daily report and daily operations meetings; and through weekly HSE meetings.

The meetings are used to identify and communicate:

- Environmental Performance.
- Issues associated with implementation of the EP.
- Any proposed changes to equipment, systems, or methods of operation of equipment, where these may be HSE implications.
- Any proposals for the continuous improvement of environmental protection.

8.9 Monitoring and Reporting

Regulation 22(5), (6) and (7) of the OPGGS(E)R require that the implementation strategy:

- Provide for sufficient monitoring recording, audit and management of non-conformance and review of the environmental performance of the activity
- Provide for sufficient monitoring and maintenance of records of emissions and discharges to demonstrate that the EPO and EPS are being met
- Provide for reporting to NOPSEMA in relation to the environmental performance of the activity.

8.9.1 PFW Monitoring Decision and Adaptive Management Frameworks

All new crew joining Yolla-A are assessed as competent to perform their role through the Beach training and competency framework (refer Section 8.4.1) for their role prior to joining the platform either on-board during manned operations or as part of the remote operation. This is followed up through regular performance reviews.

All new crew joining Yolla-A attend an EP awareness induction, which provides an overview of the environmental impacts and risks associated with the facility, including routine discharges such as PFW. The presentation points to specific procedures for crew to become familiar with. Refresher inductions are not required unless new impacts or risks are identified. Upon acceptance of this EP, all platform crew will be provided with a refresher induction to ensure that the EPS outlined in this section are communicated and understood by all. Beach will also consolidate the various PFW procedures

currently in place into one document to act as a 'go-to' reference for all PFW management and monitoring issues.

There is formal and informal on-the-job training undertaken with all personnel. As outlined in Section 8.4.1, there is a BassGas Workforce Capability Requirements Matrix in place that details technical competency requirements that is updated on a monthly basis to identify training gaps and schedule training. The Beach Learning Management System (LMS) also records and tracks technical compliance training. For example, a new Production Technician joining the platform will be shown how various equipment works and the procedures associated with these by the PIC or an experienced Production Technician. With regard to PFW management, this involves demonstrating how the various PFW procedures are implemented (e.g., explaining how the X-One analysers work, how they are calibrated and maintained, how to enter the data, where the manual sampling points are and so forth). Once the individual is assessed as competent in performing the required tasks, as determined by senior personnel, this is noted in the capability requirements matrix.

Table 8.4 describes the routine and non-routine monitoring program that is in place as part of the AMF that ensure the limits are not breached.

Table 8.4: PFW TPH routine monitoring and management assurance

Program element	Explanation	Frequency	Responsibilities
TPH	• From the existing two X-One analysers continuously monitoring TPH – alarms triggered at 90 mg/L and 127 mg/L. Levels over 127 mg/L for 60 minutes will trigger automatic shut in of the PFW stream.	Continuous	• Production Technicians, PIC
Total PFW volume discharge monitoring	• Total discharge rate monitored and alarmed not to exceed 300 m^3/day. • PFW shut in if a volume of 300 m^3/day is exceeded.	Daily	• Data entry and trend monitoring – Senior Process/Production Optimisation Engineer • Compliance review – Senior Environmental Advisor (SEA)
TPH verification	• Weekly third-party laboratory samples added to the LIMS spreadsheet to validate X-One TPH data.	Weekly	• Sampling & freight – Production Technician • Data entry and trend monitoring – Senior Process/Production Optimisation Engineer • Compliance review – SEA
Online TPH analyser maintenance	• Maintenance performed in accordance with the CMMS.	As required	• Maintenance – Production Technician
Online TPH analyser correlation check	• Monthly Technical Monitoring Report includes review of the past month's test results against analyser output. The review assesses the trends in BTEX, TPH and total PFW discharge volume. • If there is any increasing trend, further action will be undertaken to investigate the reason. This will consist of process intervention, consideration of further PFW characterisation and WET testing. • 3M Preventative Maintenance task scheduled for engineering team to review accuracy of the fluorescent units to TPH correlation.	Monthly	• Input to report – Senior Process/Production Optimisation Engineer • Review of results - SEA • Response to trend increase - PIC
PFW chemical characterisation	• The chemical characterisation study of the PFW stream has been undertaken six-monthly since mid-2018. In 2026 two extra samples will be	6-monthly (note that sampling frequency will increase	• Sampling & freight – Production Technician

Program element	Explanation	Frequency	Responsibilities
	taken six-monthly for PFW-GLDA events. The sample is taken after treatment prior to its discharge to ocean. • Characterisation includes physical and chemical parameters (as outlined in Table 7.8 and Table 7.9). • Routine chemical characterisation allows a detailed database of information to be collected over the years. It enables more regular monitoring for potential contaminants of concern that may be known to contribute to toxicity. This knowledge continues to be developed through ecotoxicity analysis of PFW, and in particular expanding these tests to identify contaminants causing or contributing to levels of toxicity. • The process to be followed to assess the biannual chemical characterisation data and any potential change in risk is as follows: Compare results to previous chemical composition data and assess the results for any significant changes (to be determined by the SEA and/or Production Chemist reviewing the data) that may be a potential indicator of change in overall toxicity and compliance with the relevant EPO. Beach will engage experts as required to review the data in light of their knowledge of components contributing to PFW toxicity and toxicity more broadly. If such components have changed to a degree where there is uncertainty as to known toxicity from that defined from the last round of ecotoxicity testing, the PFW AMF will be followed and potential additional WET testing trigged if required. The trigger for the allowable degree of effluent quality reduction in the six-monthly characterisation tests will be based on the concentrations of constituents in the PFW observed with the dilution factor (from the PFW modelling) applied to estimate the concentration of each PFW constituent at the edge of the mixing zone. The trigger for management measures will then be based on whether the trigger level (e.g., ANZG, 2018) is exceeded at the edge of the mixing zone. Depending on which (if any) constituent is predicted to exceed a trigger at the edge of the mixing zone, further sampling/characterisation will be undertaken to test if the result was an anomaly or a WET testing event triggered to see if	in 2026 with 6 monthly characterisation for both regular and GLDA PFW streams) and to be reduced thereafter based on results)	• Review of results - SEA, Production Chemist • Specialist consultants contracted as required

