Environment Plan

BassGas Offshore Operations

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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
ALA	Atlas of Living Australia
ALARP	As Low As Reasonably Practicable
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
APPEA	Australian Petroleum Production and Exploration 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
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
CO2	Carbon dioxide
CoEP	Code of Environmental Practice
CP	Cathodic Protection
CRA	Corrosion Resistant Alloy

Terms/acronym	Definition/expansion
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 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
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
GVI	General Visual Inspection
HAZID	Hazard Identification
HFL	Hydraulic Flying Lead
HPU	Hydraulic Power Unit

Terms/acronym	Definition/expansion
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
MP	Marine Park
MPa	Megapascal(s)
MSDS	Material Safety Data Sheet

Terms/acronym	Definition/expansion
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
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
PMP	Primary Muster Point
PMS	Planned Maintenance System
PMST	Protected Matters Search Tool

Terms/acronym	Definition/expansion
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
SSSV	Sub-Surface Safety Valve
SST	Sea Surface Temperature
SVS	Subsea Valve Skid

Terms/acronym	Definition/expansion
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
WIMP	Well Integrity Management Plan
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)

Terms/acronym	Definition/expansion
m	Metre(s)
m2	Square metres
m3	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

1.13 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.

1.14 Environment Plan Summary

Table 1.1provides 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 7
The control measures for the activity	Section 7
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

1.15 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.

1.15.1 Definition of the Activity

In accordance with Regulation 5 of the OPGGS(E), this EP applies to a defined 'petroleum activity.' The petroleum 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 2011 (herein referred to as the OPGGS Regulations) Regulation 6, the petroleum 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 raw gas pipeline (RGP).
- Lang Lang Gas Plant (LLGP).
- Sales Gas Pipeline.

1.15.2 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), administered by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA); and
- Part 2.2 of the OPGGS Regulations, administered by the Victorian Department of Energy, Environment and Climate Change (DECCA).

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.

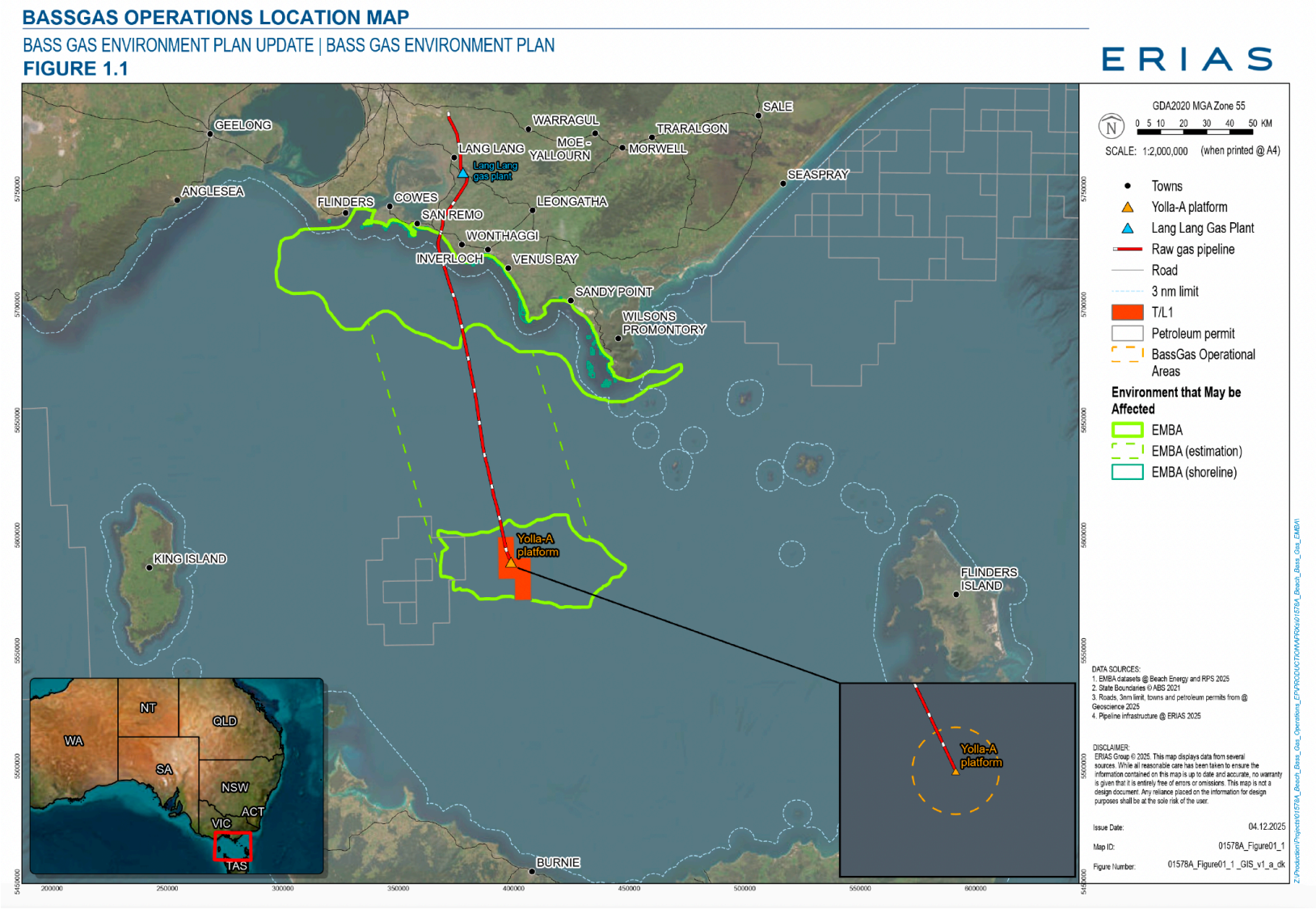


Figure 1.1: BassGas location map

1.15.3 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 19060213Yolla-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 18986979Offshore 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.

1.16 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 Bass basins (BassGas) production and associated facilities. The titleholder and the liaison person detail applicable to the Operations activity are listed in Table 1.2 below.

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.

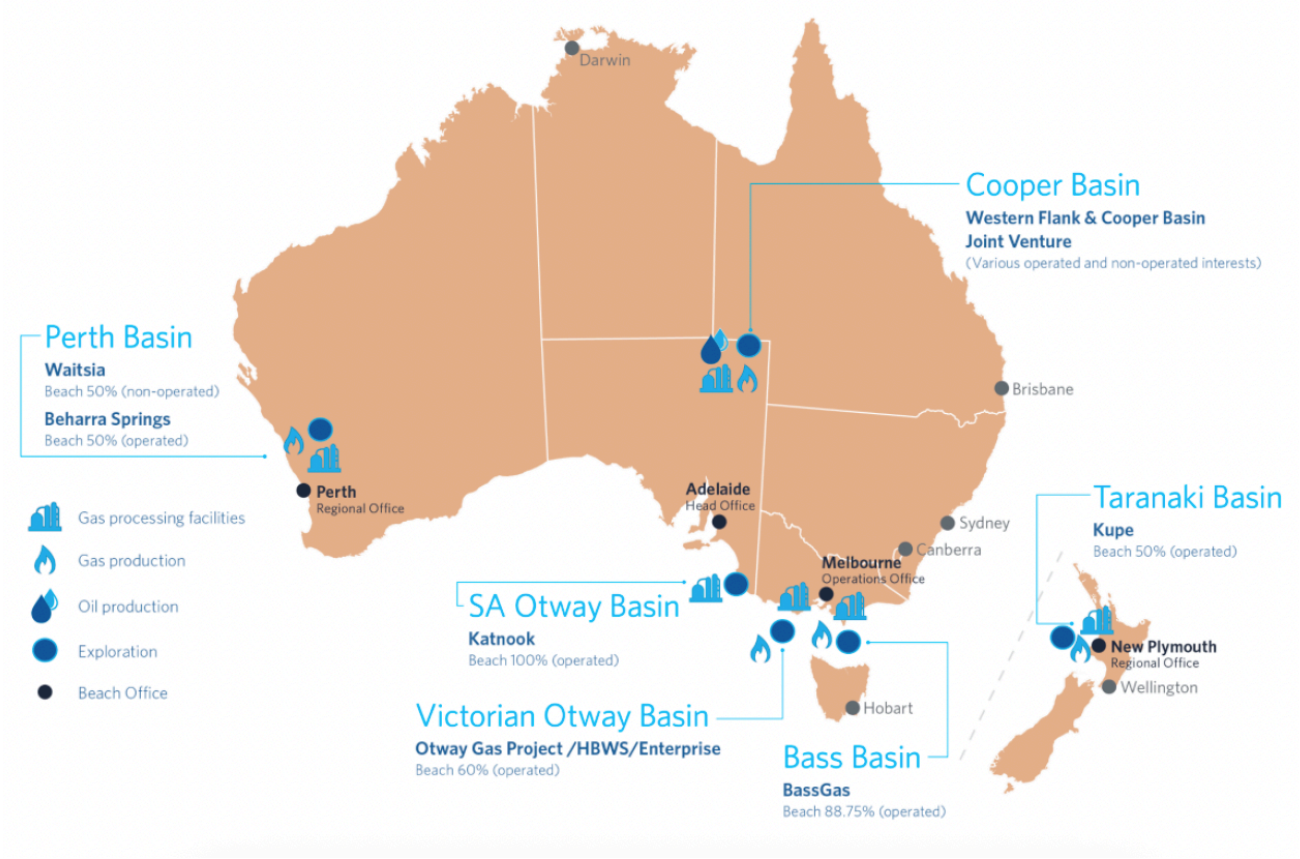


Figure 1.2: Location of Beach's assets

1.17 Objectives of the EP

As required by Regulation 41(1) of the OPGGS(E) 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) 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 demonstration 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).
- 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) and Regulation 15(3)(a) of the OPGGS Regulations, this chapter describes the legislative requirements that apply to the activities described in this EP.

2.13 Beach Environmental Policy

In accordance with Regulation 24(a) of the OPGGS(E) 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.

2.14 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); 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 39° 50′ 38″ S and 145° 49′ 05″ E	OPGGS(E)
RGP	T/PL2	From the Yolla platform to 39° 11′ 55″ S and	RGP
	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:

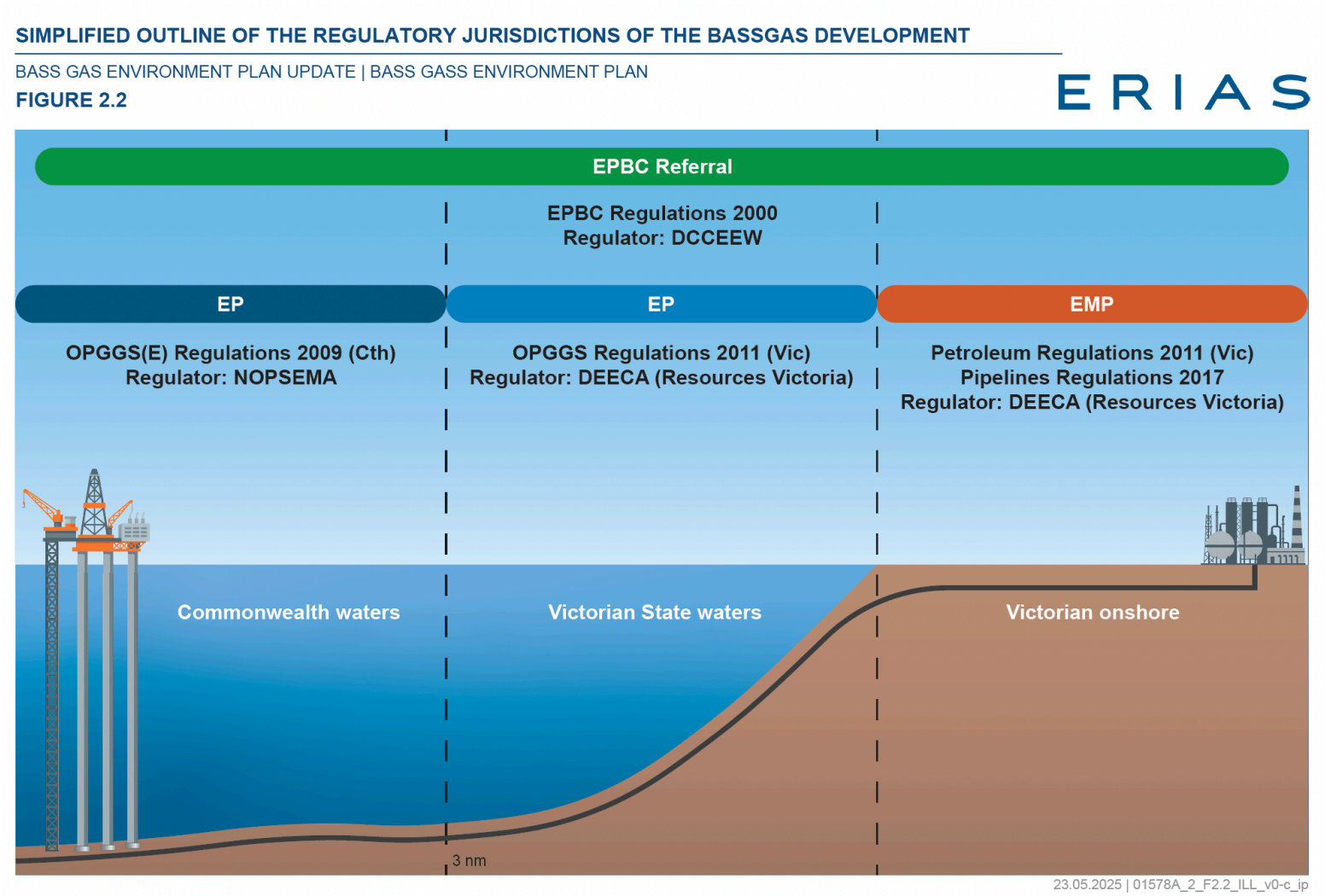
- Comply with relevant environmental laws, regulations, and the Beach Operations Excellence Management System which is the method by which Beach identifies and manages environmental risk.
- Establish environmental objectives and targets, and implement programs to achieve them that will support continuous 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

2.14.1 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) addresses 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 DoEE 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.

2.14.2 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 2011

The OPGGS Act 2010 (and associated OPGGS Regulations 2011) 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
Aboriginal and Torres Strait Islander Heritage Protection Act 1984	The Aboriginal and Torres Strait Islander Heritage Protection Act 1984 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.	Department of Climate Change, Energy, the Environment and Water (DCCEEW).
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) (& Regulations 2000)	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.	DCCEEW. (NOPSEMA in the case of this activity)

Legislation/Regulation	Scope	Related International Conventions	Administering Authority
		• Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention) 1979.	
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. **Relevance to this activity**: The preparation and acceptance of this EP satisfies the key requirements of this legislation.	Not applicable.	NOPSEMA
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]	DCCEEW
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
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	• Agreement between the Netherlands and Australia concerning old Dutch Shipwrecks 1972.	DCCEEW

Legislation/Regulation	Scope	Related International Conventions	Administering Authority
	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 pipeline in Commonwealth waters. In the event of the discovery of, and damage to previously unrecorded wrecks, this legislation may be triggered.		
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. **Relevance to this activity**: The platform, support and maintenance vessels will adhere to the relevant MOs while operating within Commonwealth waters.	• 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). • International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) as amended, 1995.	AMSA
Protection of the Sea (Prevention of Pollution from Ships) Act 1983 Protection of the Sea (Prevention of Pollution	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.	Various parts of MARPOL.	AMSA

Legislation/Regulation	Scope	Related International Conventions	Administering Authority
from Ships) (Orders) Regulations 1994	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 2.4 for further information.		
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
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

Legislation/Regulation	Scope	Related International Conventions	Administering Authority
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
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: (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.	Not applicable.	Attorney-General's Department
National Greenhouse and Energy Reporting Act 2007 (NGER) (& Regulations 2008)	Establishes the legislative framework for the NGER Scheme, which is a national framework for reporting GHG emissions, GHG projects and energy consumption and production by corporations in Australia. **Relevance to this activity**: Beach is a registered reporter under this Act (ABN 200 076 179 69). The development as a whole triggers this legislation because of the volume of emissions from the various assets.	• 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	• International Convention for the Control and Management of Ships Ballast Water & Sediments 2004.	DCCEEW

Legislation/Regulation	Scope	Related International Conventions	Administering Authority
	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 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.	• 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.	
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.	Not applicable.	AMSA

Legislation/Regulation	Scope	Related International Conventions	Administering Authority
	• 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 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 pipeline in Commonwealth waters.		
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
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 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 reforms, which will apply principally to the industrial and resources sectors, is one such measure.	DCCEEW

Legislation/Regulation	Scope	Related International Conventions	Administering Authority
	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.		
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
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.	Triggered in the unlikely event of a hydrocarbon spill that enters Australian marine parks.	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 2011)	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 gas pipeline traverses Victorian state waters.	DECCA (RVRO)
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 State waters.	Victoria Department of Energy, Environment and Climate Action (DEECA)
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)

Legislation/Regulation	Scope	Relevance to activity	Administering Authority
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 from or extends to State waters. All support and maintenance vessels working on the pipeline 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 2.4 for further information.	Triggered in the unlikely event of a hydrocarbon spill that originates from or extends to State waters that requires a vessel- based response.	Jointly administered by DEECA and EPA
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.	Triggered in the unlikely event of a hydrocarbon spill that enters Victorian marine parks.	DEECA

Legislation/Regulation	Scope	Relevance to activity	Administering Authority
	Several marine national parks occur within the amalgamated oil spill EMBA (see Section 5.4).		
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
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 State waters. Provides the Victorian Government response structure and contingency planning arrangements for marine pollution incidents in Victorian waters that must be implemented for vessel incidents.	Maritime Safety Victoria
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:	There is the potential for aboriginal heritage and Registered Aboriginal Parties	First Peoples State Relations

Legislation/Regulation	Scope	Relevance to activity	Administering Authority
	• 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 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.	within the Operational and Planning Areas.	
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 7.	Victorian Fishing Authority (VFA).
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.	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

Legislation/Regulation	Scope	Relevance to activity	Administering Authority
	The Act also defines marine incidents and the reporting of such incidents to the Victorian Director of Transport Safety.		
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 5.6 identifies aboriginal heritage sites and Registered Aboriginal Parties within the Operational and Planning Areas.	Department of Justice and Community Safety
Climate Action Act 2017			

2.14.3 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).
- Oil spill modelling (NOPSEMA Bulletin #1, April 2019).

OPEP

- Oil pollution risk management (NOPSEMA Guidance Note N-0470-GN1488, A382148, February 2021).
- Advisory Note Offshore Petroleum Industry Oil Spill Contingency Planning Consultation (Department of Transport Planning and Local Infrastructure [DTPLI], Version 2.0, August 2013).
- Technical Guideline for the Preparation of Marine Pollution Contingency Plans for Marine and Coastal Facilities (AMSA, January 2015).
- Advisory Note for Offshore Petroleum Industry Consultation with Respect of Oil Spill Contingency Plans (AMSA, 2012).

OSMP

- Operational and scientific monitoring programs (NOPSEMA Information Paper, N-04750-IP1349, A343826, January 2024).
- EPBC Act Policy Statement 1.1 – Significant Impact Guidelines – Matters of National Environmental Significance (DCCEEW, 2021).

2.4 Government Management Plans

The 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.
- 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. **Appendix 1** provides a complete assessment of BassGas operations against marine reserve objectives.

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	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).	

Park Management Plan	Management Objectives	Relevance to Operations
Haven Coastal Reserve		
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).	
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).	

Table 2.5 details the Commonwealth-listed threatened species Conservation Advice and Recovery Plans applicable to BassGas operations. These species are described in Chapter 5. An assessment of BassGas operations against the objectives of these species' management plans is provided in **Appendix 2.**

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

Recovery Plan/Advice	Management Objectives	Relevance to Operations
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.

Recovery Plan/Advice	Management Objectives	Relevance to Operations
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 subantarctica* (Fairy Prion (southern))	Surveying, monitoring and threat abatement strategies to ensure conservation of the fairy prion (southern).	None identified.
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)	The conservation of the Australasian bittern.	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.
Approved Conservation Advice for *Lathamus discolor* (Swift Parrot)	Surveying, monitoring, education and threat abatement strategies to ensure conservation of the swift parrot.	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 leschenaultia* (Great sand plover)	The conservation of the greater sand plover.	Illuminated boats and structures: Evaluate risk of lighting on vessels and offshore structures.

Recovery Plan/Advice	Management Objectives	Relevance to Operations
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.
Conservation Advice *Thinornis rubricollis rubricollis*	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.	
Approved Conservation Advice for *Megaptera novaeangliae* (Humpback Whale)	Provides threat abatement activities that can be undertaken to ensure the conservation of the humpback whale.	
Conservation Management Plan for the Southern Right Whale, 2024	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.

Recovery Plan/Advice	Management Objectives	Relevance to Operations
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*)	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.
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.
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 Operations
Seabirds		
Buller's albatross (*Thalassarche bulleri*)*	Supports national approaches to minimising impacts on the listed	Marine Pollution: Evaluate risk of oil spill impact to nest locations and, if

Action Statement	Management Objectives	Relevance to Operations
Southern Royal Albatross (*Diomedea epomophora*)*	seabird species and to implement Victorian management arrangement consistent with the national approach.	required, implement appropriate mitigation measures.
Sooty Albatross (*Phoebetria fusca*)*		
Wandering Albatross (*Diomedea exulans*)		
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		

Action Statement	Management Objectives	Relevance to Operations
Leartherback 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 international approaches to recovery.	Vessel disturbance/strike: 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. 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 7.

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 is in force in 156 countries (at January 2018). It is relevant to the vessels attending to the Yolla-A platform. It is also relevant to the Yolla-A platform itself because MARPOL defines 'ship' to include 'fixed or floating 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).

At November 2020, IOGP's members comprise 88 members, comprising oil and gas exploration and production companies, associations and contractors.

Beach is an IOGP member and the relevant guidelines have been referenced in this EP (and associated OPEP) to support the oil spill response strategies.

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). At November 2020, IPIECA's members comprise 79 members, comprising 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.

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
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.

2.6 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 7.

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); 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 APPEA 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 APPEA CoEP has been used as a reference for the impact and risk assessment (Section 7 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).

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 development, 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 and maintenance activities, a 500m corridor 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 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 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

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
Wilsons Promontory Marine Park	91 km northeast	53 km east
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. 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, including accommodation module) were installed on Yolla-A.