Program element	Explanation	Frequency	Responsibilities
	the constituent exceeding a trigger is resulting in an increase to toxicity of the PFW stream.		
WET testing	• See discussion under 'PFW WET testing' for the methodology involved in undertaking WET testing. • If WET testing is triggered through this AMF, then this testing may occur more or less frequently. The WET testing results will be analysed by a suitability qualified marine ecotoxicologist (or similar) to determine the sampling frequency (i.e., remain as is, increase or decrease). • If results vary significantly between WET tests, see Table 7.22 to determine appropriate management actions.	6 monthly in the first year (2026)*^. After the first year, frequency to be determined in consultation with the marine ecotoxicologist (no less frequent than annually)	• Scoping, contracting, logistics and report review - SEA • PFW sampling, preservation and laboratory management – Production Technician
PFW plume dispersion verification monitoring	• Undertaken in late 2023 to validate stochastic plume modelling results and undertaken five- early thereafter (or as otherwise triggered via the AMF). • A specialist consultancy will be awarded a contract to undertake this future work. • Based on the monitoring results, appropriate management actions will be taken (see Table 7.23).	5-yearly, or more frequently if triggered by modelling results or AMF	• Scoping, contracting, logistics and report review – SEA • Program design and implementation – specialist consultant
Seabed sediment sampling	• Undertaken in late 2021 in accordance with the SQG to begin a baseline assessment against ANZG (2018) DGVs and NAGD Screening Levels. To be repeated in 2026. • Depending on results, assessment will be made on requirements to undertake more routine sediment sampling, or if changes to PFW process are required (see Table 7.24).	5-yearly, or more frequently if triggered by sampling results or AMF	• Scoping, contracting, logistics and report review - SEA • Program design and implementation - specialist consultant

* Annual WET testing is deemed to be a suitable frequency because it has increased from the previous frequency of three years, then 6-monthly in 2021. A higher frequency than this is not appropriate as continuous TPH monitoring will trigger WET testing if there are any significant changes (i.e., increasing trend in TPH concentration).

^ In 2026 two WET testing event will be tested for standard PFW discharge and PFW-GLDA discharge.

8.9.2 Incident Reporting

The Beach Incident Management Procedure (CDN/ID 18985406) has been developed to:

- Ensure that all incidents (including near misses) are reported, investigated, documented and analysed in a consistent manner;
- Encourage open and practical analysis of incidents, aimed to establish relevant causes so that action can be taken to correct the situation and eliminate or mitigate potential reoccurrence; and
- Address regulatory requirements for managing incidents.

The procedure applies to all incidents associated with the scope of this EP and to all personnel, contractors and visitors working on the activities.

Incident reports and corrective actions for the activities will be managed using the Beach Incident Management System.

Reportable and recordable incidents are identified by the incident notification processes. In addition, recordable incidents are also identified as per the assurance and audit processes detailed in Sections 8.9.3 and 8.9.4.

As part of the review and investigation of incidents additional, or increased, environmental impacts or risks may be identified. These are managed as per the MoC process detailed in Section 8.9.5.

Notification and reporting requirements for environmental incidents to external agencies are provided in Table 8.5.

Table 8.5: Regulatory incident reporting

Requirement	Timing	Contact	Responsible Person
Recordable incident As defined within the OPGGS(E)R a recordable environmental incident is a breach of an EPO or EPS in the EP that applies to the activity that is not a reportable incident.			
As a minimum, the written monthly recordable report must include a description of: • all recordable incidents which occurred during the calendar month; • all material facts and circumstances concerning the incidents that the operator knows or is able to reasonably find out; • corrective actions taken to avoid or mitigate any adverse environmental impacts of the incident; and	Before the 15th day of the following calendar month	**Commonwealth waters** NOPSEMA – submissions@nopsema.gov.au **Victorian state waters** DEECA RVRO (Vic)– ERRChiefInspector@deeca.vic.gov.au (1300 240 308, 24/7)	General Manager Offshore