Yolla-A is a steel gravity based, self-installed platform that was originally designed for unmanned operations. The key elements of the offshore facilities are described in Table 3.2

Yolla-A platform is a normally basic manned operation with typically 7 persons on board (POB) for basic operations and routine maintenance activities, however from 2024 there has been some limited periods for which the platform is a non-manned operation, all resulting from the following operational changes:

- Reduced throughput due to reduced production from existing Yolla wells. This has meant 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)

- Reduced operational and maintenance demands for the platform lowered the frequency of staffing, so that the platform has periods when it is unstaffed.

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 (C1), 17-20% carbon dioxide (CO2), 5-8% ethane (C2) 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 C.

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 2026. 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

Well	Yolla-3	Yolla-4	Yolla-5	Yolla-6
C_{11}	0.10	0.07	0.07	0.07
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 and maintenance 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 **Error! Reference source not found.**. 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 persons on board (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 Well Intervention Operations) (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 **Error! Reference source not found.**.

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 PFW discharge rate/day as wells produce less gas leading to cessation of production.

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



Plate 3-2: Views of the dump caisson

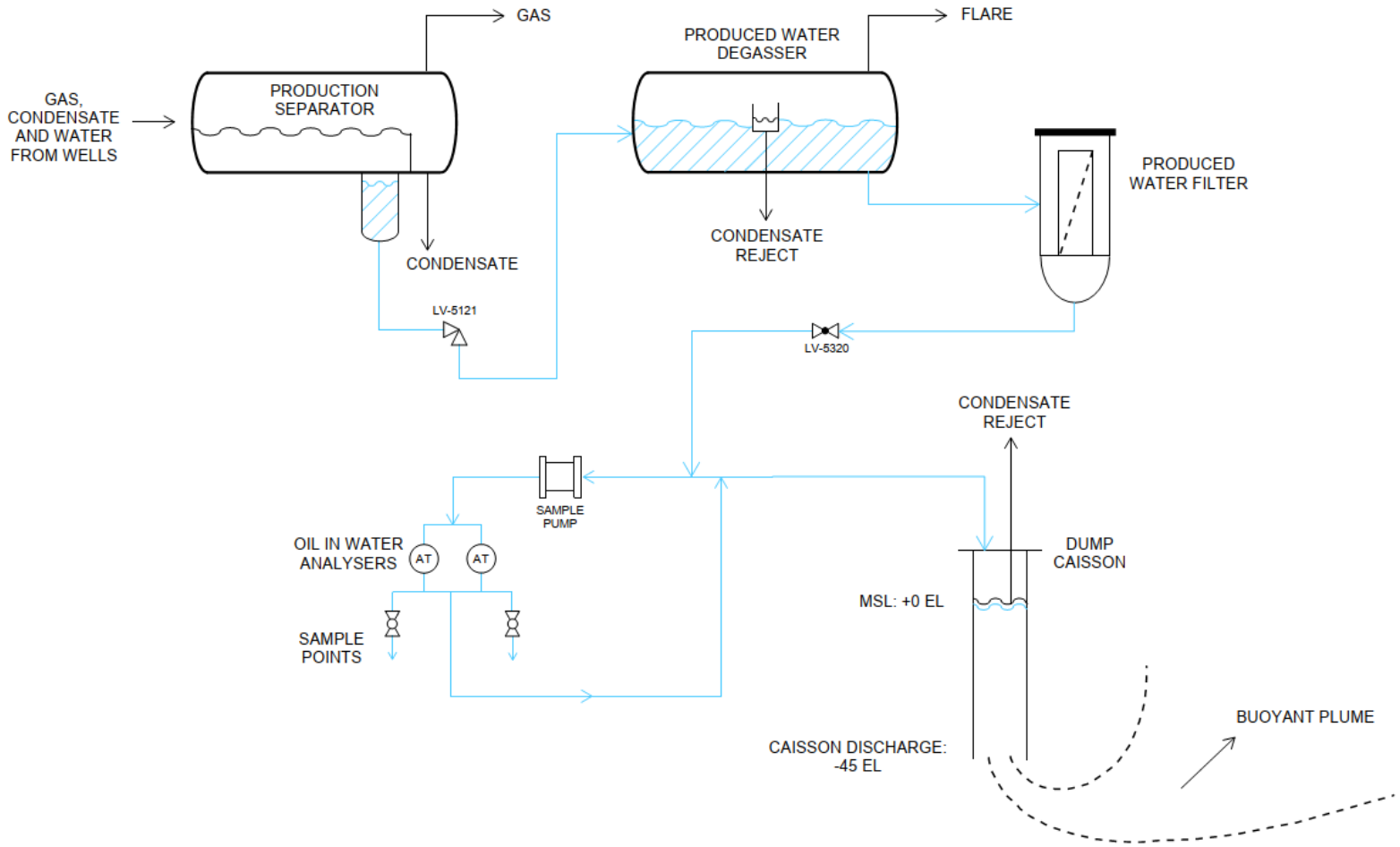


Figure 3.2: The PFW treatment process

PFW is continuously discharged unless the platform is shut in. As such, a vigilant 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).

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 m3/day.

See Section 7.6 for a definition of the PFW mixing zone. Weekly PFW samples 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 chemical descalent chemical (GLDA) to the well management activities. Descaling activities are undertaken intermittently (once

every 1-3 months) per producing well, and this results in a temporary change to the characteristics of the produced formation water for a short period of time before returning to baseline or normal operating conditions. The impacts associated with this are described in Section 6.7.

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 anominal 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 cassion 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. 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.

Information regarding greenhouse gas emissions, including from the flare, can be found in section 7.4.1.

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 Corrosion Inhibitor

Well hydrocarbon fluids are dehydrated for transfer to the raw gas pipeline 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.

3.5.13 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 3.7. 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 raw gas pipeline) and corrosion inhibitor is injected into the raw gas pipeline.

3.5.14 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 raw gas pipeline 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.

3.5.15 Hazardous Substances

The main hazardous substances and typical inventories that may be stored on the platform are shown in Table 3.7. 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 3.8. 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 3.7: 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 of GLDA in IBCs on the main deck. Usual storage would be 3-6 m^3. Approximately 40% of the well volume, 2-3 m^3.is used per injection.
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.

Table 3.8: 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.

3.5.16 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.

3.5.17 Accommodation Facilities

Originally designed for unmanned operations (and operated as such), the Yolla MLE project converted the platform to a manned facility in 2012 with the installation of permanent accommodation modules and an upgrade of the safety system. Currently Yolla is a normal basic manned operation with typically 7 persons on board (POB) for basic operations and routine maintenance activities staffed part-time on a two-week-on and two-week-off roster. From 2024 there has been some limited periods for which the platform is a non-manned operation and (see Section 3.3 Overview of Major Components of the Offshore BassGas Development).

Yolla-A manning level capacity:

- 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). This scenario is 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.

3.5.18 Communications

Communications integrity is ensured at all times, with control and surveillance of the platform and two-way voice communication with personnel on-board, by the provision of the following communications equipment:

- Primary satellite link for voice, fax, production data transmission and office network facilities.
- Back-up satellite system that is able to exchange a limited range of critical data in the event of a main satellite communication link failure. The back-up satellite is energised upon shutdown of the main satellite antenna and sends a selected list of PCS, Safety Instrumented System (SIS) and fire and gas (F&G) information to LLGP to allow continued remote monitoring.
- Private Automated Branch Exchange (PABX) telephone system onshore with external links channelled through the 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 primary 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.

3.5.19 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).

3.5.20 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:

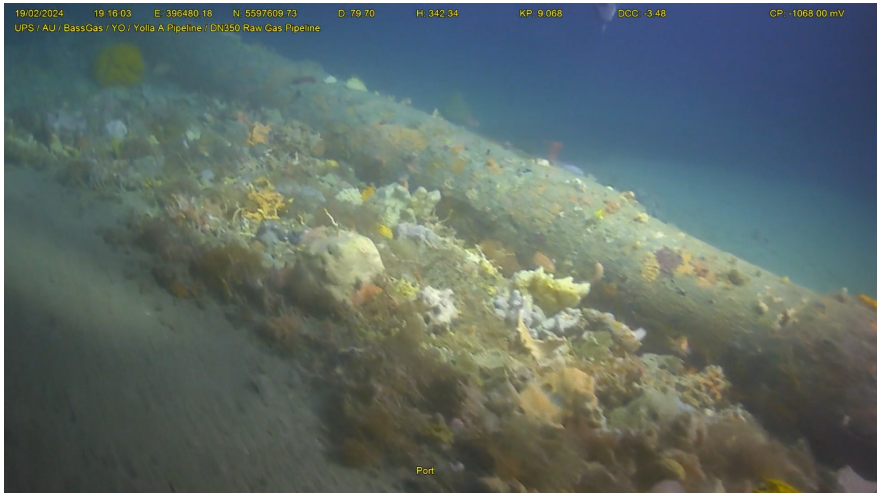
- Flow rate of raw fluids into the pipeline in the range of 20–67 TJ/day sales gas equivalent.

- 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.

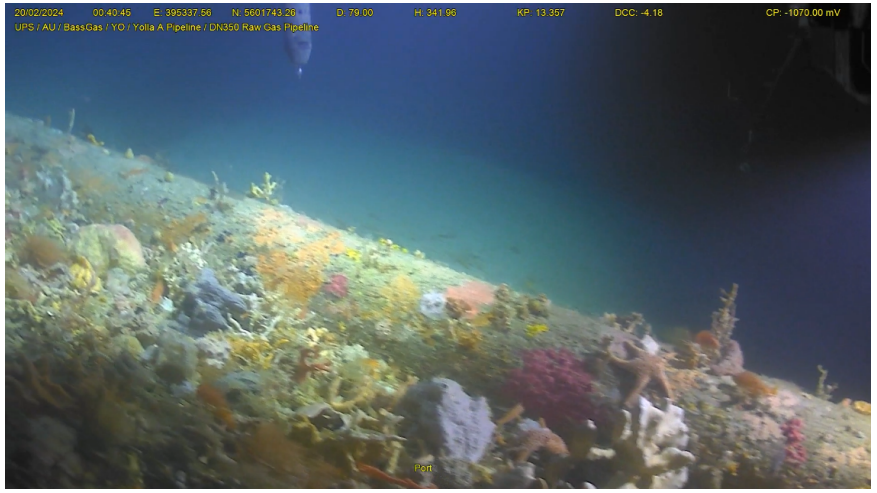
In the event of a pipeline leak, a drop in pressure will be identified at either the LLGP via the inlet PZT (which will trip the plant at 4,000 kPa) or at the Yolla-A platform if two out of three independent pressure transmitters on the export line register a pressure of 4,000 kPa. These transmitters 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 famer 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 3.6.1, following).

A series of 12 Plates (Plate 3-4) show images of various sections of the offshore RGP from the 2019 and 2024 subsea inspection.

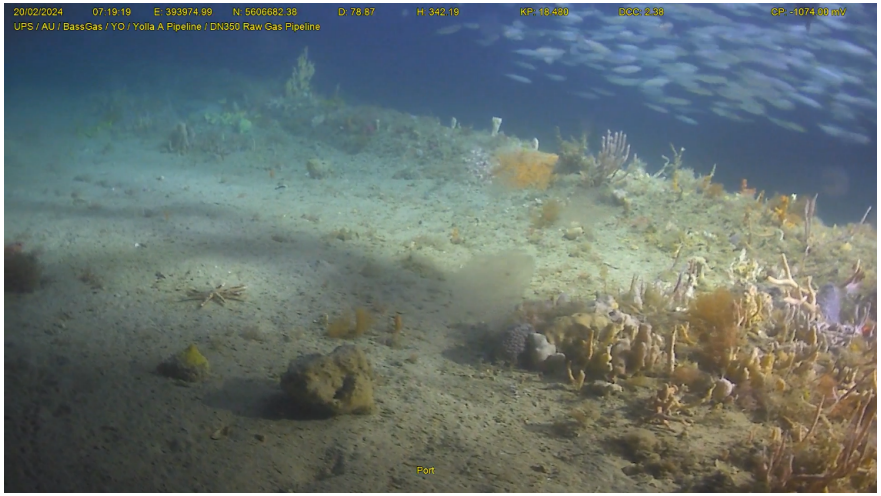
Plate 3-4: Images of various sections of the offshore RGP from the 2019 and 2024 subsea inspection Campaign



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)



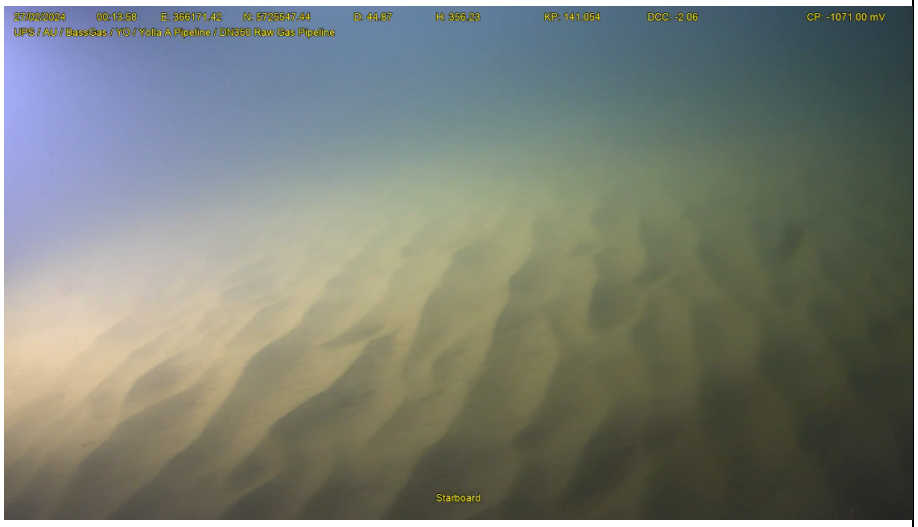
KP 110.924, Depth 73.57 m (2024)



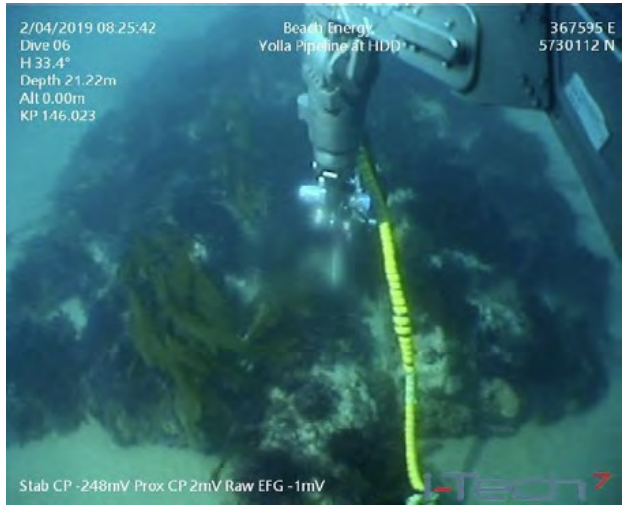
KP 128.386, Depth 47.58 m (2024)



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.

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 pipeline. This 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 Integrity Maintenance

Inspection and maintenance of BassGas facilities and equipment is coordinated through the Computerised Maintenance Management System (CMMS). Maintenance plans and procedures are outlined in the Monitoring of Compliance with Risk Controls (CDN/ID 3976775) and Management of Integrity of Pressure Vessels and Piping (CDN/ID 3976802) documents.

These plans aim to:

- Ensure a consistent, cost-effective and efficient system of maintenance management; and
- Provide optimum levels of inspection and maintenance 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 [101]. The visual inspection highlighted no areas of damage, corrosion, or any structural defects during the time of inspection. Yolla 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 offshore pipeline, 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 3.9 summarises the results of the ROV surveys undertaken since BassGas became operational in 2006.

Table 3.9: Summary of ROV inspections

Year	Inspection target
2024	Yolla A Suspended well inspection and survey of Bass Gas pipeline
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 (≤yearly) 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, TAS-5185-E55-PLN-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 inspection, maintenance and repair (IMR) purposes and are undertaken from a diving support vessel or from the Yolla-A launch and recovery system (LARS). Diving procedures are prepared for each campaign, specific to the contractor and vessel 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;
- General platform and pipeline repair works; and

A Level 2 inspection utilising a diving support vessel was conducted in 2023.

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 the use of Hydex® (a chemical compound) for hydrocarbon cleaning. Hydex® 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 its precise location, especially as large sections of the pipeline have become buried by seabed sediments over time. This allows pipeline engineers to determine any integrity issues. 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 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.

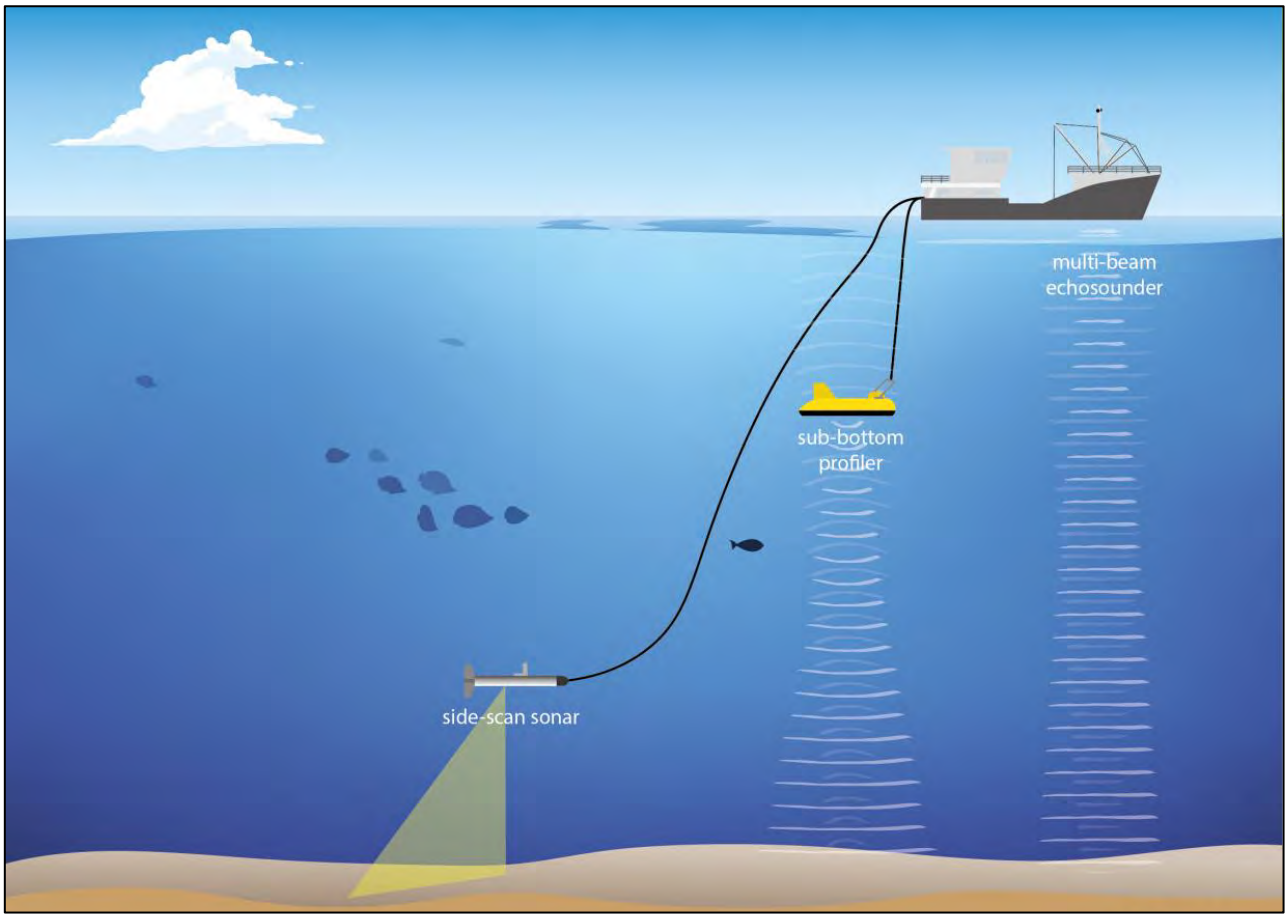


Figure 3.3: Simplified representation of pipeline geophysical survey techniques

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

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:

1. 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.

2. 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.

3. 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 magnotometer survey activitres.

3.8 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.

3.8.1 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 Bristow, 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 normal basic manning with periods where the plaform is unmanned has not changed the helicopter flight schedule to Yolla where there are approximately three return helicopter flights per week 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.

3.8.2 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 3.5.12, 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).

3.8.3 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.

3.8.4 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.

PSV contractors must demonstrate they have a rigorous HSE Management System onboard in accordance with Beach's Contractor Management Directive (LAT-HSE-DVE-001), Level 1 High Risk HSE Pre-qualification assessment (CDN/ID 17866434), Level 3 third-party assurance audit and compliance with the Field Support Vessel Operations Procedure (CDN/ID 3974221). Vessel contractors are subject to change.

The PSV returns domestic and industrial waste generated on Yolla-A platform to shore, 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) and Corio Quay (Geelong) are used as back up ports.

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.

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. 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.

3.9 Non-routine Operations

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

3.9.1 Loss of Containment – RGP

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). 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 Source Control Emergency Response Plans (SCERP) in accordance with WECS Standards and Offshore Energies UK (OEUK) Relief Well Planning for Offshore Wells (Issue 3). 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.

Beach has a Relief Well Plan (RWP) (Otway and Bass) (19060495) and Source Control Contingency Plan (SCCP) in place for implementation if required. These plans ensures 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. This team will consist of Beach drilling engineers and external experts (including well control specialists, site surveyors, rig broker and spill control organisations) as required.

3.10 Cessation of Production & Preservation Phase

3.10.1 End of Field Life

The base case assumption for this Environmental Plan is that the existing production operations will continue for the full duration of the plan. To support this assumption, Beach has provided its current best technical estimate end of production life in Table 3.10. While an unlikely outcome, it is possible that Yolla production will cease during the term of this EP and activities for the cessation of production have been included within the scope of this EP.