Requirement	Timing	Contact	Responsible Person
• corrective actions that have been taken, or may be taken, to prevent a repeat of similar incidents occurring. The OPGGS(E)R requires a recordable incident report to be submitted if there is a recordable incident, thus nil reports are not required.			
Reportable incident As defined within the OPGGS(E)R, a reportable incident is an incident relating to the activity that has caused, or has the potential to cause, moderate to significant environmental damage. In the context of the Beach Environmental Risk Matrix moderate to significant environmental damage is defined as any incident of actual or potential consequence category Serious (3) or greater. These risks include: • Loss of well integrity resulting in a condensate spill or otherwise. • Vessel collision resulting in a loss of containment or otherwise. • Introduction of marine pests to the operational area. In addition, the following that does not have an actual or potential consequence category Serious (3) or greater will be reported as a reportable incident: • Injury of death of a protected species.			
Initial notification The notification must contain: • all material facts and circumstances concerning the incident; • any action taken to avoid or mitigate the adverse environmental impact of the incident; and • 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 after notification of a reportable incident, a written record of the notification must be given to: • NOPSEMA (The Regulator) • NOPTA (Titles Administrator) • DEECA (Vic) (Department of Responsible State Minister for Vic titles) • Department of State Growth who has delegated to EPA Tasmania (Department of Responsible State Minister for Tas Titles)	Within two hours of becoming aware of incident	**Commonwealth waters** NOPSEMA – 1300 674 472 submissions@nopsema.gov.au NOPTA – reporting@nopta.gov.au **Victorian state waters** DEECA RVRO (Vic)– ERRChiefInspector@deeca.vic.gov.au (1300 240 308, 24/7) **Tasmanian state waters** EPA – 1800 005 171 incidentresponse@epa.tas.gov.au	General Manager Offshore

Requirement	Timing	Contact	Responsible Person
Incident Report Initial notification of a reportable incident to the regulator must be followed by a written report. As a minimum, the written incident report will include: • the incident and all material facts and circumstances concerning the incident; • actions taken to avoid or mitigate any adverse environmental impacts; • the corrective actions that have been taken, or may be taken, to prevent a recurrence of the incident; and • the action that has been taken or is proposed to be taken to prevent a similar incident occurring in the future.	Not later than 3 days after the first occurrence of the incident	**Commonwealth waters** NOPSEMA – submissions@nopsema.gov.au	General Manager Offshore
Written incident reports to be submitted to NOPTA, DEECA and EPA (Tas) (for incidents in Commonwealth waters).	Within 7 days of written report submission to NOPSEMA	**Commonwealth waters** NOPTA – reporting@nopta.gov.au **Victorian state waters** DEECA RVRO (Vic)– ERRChiefInspector@deeca.vic.gov.au (1300 240 308, 24/7) **Tasmanian state waters** EPA – 1800 005 171 incidentresponse@epa.tas.gov.au	General Manager Offshore
Vessel spill to marine environment All discharges /spills or probable discharges/spills to the marine environment of oil or oily mixtures, or noxious liquid substances in the marine environment from vessels. Reporting info: http://www.amsa.gov.au/forms-and-publications/AMSA1522.pdf.	Verbal notification ASAP	**Commonwealth waters** Immediate notification by the Vessel Master to AMSA. Follow-up with Marine Pollution Report (POLREP). Ph: 1800 641 792 Email: rccaus@amsa.gov.au AMSA POLREP: https://amsa-forms.nogginoca.com/public/ **Victorian state waters** EPA Victoria – 1300 372 842 **Tasmanian state waters** EPA Tasmania – 1800 005 171	Vessel Master

Requirement	Timing	Contact	Responsible Person
Australian Marine Park (AMP) In the event an AMP may be exposed to hydrocarbons (Commonwealth waters jurisdiction)	Verbal notification ASAP	Marine Park Compliance Duty Officer – 0419 293 465 Notification must be provided to the Director of National Parks (DNP) and 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 (e.g. dispersant, containment, etc.) • confirmation of providing access to relevant monitoring and evaluation reports when available • contact details for the response coordinator. Note: DNP may request daily or weekly Situation Reports, depending on the scale and severity of the pollution incident.	Emergency Management Team (EMT) Lead (or delegate)
Vessel strike with cetacean	Within 72 hours	**Commonwealth or state waters** DCCEEW – online National Ship Strike Database https://data.marinemammals.gov.au/report/shipstrike	Vessel Master
	ASAP for cetacean injury assistance	**Victorian state waters** DEECA Whale and Dolphin Emergency Hotline – 1300 136 017 Seals, Penguins or Marine Turtles 136 186 (Mon-Fri 8am to 6pm) or AGL Marine Response Unit 1300 245 678.	Vessel Master / Team Lead Environment
Injury to or death of EPBC Act-listed species	Within seven days	**Commonwealth waters** DCCEEW – 1800 803 772 EPBC.Permits@environment.gov.au	Team Lead Environment
Suspected or confirmed Invasive Marine Species introduction	Verbal notification ASAP	**Commonwealth waters** DAFF – 1800 675 888 ccimpe@aff.gov.au	Team Lead Environment

Requirement	Timing	Contact	Responsible Person
		Victorian state waters Agriculture Victoria 136 186 marine.pests@agriculture.vic.gov.au **Tasmanian state waters** DRET Biosecurity Tasmania 03 6165 3777 invasivespecies@nre.tas.gov.au or biosecurity.tasmania@nre.tas.gov.au	
Identification of any historic shipwrecks, aircraft, or relics	Written notification within 1 week	**Commonwealth waters** Written notification via the notification of discovery of an historic shipwreck or relic online submission form (available here). **Victorian state waters** Notification to Heritage Victoria via email (using the form available here).	General Manager Offshore
Identification of any First Nations cultural heritage relics or sites	Online notification within 24 hours after identification	**Commonwealth waters** DCCEEW Australasian Underwater Cultural Heritage Database, online Notification of Discovery of Underwater Cultural Heritage online form (available here).	General Manager Corporate Affairs or First Nations Engagement Manager
Identification of any unexploded ordnance	Written notification within 1 week	**Commonwealth or state waters** Written notification via email to the Department of Defence offshore.petroleum@defence.gov.au	General Manager Offshore

In accordance with Regulation 54 of the OPGGS(E), Beach will notify NOPSEMA of the start and end dates of each phase of the activity if it occurs during the life of this EP (i.e., the end of operations, the start/end of CoP and the start of the preservation phase).

8.9.3 EP Assurance

Table 8.6 provides a summary of the processes (specific measures) undertaken by Beach to ensure that for the duration of the activities within the scope of this EP:

- The environmental impacts and risks of the activity continue to be identified and reduced to a level that is ALARP.
- Control measures detailed in this EP are effective in reducing the environmental impacts and risks of the activity to ALARP and an acceptable level.
- Environmental performance outcomes and standards set out in this EP are being met.

Non-compliances and opportunities for improvements identified via the assurance processes in Section 8.9.4 and the following sections are communicated to the General Manager Offshore to report and action in a timely manner.

Tracking of non-compliances and actions is undertaken using Beach's incident management system, which includes assigning a responsible person for ensuring the action is addressed and closed out. Any additional, or increased, impacts or risks identified are managed as per the MoC process detailed in Section 8.9.5.

Where an assurance process identifies a breach of an EPO or EPS in the EP this will be reported as a recordable incident as per Table 8.6.

Table 8.6: EP assurance processes

Process	Frequency	Responsible
Incident reviews and investigations covering: • Review of all incidents to identify any additional, or increased, environmental impacts or risks. • Reporting and investigation of incidents to identify any additional, or increased, environmental impacts or risks. See Section 8.9.2.	Weekly As required	Senior Environmental Advisor General Manager Offshore with support from Senior Environmental Advisor
Activity impact and risk review to ensure impacts and risks can be managed to ALARP and an acceptable level and any additional, or increased, environmental impacts or risks identified. See Section 8.9.6.	As required	General Manager Offshore with support from Senior Environmental Advisor
EP Performance Report covering: Review of EPOs and EPSs. See Section 8.9.11.	Annually	Senior Environmental Advisor
Activity emissions and discharge records See Section 8.9.9.	As detailed in Section 8.9.9.	General Manager Offshore

8.9.4 Audits and Inspections

Environmental performance will be reviewed in several ways to ensure that for the duration of the EP:

- EPOs, EPSs and implementation strategy requirements are met.

- Controls measures are effective in reducing the environmental impacts and risks of the activity to ALARP and acceptable levels.

- Any additional, or increased, impacts or risks are identified.

Beach undertakes 6 monthly internal assurance utilising the BassGas Offshore Operations EP Assurance Checklist (CDN/ID 18990041). This includes assurance for inspection, maintenance and repair and survey activities within the scope of this EP as required. The assurance check consists of reviewing the EPs EPOs, EPSs and implementation strategy requirements. Non-compliances and opportunities for improvements identified via assurance checks or any other means are communicated to the General Manager Offshore to report and action in a timely manner. Any additional, or increased, impacts or risks identified are managed as per the MoC process detailed in Section 8.9.5.

Tracking of non-compliances and actions is undertaken using Beach's incident management system which includes assigning a responsible person for ensuring the action is addressed and closed out.

Where an assurance check identifies a breach of an EPO or EPS in the EP this will be reported as a recordable incident as per Section 8.9.1.

The assurance checks inform the annual performance report submitted to the relevant regulator as per Section 8.9.11.

8.9.5 Management of Change Standard

The Beach Management of Change Procedure (CDN/ID 3675087) (MoC Procedure) has been developed to specify the requirements for raising, progressing and closing of a MoC request to ensure that all temporary and permanent changes to the organisation, personnel, systems, procedures, equipment, products, and materials are identified and managed to ensure HSE risks arising from these changes remain at an acceptable level.

It ensures:

- holistic assessment of a proposed change,

- consultation with stakeholder's dependent upon the nature of the change,

- clear accountability for the change.

Changes to equipment, systems and documentation will be managed in accordance with the MoC procedure to ensure that all proposed changes are adequately defined, implemented, reviewed, and documented by suitably competent persons. The MoC process is managed using an electronic tracking database, which provides assurance that all engineering and regulatory requirements have both been considered and met before any change is operational.

Not all changes require a technical MoC review. Each change is assessed on a case-by-case basis. The potential environmental impacts and/or risks are reviewed by a member of the Beach Environment Team to determine whether the MoC review process is triggered using the Environmental Management of Change Offshore Environment Plans Procedure (CDN/ID 18446109).

Where the MoC review processes identifies a change in impacts, risks, or controls compared to those described and assessed in Section 0, and triggers a regulatory requirement to revise this EP, the revision shall be defined, endorsed, completed and communicated in accordance with the MoC Procedure.