Table 3.10: BassGas End of Field Life Estimates (YEJ25)

Reserves Case	End of Field Life (YEJ25 Reserves)
1P Proven	2028
2P Proven & Probable	2031
3P Proven, Probable & Possible	2033

These estimates are based on audited reserves forecasts for Year Ending June 2025 (YEJ25), and are 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 - for example, '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. For any alternate use project to proceed, a new set of regulatory approvals (specific to the alternate use) will be required along with a Final Investment Decision (FID). In the absence of those pre-requisites being achieved, the base case is for the infrastructure to be decommissioned as described in Section 3.10.8.

3.10.2 Activities upon Cessation of Production

As there is some possibility that Yolla production might cease within the term of this Environmental Plan, Beach has included activities that will occur upon cessation of production (CoP) within the scope of this EP. These CoP activities are intended to place the Yolla 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.

3.10.3 Wells

Upon cessation of production (CoP), the Yolla platform wells will be shut-in using the SSSV and Xmas tree valves. Well annulus pressure transmitters will remain in service for monitoring well pressures during the preservation phase, until such time that the wells have been permanently abandoned.

Consistent with the in-force Yolla-A Platform WOMP, Beach will make a risk-based decision (by individual well) to either shut-in and continue to monitor each well until it is decommissioned, or to suspend the wells by way of a wireline-deployed tubing plug. Any wireline intervention would be conducted under the scope of the existing WOMP, Safety Case and this EP.

3.10.4 Yolla Platform & Topsides

The production system infrastructure (i.e. hydrocarbon-bearing process piping, vessels and equipment) will be de-pressured to the platform flare upon cessation of production. Liquid hydrocarbons will be drained from vessels and pipework, and disposed of consistent with normal operational procedures and controls.

Once sufficiently cleaned of hydrocarbons, the production system will be purged and displaced with nitrogen for preservation. The nitrogen required for the topsides purging will be supplied by nitrogen cylinder banks transported to the platform by supply vessel.

The 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').

3.10.5 Yolla Raw Gas Pipeline

In the last few days of production, an increased programme of pipeline pigging activities will be performed, using the existing pigging facilities and consistent with normal operational procedures. The objective of these activities is to sweep residual hydrocarbon liquids from the pipeline to the LLGP such that the pipeline contains only dry gas.

Upon cessation of production, the pipeline will be blown down to flare and depressurised before being purged with nitrogen. The direction of the nitrogen purge will occur from LLGP to the Yolla platform (preferred), or from the Yolla Platform to the LLGP. Purging from LLGP is preferred to avoid the need to mobilise either bulk nitrogen tanks or a nitrogen-generation spread onto the Yolla Platform. Purged gas would be directed to flare, either at the LLGP flare or the platform flare.

3.10.6 Maintaining Property to Enable Decommissioning

Section 572 (2) of the OPGGS Act states:

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

(b) used in connection with the operations authorised by the permit, lease, licence or authority.

With respect to post-production phases, Section 572 (2) requires titleholders continue to maintain all property in a state that ensures it can either be safely removed at the end of its useful life, or, that any alternate end state (as may be agreed) can be achieved.

Accordingly, the Yolla platform, its wells and the raw gas pipeline will continue to be maintained (in a preserved state) until they are decommissioned to the agreed end-state.

Existing operate-phase maintenance and integrity management practices will continue into the Preservation Phase, including:

- All property within the title area and owned by Beach, is listed in an Asset Register that is retained within the CMMS.
    - 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.
- Management of change (MOC) procedures applies to both CoP and decommissioning.
    - MOC(s) relating to the cessation of production 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.
    - 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.

3.10.7 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 include (non-exhaustive):

- Planned preventative maintenance, testing, inspection, calibration and integrity management activities, as well as any arising corrective maintenance work.
- Environmental monitoring and studies, including sediment sampling and water quality monitoring.
- Associated logistics operations including helicopter flights, vessel & cargo operations
- Pre-decommissioning activities, including:
    - Removal of surplus equipment and infrastructure
        - Removal of the LQ and compressor modules is expected to be required as a pre-requisite for subsequent well and platform decommissioning

        - Redundant plant modules may be removed earlier to optimise subsequent platform removal

    - Installation of jacking systems, lifting & tie-down points,
    - Structural inspections and engineering surveys
    - Installation of frames and structural supports for a hydraulic workover unit onto the platform
    - Mobilisation of equipment & personnel to support pipeline preservation or decommissioning activities.

- Well decommissioning
    - The wells must be permanently decommissioned before the final platform decommissioning occurs (i.e. activities to plug and abandon the wells will occur while the platform remains in preservation state).
    - Well decommissioning activities may (or may not) occur during the term of this Environmental Plan, but are outside the scope of both this EP and the Yolla-A Platform WOMP. See further details in section 3.11.4.1.

It is envisaged that the platform will be mostly unmanned during the Preservation Phase, and that remote monitoring of the platform would be ongoing. The platform will be manned periodically for scheduled maintenance, monitoring and inspection activities, as well as when executing any preservation or decommissioning related work.

Power supply for the platform is provided by two gas turbine driven generations with fuel gas taken from the primary production stream. Once the wells are isolated and the topsides placed under 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 expected that this become the primary power supply and operate continuously when the platform is manned. Short-term redundancy will continue to be provided by the existing Uninterruptable Power Supply systems.

When the platform is unmanned and in preservation mode, power demand will be significantly reduced compared to manned, production operations. While unmanned, power loads will be limited to 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 likely that a small-scale, combined solar-battery system or similar will be installed for this phase. The diesel generator is expected to operated only when the platform is being manned (e.g. well intervention, maintenance campaign, pre-decommissioning activities).

Associated helicopter & vessel operations (as outlined in Section 3.8) will continue to be performed during the Preservation Phase.

3.10.8 Planning for 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.

As outlined in Section 3.10, Beach is planning and assessing options to repurpose or decommission the offshore Yolla infrastructure. Both streams are interdependent and are being progressed in parallel – for example, a potential scenario might involve asset re-purposing of the Yolla platform topsides and pipeline, but decommissioning of the platform wells.

The execution of any decommissioning activities associated with the Yolla infrastructure (as described in this EP) are not proposed within the scope of this EP, however, they are described here to provide context for Beach's planning for future phases.

3.10.9 Regulatory Context

In Australian Commonwealth waters, decommissioning of offshore oil and gas infrastructure is governed by a comprehensive regulatory framework (Table 3.11).

The primary legislative instrument is the *Offshore Petroleum and Greenhouse Gas Storage 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 3.11: Offshore Decommissioning Legislation & Regulatory Guidance

Regulator	Title	Reference
NOPSEMA	*Offshore Petroleum and Greenhouse Gas Storage Act 2006*	C2006A0014
DISR	Guideline: Offshore Petroleum Decommissioning	v4 2 March 2022
NOPSEMA	Decommissioning Compliance Strategy 2024-2029	A927433, v0 November 2023
NOPSEMA	Information Paper: Planning for proactive decommissioning	A816565, 11 September 2025
NOPSEMA	Policy: Section 572 Maintenance and removal of property	A720369, 17 September 2025
NOPSEMA	Policy: Section 270 Consent to surrender title – NOPSEMA advice	A800981, 17 September 2025

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* are also required. The Sea Dumping Act is administered by Department of Climate Change, Energy, the Environment and Water (DCCEEW). This means that approvals from both NOPSEMA and DCCEEW are required for the in-situ decommissioning of oil and gas infrastructure.

3.10.10 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 means executing work activities like plugging and abandoning (P&A) of wells 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 into 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 (e.g. cleaning, flushing etc.) 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, re-inforcing, 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 (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.

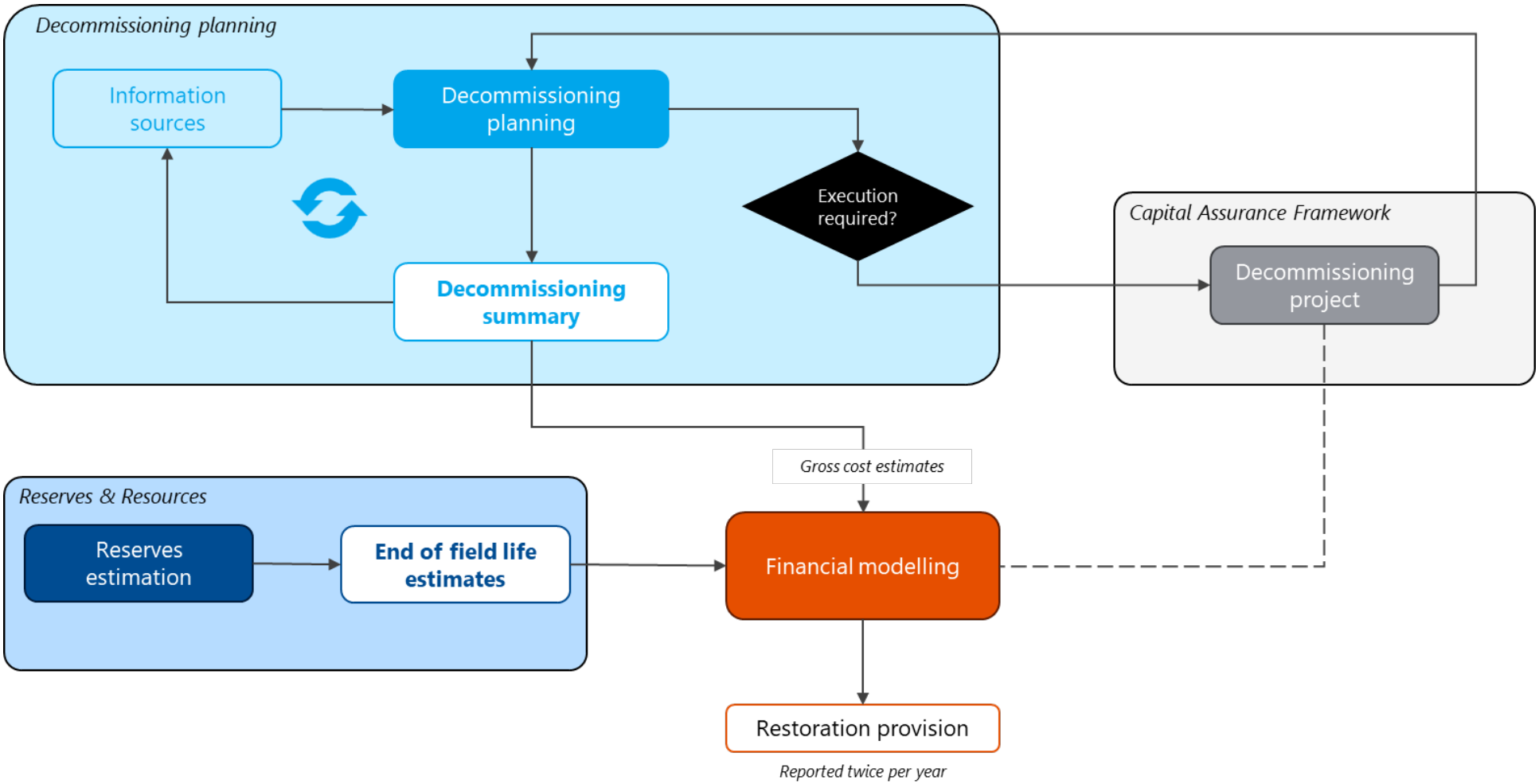


Figure 3.4: Beach Decommissioning Planning Process

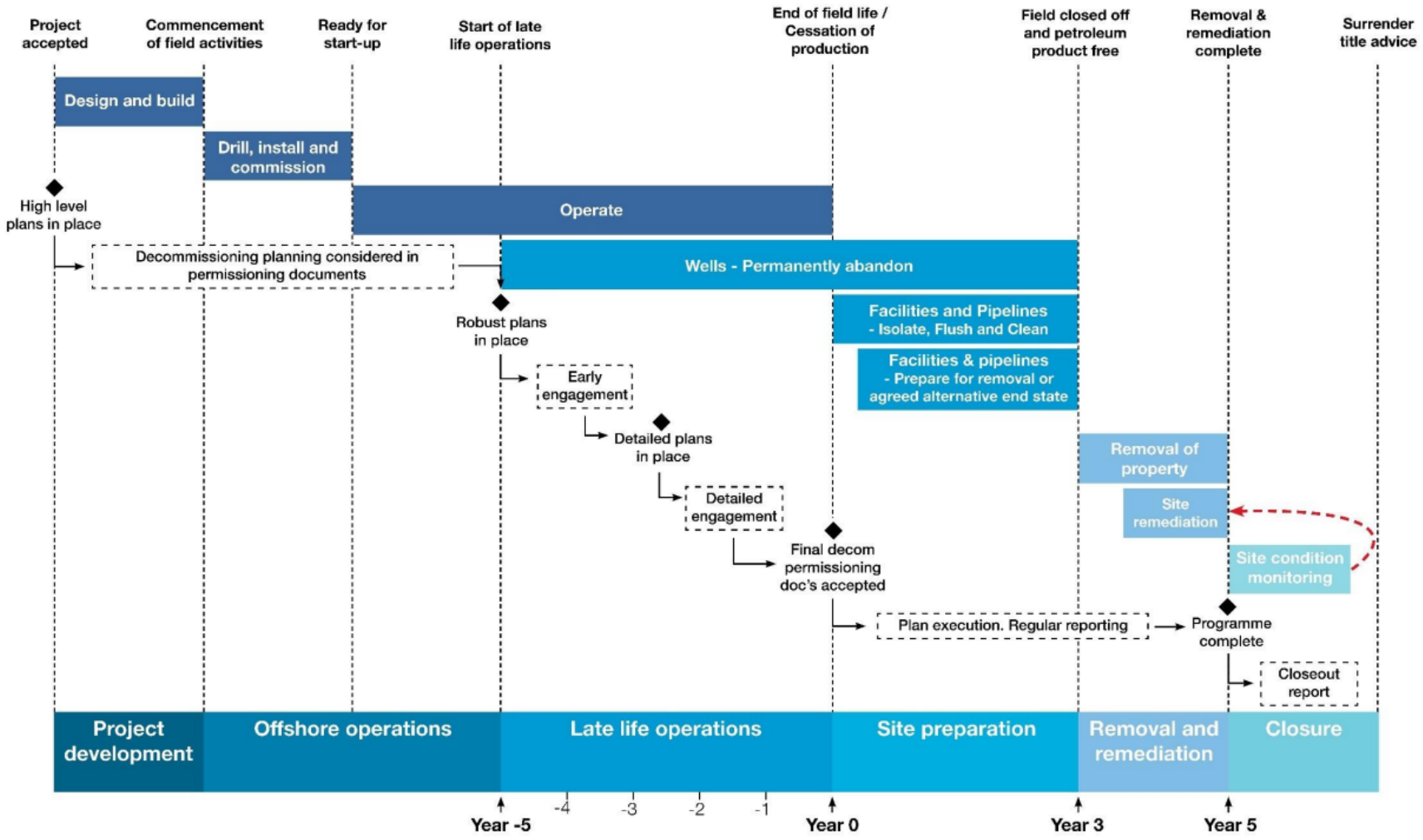


Figure 3.5: NOPSEMA Decommissioning Planning Timeline

3.10.11 Planning for Proactive Decommissioning

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

- All wells are plugged and abandoned within 3 years of the production system ceasing production.
- All structures, equipment and property (including pipelines, platforms and all other subsea infrastructure) that forms part of a production system 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 approved end state as soon as practicable or otherwise as agreed by NOPSEMA.

Consistent with NOPSEMA's Section 572 policy, the base case for decommissioning of the Yolla offshore infrastructure is full removal, unless an alternative arrangement has been accepted by NOPSEMA.

The regulatory framework acknowledges that full removal may not always be the most appropriate or practicable option. Under Section 572 (7) of the OPGGS Act, titleholders may propose alternative arrangements for dealing with property that differ from the default requirements in Sections 572 (2) and (3). In such cases, alternative arrangements — such as in-situ decommissioning, partial removal, or re-purposing — may be considered, provided they achieve equivalent safety and environmental outcomes. Such alternatives must be satisfactory to NOPSEMA via an accepted permissioning document, and if required, to DCCEEW via an approved sea dumping permit.

Consistent with the provisions afforded by Section 572 (7), Beach is incorporating the consideration of alternative arrangements into its Yolla decommissioning strategy by:

- Evaluating alternate end-states for infrastructure, including pipelines and associated assets.
- Conducting environmental studies and risk assessments to support any proposed deviation from full removal.
- Ensuring that any alternative arrangements are clearly justified and documented within future permissioning documents and sea dumping permit applications submitted to NOPSEMA and DCCEEW respectively.
- Progressing the above items in parallel with the development of plans for full removal.

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. Beach's intention is to prepare and submit a Decommissioning End-State EP to NOPSEMA at least 2 years prior to the CoP. The acceptance (or not) of the end-state EP will inform subsequent decommissioning planning and decision-making, including the preparation of scope-specific EPs for the various decommissioning activities.

This approach reflects Beach's commitment to responsible asset retirement, environmental stewardship, and regulatory compliance.

3.10.12 Yolla Decommissioning Strategy

The Yolla decommissioning strategy is outlined below:

- Permanent plugging of the four Yolla platform wells, consistent with accepted well engineering standards.
- Removal of the Yolla platform topsides, hull and jacket tower as close to the seabed as technically feasible.
- Assessment of leave in situ option for platform suction-cassion/gravity base.
- Assessment of leave in situ option for the Yolla raw gas pipeline and associated appurtenances such as stabilising mattresses, grout bags and anchors.

It is anticipated that the decommissioning activities will be addressed under a suite of separate permissioning documents, specific to the main system components (i.e. wells, platform, pipeline).

A conceptual sequence to decommission the Yolla infrastructure is as follows:

4. Removal of compressor module to permit use of Hydraulic Workover Unit within platform structural limits
5. Plug & abandon all four wells using a Hydraulic Workover Unit
6. Prepare platform for decommissioning & remove Living Quarters (LQ) module
7. Jack down hull, cut jacket at mud-line (or as close as possible). Recover hull and jacket onto heavy-lift vessel and transport for recycling & disposal.
8. Decommission pipeline (either full recovery, leave in-situ or combination)

3.10.13 Wells

The Yolla platform wells will be plugged and abandoned in accordance with relevant industry standards. Conceptual plans for well decommissioning of each of the four wells are presented within the current in-force operate-phase WOMP (CDN 3972817). A future well decommissioning WOMP will be prepared and submitted to NOPSEMA, along with an activity specific EP.

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 plugged and abandoned within 3 years of CoP in accordance with NOPSEMA guidance.

Decommissioning of each of the Yolla Platform wells will require the support of additional drilling or well intervention facilities upon the Yolla Platform, either as a Hydraulic Workover Unit (HWU) installed on the platform itself (subject to structural limits), or a Jack-Up rig (JU) positioned immediately adjacent to the platform. Use of a HWU is the preferred concept at this time, due to historical punch through incident experienced when using a jack up rig for the original drilling of Yolla 3 & 4,

associated with the soft seabed conditions. Some top-side equipment (compressor module) will likely be required to be removed in order to accommodate the HWU while remaining within platform structural limits. This will be subject to future planning work.

Once cement plugs have been placed to plug the well, surface and conductor casings will be cut below or as close as possible to, the seabed or gravity base in order to eliminate or minimise the extent of any casing stump protrusion.

3.10.14 Yolla Platform & Topsides

Yolla-A platform is a self-installing steel "Drill-Ace" platform, with a suction-caisson/gravity base, located in 80m water depth.

Two methods for removal of the Yolla Platform were originally proposed:

9. Reverse installation - where the topsides and hull are jacked down to sea level, the suction base is released from the seabed by water-jetting, and then the base lifted to the hull. The topsides, base and jacket would then be towed away and loaded onto a heavy lift ship for transport and disposal.

10. Removal in sections – where the topsides and hull are jacked down to sea level, the jacket tower is cut free from the gravity base and then lifted up through the platform deck penetrations and onto a barge of heavy lift ship. The hull and topsides are then floated or lifted onto a barge or heavy lift ship and transported for disposal. The concrete gravity base would remain in situ on the seabed.

Since initial construction, the Yolla MLE project added a significant number of facilities onto the Yolla topsides, making the methodology to jack-down the topsides more complex (for both methods).

- The new Living Quarters (LQ) module weighing 550t on the North side of the platform extends down to the level of the bottom of the hull meaning that it would be submerged if the hull was jacked down to the sea level for a reverse installation. For this reason, it is necessary to remove the LQ as part of the demolition works, which will require a crane barge with sufficient capacity and reach to remove the LQ.

- The compressor module would also have to be removed as the current location of the compressor would not allow installation of the jacking frames or the topsides to be lowered on the lattice tower.

- The additional weight imposed by the MLE additions (1,097t) will result in the deck hull being less buoyant once lowered onto the sea surface, with 0.9m reduction (est.) in freeboard to 1.9m, which may not be sufficient for safety.

In all cases, a crane barge will be required as part of the initial demolition works to lift off the LQ and compressor modules. A crane with a minimum capacity of 1000t would be required, and if this crane has sufficient capacity, it could also be used for the remaining demolition activities.

Selection of the final removal method will be based upon the combination of detailed engineering assessments as well as environmental assessments for leaving the gravity base in-situ.

- Due to the soft geotechnical conditions, the platform base does not have conventional piled foundations, instead using a suction-cassion base. The 50m x 50m concrete skirt of the base

penetrates approximately 5m into the seabed to provide the foundation for the jacket, held in place by the combination of static friction ('stiction') and gravity. Only the well conductor casings were pile driven.

- Removal of the base may either be not technically feasible, or require an unacceptable degree of water-jetting (and associated environmental disturbance) to remove seabed material from around, and inside of, the base. There is potential that, even with a high amount of water-jetting, that the base still may not be able to be recovered.

- While full removal of the jacket forms the current base case assumption, partial removal of the jacket (above 55m) may also be considered. 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. Dimensions and weights of the Yolla platform are displayed in Table 3.12.

Table 3.12: Dimensions and weights of the Yolla platform

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

3.10.15 Yolla Raw Gas Pipeline

The Yolla Raw Gas Pipeline is constructed from 14" diameter carbon steel pipe, with a 12.7mm wall thickness. An external concrete coating (30 to 60mm thick) was applied to ensure on bottom stability. The pipeline is not trenched, but some sections may have become buried at various sections over its 147km length (offshore section).

Three decommissioning methodologies are to be considered for the Yolla raw gas pipeline:

1. Full removal

2. Trenching and burial

3. Leave in-situ

It is possible that a combination of these methods may be applied over different sections of the pipeline as part of ensuring optimal decommissioning outcomes, reflecting the local metocean conditions and environmental factors.