8.9.6 Environment Plan Review

Beach may determine that a review of this EP is required when one or more of the following occurs:

- Changes to impacts and risks and/or controls identified during the activities within the scope of this EP.
- Annual environmental performance reporting identifies issues in the EP that require review and/or updating.
- Implementation of corrective actions is required to address internal audits findings or external inspection recommendations.
- Changes to or introduction of new environmental requirements.
- An environmental incident and subsequent investigation identifies issues in the EP that require review and/or updating.
- A modification of the activity is proposed that is not significant but needs to be documented in the EP.
- Changes in understanding of the existing environment in areas such as:
    - EPBC Act listed threatened and migratory species.
    - Part 13 statutory instruments (recovery plans, threat abatement plans, conservation advice, wildlife conservation plans).
    - Marine protected areas and/or plans.
    - First Nations cultural heritage/values, Native Title, IPAs, ILUAs and management/Sea Country Plans.
    - Commercial fishing and marine users.
- Changes to impacts, risk and controls identified through the Risk Management Processes as per Section 2 and Section 0.
- New information or changes in information from relevant persons, research, studies, protected species, legal and other requirements. This shall be achieved by:
    - Subscription to regulator and relevant industry distribution lists (such as AEP and IOGP).
    - Subscription to the NOPSEMA website to identify any new petroleum activities within the Otway Basin that may overlap with activity locations and timings.
    - Consultation for implementation of EP as per Section 8.11.1.

Any revisions to the EP are to be assessed against the criteria for submission of a revised EP to NOPSEMA as detailed in Section 8.9.7 and MoC as per Section 8.9.5 shall be evaluated.

8.9.7 Environment Plan Revision

In accordance with the OPGGS(E)R, if a revision of this EP is required it shall be submitted to NOPSEMA as per the regulatory requirements in Table 8.7.

Table 8.7: Regulatory requirement for submission of a revised EP

OPGGS(E)R	EP Revision Submission Requirements
38	With the regulator's approval before the commencement of a new activity.
39(1)	Before the commencement of any significant modification or new stage of the activity that is not provided for in the EP as currently in force.
39(2)	Before, or as soon as practicable after, the occurrence of any significant new or significant increase in environmental impact or risk; or The occurrence of a series of new or a series of increases in existing environmental impacts or risks which, taken together, amount to the occurrence of a significant new or significant increase in environmental impact or risk.
39(3)	A change in titleholder that results in a change in the manner in which the environmental impacts and risks of an activity are managed.

Revisions and re-submission of the EP generally centre around 'new' activities, impacts or risks and 'increased' or 'significant' impacts and risks. Beach defines these terms in the following manner:

New impact or risk – one that has not been assessed in Section 0.

Increased impact or risk – one with greater extent, severity, duration, or uncertainty than is detailed in Section 0.

Significant change –

- The change to the activity that deviates from the EP to the degree that it results in new activities that are not intrinsic to the existing Activity Description in Section 3.
- The change affects the ability to achieve ALARP or acceptability for the existing impacts and risks described in Section 0.
- The change affects the ability to achieve the EPO and EPS contained in Section 0.

A change in the activities, knowledge, or requirements applicable to the activity are considered to result in a 'significant new' or 'significant increased' impact or risk if any of the following criteria apply:

- The change results in the identification of a new impact or risk and the assessed level of risk is not 'Low', acceptable and ALARP.
- The change results in an increase to the assessed impact consequence or risk rating for an existing impact or risk described in Section 0.

- There is both scientific uncertainty and the potential for significant or irreversible environmental damage associated with the change.

- While an EP revision is being assessed by NOPSEMA, any activities addressed under the existing accepted EP are authorised to continue. Additional guidance is provided in NOPSEMA Guideline When to submit a proposed revision of an EP (N-04750-GL1705).

8.9.8 Minor EP Revisions

Minor revisions to this EP that do not require resubmission to NOPSEMA will be made where:

- Minor administrative changes are identified that do not impact on the environment (e.g., document references, contact details, etc.).

- A review of the activity and the environmental risks and impacts of the activity do not trigger a requirement for a revision, as outlined in this section.

- Minor revisions to the EP will not be submitted to the regulators for formal assessment. Minor revisions will be tracked in the document control system (refer Section 8.11.3).

8.9.9 Emissions and Discharge Records

In accordance with regulation 22(6) of the OPGGS(E)R, emissions and discharges shall be recorded for the duration of the activities. The source of these emissions and discharges and their management are as described in Sections 7.3.

Table 8.8 details the types of emissions and discharges that shall be recorded including the monitoring method and frequency of reporting. Greenhouse gas emissions are reported annually as part of statutory *National Greenhouse and Energy Reporting Act* (NGER) 2007 reporting and other pollutants are reported under the annual National Pollution Inventory (NPI) reporting requriements.

Table 8.8: Emissions and discharges monitoring requirements

Emission / Discharge	Monitoring parameter	Recording Method	Frequency	Responsibility
Platform				
MDO	Volume used	Daily report	Based on monthly tallies	BassGas Production Manager
Fuel gas	Volume used	Daily report	Based on monthly tallies	BassGas Production Manager
Flaring	Volume	Daily report	As flared	BassGas Production Manager
PFW and deck drainage via dump caisson	TPH	Production database	Continuously via the two continuous automatic PFW analysers	BassGas Production Manager
(in accordance with Produced			Twice daily manual logging of continuous	BassGas Production Manager

Emission / Discharge	Monitoring parameter	Recording Method	Frequency	Responsibility
Formation Water Sampling and Testing Procedure (CDN/ID 10020479))			automatic PFW analyser reading	
	TPH, BTEX and phenol	PFW sample log	4 samples per month aligned with platform manning schedule	BassGas Production Manager
	PFW characterisation testing	LIMs spreadsheet	Annually or as directed by the AMF	BassGas Production Manager
	Volume	Production database	Continuous	BassGas Production Manager
	WET testing	Reporting database	Annually or as guided by the AMF	BassGas Production Manager
	Plume verification	Report	Every 5 years or as guided by the AMF	BassGas Production Manager
	Seabed sediment sampling	Report	Every 5 years or as guided by the AMF	BassGas Production Manager
Sewage and grey water / brine via sewage caisson	Volume discharged	Sewage records	Monthly	BassGas Production Manager
Putrescible waste	Volume discharged	Garbage record book	As required	BassGas Production Manager
Waste	Volume/weight	Garbage record book	Each offloading event once ashore	BassGas Production Manager
Pipeline and Platform				
Cleaning	Volume of grit blasting material	Daily report	Daily during maintenance campaigns	Activity Manager
Vessels				
Bilge water	Volume discharged	Oil record Book	As required	Vessel contractor
MDO use	Volume consumed	Daily report	Daily	Vessel contractor
Putrescible waste	Volume discharged	Garbage record book	As required	Vessel contractor
Waste	Volume sent to shore for disposal and recycling	Garbage record book	As required	Vessel contractor

8.9.10 Marine Mammal Sighting Reports

Marine mammal sightings will be recorded and submitted to DCCEEW via the National Marine Mammal Data Portal. Sightings will be submitted annually not more than three months after the anniversary date of the EP acceptance by NOPSEMA. The interval between reports after that will not be more than one year.

8.9.11 Annual Performance Report

In accordance with regulation 22(7) of the OPGGS(E)R, Beach will submit a report on the environmental performance of the program activities to NOPSEMA. Performance will be measured against the EPOs and EPSs described in this EP. The report will be submitted annually not more than three months after the anniversary date of the EP acceptance by NOPSEMA. The interval between annual reports after that will not be more than one year.

8.10 Oil Pollution Emergency Response

Regulations 22(8), (9), (10) and (11) of the OPGGS(E)R require that the implementation strategy contain an oil pollution emergency plan (OPEP) that includes:

- arrangements for responding to a monitoring marine oil pollution,
- monitoring of impacts associated with oil pollution and response activities and
- demonstrating that the response arrangements in the OPEP are consistent with national system for oil pollution preparedness and response.

Further, regulations 22(12), (13) and (14) of the OPGGS(E)R require that the implementation strategy include arrangements for the testing of the response arrangements in the OPEP.

The emergency response framework to be applied to the activities, including the establishment and testing of the OPEP, is outlined in the following sections.

8.10.1 Crisis and Emergency Response Framework

The Beach Crisis and Emergency Management Framework consists of a tiered structure whereby the severity of the emergency triggers the activation of emergency management levels. The emergency response framework contains three tiers based on the severity of the potential impact, as outlined in Figure 8.5 This framework is described in the Beach Emergency Management Plan (EMP) (CDN/ID 18025990).

The responsibilities of the Emergency Response Team (ERT), Emergency Management Team (EMT) and Crisis Management Team (CMT) are outlined in Table 8.9.

The key emergency response arrangements for the activity are outlined below.

8.10.2 Beach Emergency Management Plan

The Beach EMP (CDN/ID 18025990) provides the standard mechanism for the Emergency Management Team (EMT) to operate from and includes guidance on effective decision-making for emergency events, identification, assessment, and escalation of events and provides training and exercise requirements. The EMP provides information on reporting relationships for command, control, and communications, together

with interfaces to emergency services specialist response groups, statutory authorities, and other external bodies. The roles and responsibilities are detailed for onshore and offshore personnel involved in an emergency, including the response teams, onshore support teams, visitors, contractors, and employees. The EMP details the emergency escalation protocol depending on the nature of the emergency.

Associated with the EMP are the EMT & CMT Roster and EMT & CMT Resource List. These documents constitute a suite of emergency response documents that form the basis for Beach's response to an emergency situation.

8.10.3 Activity Specific Emergency Response Plan

For the activities within the scope of this EP, the Beach BassGas Site Emergency Response Plan (CDN/ID 3974548) (ERP) describes the processes and interfaces for responding to emergency events relating to the platform and pipeline operations.

The ERP describes the emergency roles and responsibilities and outlines the actions to be taken for relevant scenarios (e.g., loss of containment, vessel emergency, fire, person overboard, fatality, etc). The ERP defines responsibility for both regulatory and internal reporting requirements of an emergency incident for support as required.