Decommissioning concepts explored to date have been based upon a cut-and-lift methodology, whereby multiple vessels will be required to jet, clean/blast, cut-and-lift (in 18m sections), and transport the recovered pipeline to shore for disposal or recycling. The pipeline was initially constructed using a conventional S-lay method, and while a reverse S-lay methodology has not yet been assessed, it may be explored at a later time. Total vessel working days for a cut-and-lift method is estimated at over 500 days, including allowances for wait-on-weather. Total tonnage to be recovered is estimated at 35,100 tonnes, including ~20,000 tonnes of concrete coating.

Full removal of the Yolla pipeline will cause substantial disturbance of the seabed and would cause a loss of habitat created at the seabed around the pipeline. Removal of the pipeline would also result in spalling of the concrete coating which would then spread on the seabed.

Trenching and burying the pipeline will result in similar seabed disturbances as for full removal. Some reduction in seabed disturbance may be expected for buried sections where there is no benefit to excavate and re-bury the line. This methodology is expected to present a lower risk to personnel and result in reduced tonnage for disposal (to landfill).

Decommissioning the pipeline in situ is considered to be the optimal concept at this time, but remains subject to further work and studies.

- Leaving the pipeline to degrade in situ will minimises the environmental impacts and risks associated with its removal and provides continued seabed habitat. There are no plastic components within the pipeline.
- Decommissioning in-situ eliminates safety risks to personnel as well as the emissions associated with multiple operating vessels for full removal, or trench and bury methods.
- Footage gathered from in-water inspections of the pipeline (during inspection and maintenance activities) will be used to perform environmental studies to understand the ecological benefits of leaving the pipeline in place, if any.
- Further environmental studies and assessments, and stakeholder consultation, is required to determine the optimal decommissioning strategy for the raw gas pipeline. Impacts to any adjacent infrastructure (e.g. other pipelines, submarine cables) may need to be considered (specifically the Telstra Bass Strait-2 fibre optic telecommunications cable crosses the pipeline at KP 70.8.)

These studies will assist to inform the decision to decommission the pipeline in situ or to remove (in whole or part). The decision to select the methodology will be based on the best overall outcomes with respect to:

4. Safety of personnel,
5. Net environmental benefits,
6. Stakeholder consultation (e.g commercial & recreational fisheries)

3.11 Summary of Emissions and Discharges

This chapter provides a detailed description of the Yolla-A platform and pipeline operations and maintenance activities. Table 3.13 summarises the hazards associated with planned activities (e.g.,

routine emissions and discharges) and unplanned activities (e.g., emergency events) resulting from operations and maintenance activities and where these are addressed in the environmental impact assessment (EIA) and environmental risk assessment (ERA) in Chapter 7 of this EP.

Table 3.13: 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	3.5.7	7.6
Air emissions	3.5.11, 3.5.12	7.4
Chemical injection	3.5.13	N/A – closed loop
Navigational and deck lighting	3.5.22	7.3
Platform and vessels		
Deck drainage	3.5.9, 3.5.10	7.10
Sewage and grey water disposal	3.5.14	7.8
Waste disposal	3.5.14, 3.7.1, 3.7.3	7.11
Sound and vibration	3.10.6, 3.10.7	7.5
Pipeline only		
Physical presence	3.5	7.1
Sound (maintenance activities)	3.7.5	7.5
Vessels only		
Cooling and brine water discharges	3.7	7.9
Helicopters only		
Air emissions	3.8.1	7.4
Sound and vibration	3.8.1	7.5
Unplanned activities		
Platform only		
LoC – production chemicals	3.5.13	7.14
LoC – diesel	3.5.12	7.15
LoWC	3.9	7.17
Platform and vessels		
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 – pipeline rupture	3.9	7.16

Hazard	Described in EP Section	Assessed in EP Section
Vessels only		
Sound and vibration	N/A	7.5
Vessel collision with megafauna	3.8.2	7.12
Introduction of invasive marine species	N/A	7.13
Diesel spill	3.8.2	7.15
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 3.14 over page.

Table 3.14: Environmental aspects associated with BassGas operations

Activities	Planned Events										Unplanned Events						
	Physical presence of infrastructure	Infrastructure inspection and maintenance	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							✓	✓			✓						
Inspection and maintenance		✓	✓		✓									✓	✓		
Raw gas pipeline																	
Operations	✓	✓			✓									✓		✓	
Inspection and maintenance		✓	✓		✓							✓				✓	
Logistics																	

Activities	Planned Events										Unplanned Events						
	Physical presence of infrastructure	Infrastructure inspection and maintenance	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, following all applicable regulations, case law, guidelines, and Beach's policies and standards outlined in Section 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 consultation period for the purposes of this EP commenced on 14 July 2025 and concluded on 10 October 2025.

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 4.17. 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 8.3.4. Appendix 2 provides a full record of the correspondence between Beach and relevant persons. A 'Sensitive matters report' will be 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 3.15: **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. EP Section 4.14.1 shows actual measures adopted (if any) as a result of consultation on this EP. 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.
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	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.

OPGGS(E)R section	OPGGSR 2021 (Vic)	How requirements were met
activities to be carried out under the environment plan; (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, 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. Includes a schedule of advertising and public information sessions held.
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.
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:	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. EP Section 4.14 includes approach to assessment of the merits of objections or claims about the adverse impacts of

OPGGS(E)R section	OPGGSR 2021 (Vic)	How requirements were met
(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 (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;		each activity and Beach's response and reference to the report on consultation in Appendix B. The full text of any response by a relevant person was provided to the relevant regulator on submission of the EP as sensitive information.
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 4.17 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
NOPSEMA	GL2086 – Consultation in the course of preparing an environment plan – 20/5/2024 (NOPSEMA Consultation Guidelines)
	GL1721 – Environment Plan decision making (Section 12.3 of GL1721) – January 2024
	GN1344 – Environment plan content requirements – January 2024
	GN1785 – Petroleum activities and Australian Marine Parks – January 2024
	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 – July 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.

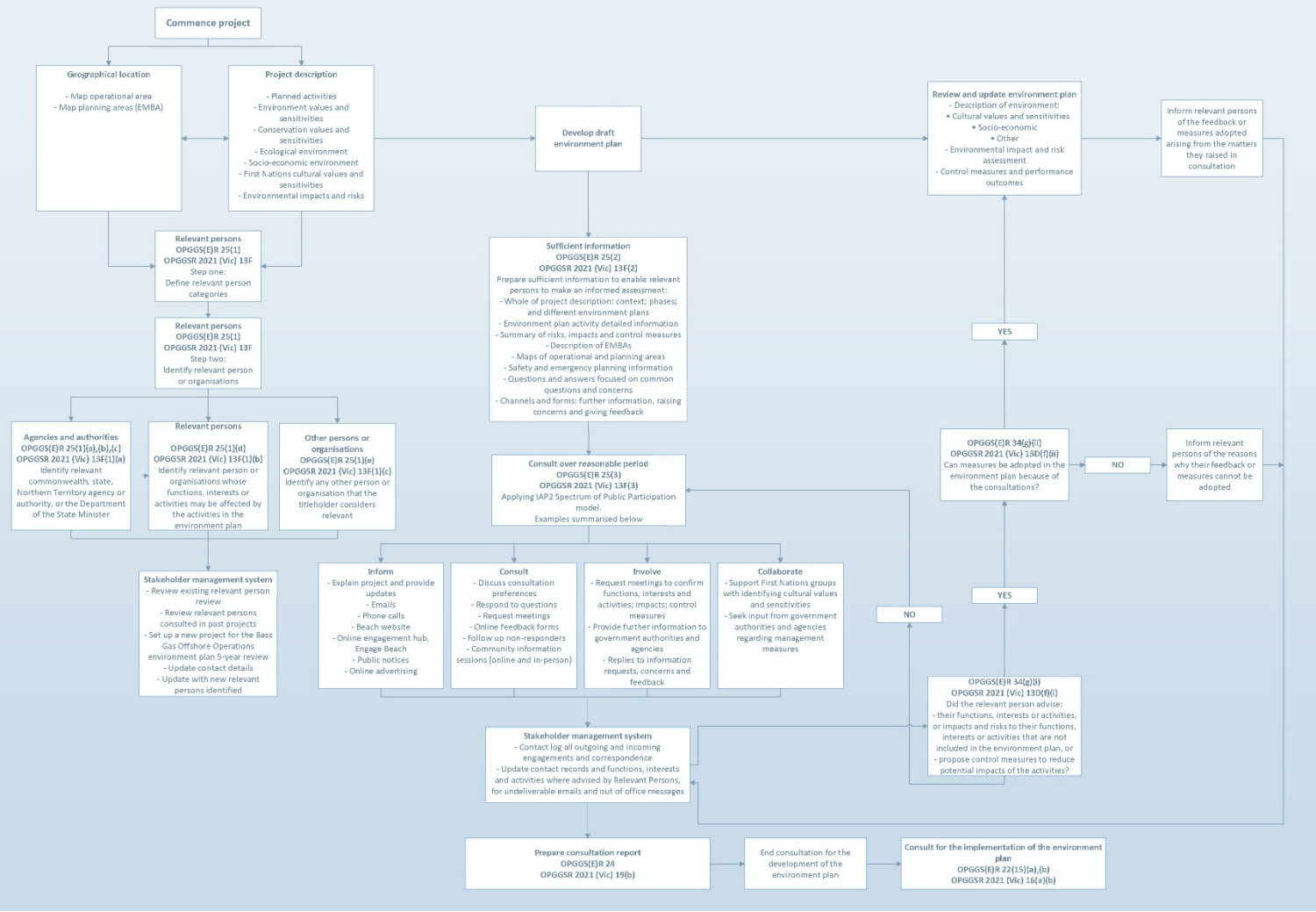


Figure 4-1: Relevant person methodology

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 4-4. 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 6-1 and Section 7 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 4-3 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: 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.
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.	<u>Low threshold</u> 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. <u>Moderate and high threshold</u> 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	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

Table 4-3: Geographic locations and relevant person focus

	effectively cleaned up as per the NOPSEMA Oil Spill Modelling Environment Bulletin (April 2019).	• 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 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.	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.

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 4-4.