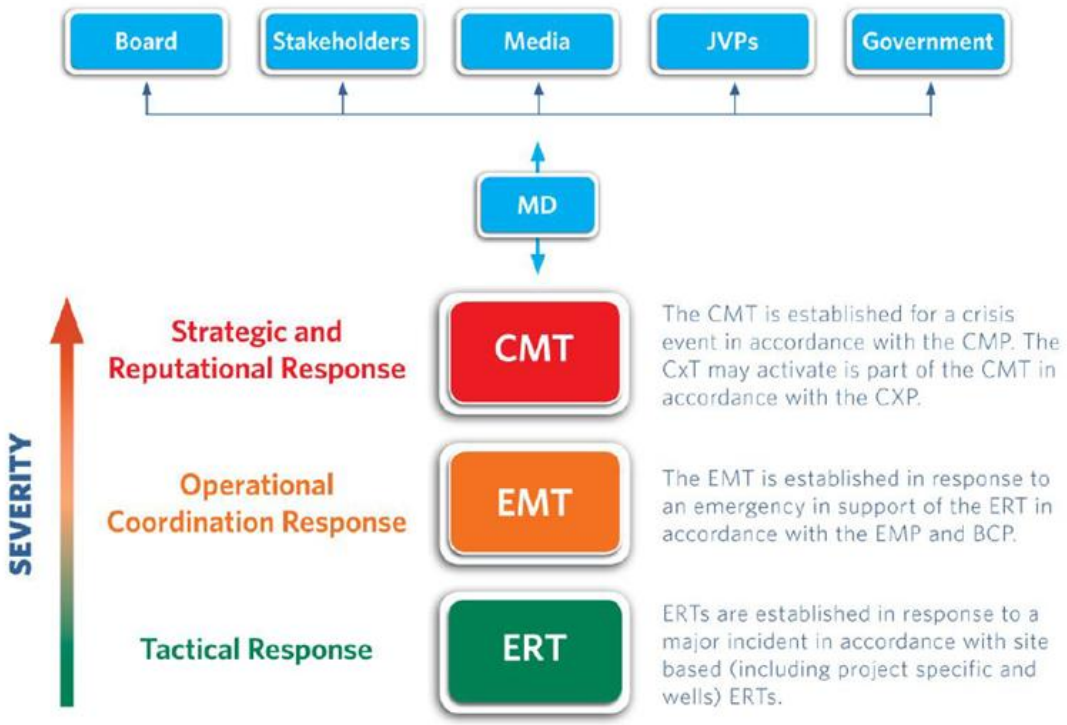


Figure 8.5: Beach Crisis and Emergency Management Framework

Table 8.9: Responsibilities of the Beach crisis and emergency management teams

Team	Base	Responsibilities
CMT	Adelaide head office	Strategic management of Beach's response and recovery efforts in accordance with the Crisis Management Plan. Provide overall direction, strategic decision-making as well as providing corporate protection and support to activated response teams. Activate the Crisis Management Team (CMT) if required.
EMT	Adelaide, Melbourne	Provide operational management support to the Emergency Response team to contain and control the incident. Implement the Business Continuity Plan. Liaise with external stakeholders in accordance with the site-specific Emergency Response Plan. Regulatory reporting.
ERT	Site Vessel	Respond to the emergency in accordance with the site-specific ERP.

8.10.4 Oil Pollution Emergency Plan

Oil spill response arrangements associated with the activities are detailed in the Beach Offshore Oil Pollution Emergency Plan (OPEP) (VIC 1000 SAF PLN. CDN/ID 18986979).

Section 8.9.4 of this EP and Section 10 (On-Going Response Preparedness and Exercises) of the OPEP detail the processes that Beach will undertake to ensure that oil spill response requirements can be met during the activities.

The vessels used for the activities will have a SMPEP or equivalent.

8.10.5 Operational and Scientific Monitoring Plan

Operational and scientific monitoring arrangements associated with the program are detailed within the Offshore Operational and Scientific Monitoring Plan (OSMP) (CDN/ID S4100AH717908) and BassGas Operations OSMP Addendum (CDN/ID 18985299).

8.10.6 Testing of Spill Response Arrangements

The OPEP details the oil spill response testing arrangements.

8.11 Consultation and Compliance

8.11.1 Community Engagement

Consultation in the course of preparing the revised EP has been completed in accordance with the Regulations. Beach engages in ongoing consultation and communications during the implementation of the activities undertaken in accordance with this revised EP and relevant persons can provide Beach feedback on any new relevant matter that may emerge. Beach will assess any new matters and where appropriate, Beach will apply its Management of Change standard (Section 8.9.5).

Beach will continue to consult with relevant persons to meet OPGGS(E)R 22(15) and OPGGSR 2021 (Vic) 16(8). This includes providing updates and notices as needed to keep relevant persons informed. This will

be done via one-on-one communications, emails, and provision of information on Engage Beach. All records of ongoing consultations will be maintained in Beach's stakeholder management database.

Table 8.10 details the ongoing consultation requirements for the activities described in this EP.

Table 8.10: Consultation requirements for the activity

Relevant person	Consultation	Timing
All relevant persons	Activity updates including acceptance of revised EP and completion of activities	As required
Relevant First Nations groups	Consultation regarding implementation of an oil spill emergency response in the unlikely event of a hydrocarbon spill	As required
Relevant commercial fishing associations	Ongoing communication of Beach activities to their members	As required

8.11.2 Regulatory Compliance

Regulation 22(16) of the OPGGS(E)R requires that the implementation strategy must comply with the OPGGS Act (the Act), the OPGGS(E)R, any other regulations under the Act, and any other environmental legislation that applies to the activity.

This implementation strategy has been developed to comply with the requirements of OPGGS(E)R as demonstrated in Table 8.11.

Table 8.11: Regulation 22 OPGGS(E)R concordance

OPGGS(E)R	EP Implementation Strategy Section
22 Implementation strategy for Environment Plan	
(1) The environment plan must contain an implementation strategy for the activity in accordance with this section	Section 8
Environmental management system	
(2) 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:	Section 8.1
(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	Section 8.2, OEMS 1.2 and OEMS 1.6
(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	Section 8.2, OEMS 1.6 and Section 8.9.6
(c) environmental performance outcomes and environmental performance standards in the environment plan are being met.	Section 8.2, OEMS 1.6 and Sections 8.9.3 and 8.9.4.
Responsibilities of employees and contractors	
(3) The implementation strategy must establish a clear chain of command, setting out the roles and responsibilities of employees and contractors in relation to the	Section 8.8.1 and 8.10.1

OPGGS(E)R	EP Implementation Strategy Section
implementation, management and review of the environment plan, including during emergencies or potential emergencies.	
(4) The implementation strategy must include measures to ensure that each employee or contractor working on, or in connection with, the activity is aware of the employee's or contractor's responsibilities in relation to the environment plan, including during emergencies or potential emergencies, and has the appropriate competencies and training.	Sections 8.8.2, 8.8.3 and 8.8.4
Monitoring and reporting	
(5) The implementation strategy must provide for sufficient monitoring, recording, audit, management of non-conformance and review of the titleholder's environmental performance and the implementation strategy to ensure that the environmental performance outcomes and environmental performance standards in the environment plan are being met.	Section 8.9
(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 environmental performance standards in the environment plan are being met.	Section 8.9
(7) The implementation strategy must state when the titleholder will report to NOPSEMA in relation to the titleholder's environmental performance for the activity. The interval between reports must not be more than 12 months.	Section 8.9.11
Oil pollution emergency response	
(8) The implementation strategy must contain an oil pollution emergency plan and provide for the updating of the plan.	Section 8.10.4 (detail within OPEP)
(9) The oil pollution emergency plan must include adequate arrangements for responding to and monitoring oil pollution, including the following:	Section 8.10.4 (detail within OPEP)
(a) the control measures necessary for timely response to an emergency that results or may result in oil pollution;	Section 8.10.4 (detail within OPEP)
(b) the arrangements and capability that will be in place, for the duration of the activity, to ensure timely implementation of the control measures, including arrangements for ongoing maintenance of response capability;	Section 8.10.4 (detail within OPEP)
(c) the arrangements and capability that will be in place for monitoring the effectiveness of the control measures and ensuring that the environmental performance standards for the control measures are met;	Section 8.10.4 (detail within OPEP)
(d) the arrangements and capability in place for monitoring oil pollution to inform response activities.	Section 8.10.4 (detail within OPEP)
(10) The implementation strategy must provide for monitoring of impacts to the environment from oil pollution and response activities that: (a) is appropriate to the nature and scale of the risk of environmental impacts of the activity; and (b) is sufficient to inform any remediation activities	Section 8.10.5 (detail in the OSMP)
(11) The implementation strategy must include information demonstrating that the response arrangements in the oil pollution emergency plan are consistent with the national system for oil pollution preparedness and response.	Section 8.10.4 (detail within OPEP)

OPGGS(E)R	EP Implementation Strategy Section
(12) The implementation strategy must include arrangements for testing the response arrangements in the oil pollution emergency plan. The testing arrangements must be appropriate to the response arrangements and to the nature and scale of the risk of oil pollution for the activity.	Section 8.10.6 (reference to OPEP)
(13) The testing arrangements must include: (a) a statement of the objectives of testing; and (b) a proposed schedule of tests; and (c) mechanisms to examine the effectiveness of response arrangements against the objectives of testing; and (d) mechanisms to address any recommendations arising from tests.	Section 8.10.6 (reference to OPEP)
(14) For the purposes of paragraph (13)(b), the proposed schedule of tests must provide for the following: (a) testing the response arrangements when they are introduced; (b) testing the response arrangements when they are significantly amended; (c) testing the response arrangements not later than 12 months after the most recent test; (d) if a new location for the activity is added to the environment plan after the response arrangements have been tested, and before the next test is scheduled to be conducted—testing the response arrangements in relation to the new location as soon as practicable after it is added to the plan; (e) if a facility becomes operational after the response arrangements have been tested and before the next test is scheduled to be conducted—testing the response arrangements in relation to the facility when it becomes operational.	Section 8.10.6 (reference to OPEP)
Consultation and compliance	
(15) The implementation strategy must provide for appropriate consultation with: (a) relevant authorities of the Commonwealth, a State or a Territory; and (b) other relevant interested persons or organisations.	Section 8.11.1
(16) The implementation strategy must comply with the Act, this instrument, any other regulations made under the Act, and any other environmental legislation applying to the activity.	Section 8.11.2

Section 5 of this EP details the applicable environmental requirements applicable to the activities. The acceptability assessment for each environmental aspect is assessed in Section 0 and specifically details the environmental requirements pertaining to each aspect. The assurance processes described in Section 8.9 ensures periodic review to ensure that controls are implemented and to ensure ongoing compliance.

8.11.3 Document Management

Beach document management systems will be utilised for the activity to support safe and efficient operations in a manner that complies with Company and statutory obligations. This EP, and documents and records relevant to the implementation of this EP will be stored and maintained in the Beach document management systems and these records will be made available to regulators upon request.

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