Table 4-4: 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			✓	Relevant government departments First Nations groups Marine based industries Marine tourism Educational and research organisations Environmental conservation groups
National heritage places				Relevant government departments First Nations groups Marine based industries Marine tourism Educational and research organisations Environmental conservation groups
Commonwealth heritage places				
Maritime Archaeological Heritage • No wrecks have been recorded in the operational area				
Wetlands of international importance				Relevant government departments and agencies First Nations groups Land tourism Educational and research organisations Environment Conservation groups

Environmental values and sensitivities	Operational area	Planning area: Floating, dissolved, entrained	Planning area: Shoreline	Relevant person categories
Nationally important wetlands				Relevant government departments and agencies First Nations groups Land tourism Educational and research organisations Environment conservation groups
Marine protected areas: • Victorian – see Section 6.2.8			Depending on location	Relevant government departments and agencies First Nations groups Marine tourism Educational and research organisations Environment conservation groups
Terrestrial protected areas: • Victorian – see Section 6.2.9				Relevant government departments and agencies First Nations groups Land tourism Educational and research organisations Environment conservation groups
Key ecological features				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			Various assessments specific to ecological feature.	Relevant government departments and agencies Commercial fishing First Nations groups

Environmental values and sensitivities	Operational area	Planning area: Floating, dissolved, entrained	Planning area: Shoreline	Relevant person categories
sensitivities, along with impact and risk assessment (Chapter 7) from planned and unplanned activities. The ecological and physical environment includes: • Bethnic habitats and species assemblages • Carbonate sands and exposed limestone (habitat for various species) • Seagrass (coastline presence) • Algae (coastline presence) • Mangroves (coastline presence) • Plankton • Invertebrates • Fish • Birds • Marine reptiles • Cetaceans • Pinnipeds				Educational and research organisations Environmental conservation groups
Threatened ecological communities			Specific to location of ecological community.	Relevant government departments and agencies First Nations groups Educational and research organisations Environmental conservation groups
Socio-economic				

Environmental values and sensitivities	Operational area	Planning area: Floating, dissolved, entrained	Planning area: Shoreline	Relevant person categories
Victorian local government areas • Bass Coast • South Gippsland				Relevant government departments and agencies Community First Nations groups Land tourism Marine tourism Educational and research organisations Environment conservation groups
Offshore petroleum industry (non-Beach)				Marine based industries (offshore oil and gas)
Offshore renewable energy				Marine based industries (offshore renewables)
Other infrastructure Existing Planned				Marine based industries
Defence • Restricted airspace • Unexploded ordnance areas				Relevant government departments and agencies
Shipping				Relevant government departments and agencies Marine based industries
Tourism Recreation (beach, walking, fishing, snorkelling, diving, surfing close to coastline)	N/A			Relevant government departments and agencies Community First Nations groups Land tourism Marine tourism Recreational associations

Environmental values and sensitivities	Operational area	Planning area: Floating, dissolved, entrained	Planning area: Shoreline	Relevant person categories
Commercial fisheries: • Commonwealth • Victoria • Tasmania				Commercial fishing
Seaweed industry				Business First Nations groups
First Nations				
Sea Country Native Title Indigenous groups protected areas Indigenous groups land use agreements				First Nations groups
Impacts				
Light emissions: may attract light-sensitive species to MODU and vessels				Relevant government departments and agencies Commercial fishing First Nations groups Educational and research organisations Environmental conservation groups
Atmospheric emissions: decrease in air quality, greenhouse gas emissions				Relevant government departments and agencies Environmental conservation groups
Underwater sound: temporary, during vessel and MODU activities, up to 8 km				Relevant government departments and agencies Commercial fishing First Nations groups Educational and research organisations

Environmental values and sensitivities	Operational area	Planning area: Floating, dissolved, entrained	Planning area: Shoreline	Relevant person categories
				Environmental conservation groups
Physical presence: • Pre-laid anchors: 2 km caution zone for anchors • MODU on location: 500 m PSZ and 2 km caution zone for anchors • Permanent wells: 500 m PSZ				Relevant government departments and agencies Commercial fishing Marine based industries Marine tourism
Seabed disturbance: survey samples, wells, anchors, drill cuttings				Relevant government departments and agencies Commercial fishing First Nations groups Marine based industries Marine tourism Environmental conservation groups
Marine discharge MODU and vessels: putrescible waste, sewerage and grey water, cooling and brine water, bilge water and deck drainage. Marine discharge well completions, well intervention and P&A: drill cuttings and fluids, P&A fluids, BOP fluids, well completions fluids, XT control system discharges, cement, bulk dry discharges.				Relevant government Departments and agencies commercial fishing First Nations groups Environmental conservation groups
Risks				
Introduction and establishment of invasive marine species				Relevant government departments and agencies

Environmental values and sensitivities	Operational area	Planning area: Floating, dissolved, entrained	Planning area: Shoreline	Relevant person categories
				Commercial fishing First Nations groups Environmental conservation groups Educational and research organisations
Fauna interaction				Relevant government departments and agencies First Nations groups Environmental conservation groups Educational and research organisations
Loss of waste or materials				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 Educational and research organisations Environment conservation groups
Spill response activities				Relevant government departments and agencies Commercial fishing Land tourism Marine based industries

Environmental values and sensitivities	Operational area	Planning area: Floating, dissolved, entrained	Planning area: Shoreline	Relevant person categories
				Marine tourism Environmental conservation groups

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 A.

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 4-4, 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: Section 4.5.4.3
- Commercial fishing associations and commercial fishers: Section 4.5.4.4.

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. • 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.

Activity	Detail
	• 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. • 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 Table 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 Table 4-7). 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

4.5.4.4.1 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. 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 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.

4.5.4.4.2 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 4.5.4.4.1), 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 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.

4.5.4.4.3 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 4.7.2) 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 C.

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 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.	All in stakeholder management database assigned by Beach to Bass Gas Offshore Operations project as potentially relevant persons.	14 July 2025
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.	Link to previously approved EP. Recipient included in previous EP EMBA (reduced EMBA does not include recipient).	All in stakeholder management database assigned by Beach to Bass Gas Offshore Operations project as potentially relevant persons for the previous EP	14 July 2025

Information type	Purpose	Key content	Relevant person focus	Date
	Commence review of relevant persons. Invite consultation. Provide an opt in or out of consultation for those no longer in the EMBA.	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 NOPSEMA's *Consultation on offshore petroleum environment plans brochure*. Link to Engage Beach. Invite consultation. Information sessions and webinar details.	but that are no longer within the EMBA of this EP.	
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,	Key focus is for relevant persons whose functions, interests or activities may be affected by the activity in the EP.	14 July 2025

Information type	Purpose	Key content	Relevant person focus	Date
		including sensitive information. Link to Engage Beach NOPSEMA's *Consultation on offshore petroleum environment plans* brochure. Contact details		
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. Button link to NOPSEMA's *Consultation on offshore petroleum environment plans* brochure.	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
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	Provide overview of Beach.	Overview of the EP. Advise consultation dates. EMBA information.	Unknown potentially relevant persons in regional locations adjacent operational area.	21 July to 3 August 2025

Information type	Purpose	Key content	Relevant person focus	Date
sessions and webinars)	Provide overview of the project. Advise consultation and invite consultation, to unknown potentially relevant persons. Advise community information sessions and webinar series.	Project maps. Information sessions and webinar details. QR code for more information.	First Nations persons. Unknown relevant persons more broadly.	*(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 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)*

Information type	Purpose	Key content	Relevant person focus	Date
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 project as potentially relevant persons.	25 August 2025
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

Information type	Purpose	Key content	Relevant person focus	Date
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
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

Locations	Date	Media
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

Location	Date	Attendees	**Concerns, objections** and/or feedback
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. 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

Location	Date	Attendees	**Concerns, objections** and/or feedback
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".[1]

The court went on to say the obligation to consult must be capable of practicable and reasonable discharge by the titleholder .[2] This has been repeated in NOPSEMA's consultation guidelines for Section 25 10. [3]

[1] Santos NA Barossa Pty Ltd v Tipakalippa [2022] FCAFC 193 at [136]
[2] Santos NA Barossa Pty Ltd v Tipakalippa [2022] FCAFC 193 at [89].
[3] See, for example, page 5 of the NOPSEMA guideline 'Consultation in the course of preparing an environment plan' (2024).

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 [4].
- 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. [5]
- Minimum public comment periods required under other legislation include:

[4] 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.
[5] For example, see the Mineral Resources Act 1989 (Qld), section 435 (Reprint No. 5A) and also the version current as at 1 July 2016

- 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.
- 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. [6]

- "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". [7]
- "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".[8]
- "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".[9]

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.

[6] Page 8, Interim Engaging with First Nations People and Communities on Assessments and Approvals under the Environment Protection and Biodiversity Conservation Act 1999 (Cth).
[7] 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
[8] 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).
[9] 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).

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.

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 B, 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 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.	Follow up non-responses to verify contact details, receipt of Beach emails, if they wish to be consulted. Request meetings with First Nations 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.	Support First Nations groups if requested, to identify cultural values and sensitivities.

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 4.5.4.4.2). 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.

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 2.

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 8.3.4), and the relevant person will be advised of the process.

4.14.1 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	Beach has a list of previous relevant persons for the previous EP that was used as the basis for this EP's relevant	Circular Head Aboriginal Corporation included on the relevant persons list for this EP.

Relevant objection or claim raised	Beach's assessment of merit for activities	Measures adopted
Nations group in activity information sheet.	person list. Additional relevant persons, including Circular Head Aboriginal Corporation have been identified with a review of functions, interests and activities within the area.	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; - 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.	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 - 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;	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	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).

Relevant objection or claim raised	Beach's assessment of merit for activities	Measures adopted
- Formal roles for Aboriginal organisations in the emergency response process.	not reach either Tasmanian coastal waters or the coastline.	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 2) 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.

5 Existing Environment

In accordance with OPGGS(E) Regulation 13(2) and the OPGGS Regulation 15(2), the physical, biological and socio-economic 'environment that may be affected' (EMBA) by the activity is described in this section, together with the details of the relevant values and sensitivities of that environment. The EMBA has been informed by the broader emergency planning area from a hydrocarbon spill and is the greatest extent to which the environment may be impacted by the activities of the EP. Using the Protected Matters Search Tool (PMST), there is a variety of marine fauna, that may occur within the EMBA.

The existing environment that may be affected by the activity is defined as the area where a change to ambient environmental conditions has the potential to occur as a result of planned activities or unplanned events. It is noted that a change does not always imply that an adverse impact will occur; for example, a change may be required over a particular exposure value or over a consistent period of time for an adverse impact to occur.

Table 5.1 and Figure 5.1 detail the areas associated with the activity used to describe the environment that may be affected. While each hazard associated with the development has its own unique EMBA (for example light and sound EMBAs) , the largest one (the 'hydrocarbon spill EMBA') has been utilised to define the environment that may be affected for the identification of all possible values and sensitivities, utilising the most conservative approach. The EMBA has been established through hydrocarbon spill modelling (see Sections 7.15, 7.16 and 7.17 for spill scenarios and modelling results) and has been referred to as the 'EMBA' throughout the description of environment.

Table 5.1: Description of the areas used to define the existing environment

Zones	Description
Operational Area	The Operational Area is where all infrastructure and associated activity will be undertaken as detailed in Section **Error! Reference source not found.**.
Planning Area (referred to as EMBA in this EP)	The Planning Area is within Commonwealth and Victorian waters (Figure 5.1) The Planning Area is based on a combination of modelled scenarios for a marine diesel oil (MDO) spill and a loss of containment of gas condensate from either the platform or pipeline (hydrocarbon spill EMBA). The EP includes a detailed description of the environment in the broader emergency planning area, also known as the EMBA. The PMST Report for the Planning Area (EMBA) is in **Error! Reference source not found.**5.

Where appropriate, descriptions of the Bass Strait environment (beyond the Planning Area) are provided for context.

The hydrocarbon spill EMBA ('EMBA' for simplicity) (Figure 5.1) is therefore 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), loss of14,500 bbl of gas condensate from a subsea pipeline rupture (over 36 minutes) and the release of 300 m^3 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 (see Sections 7.15, 7.16 and 7.17 for spill scenarios and modelling results). The EMBA is generated from stochastic modelling and therefore does not represent the possible outcome from a single spill scenario. The EMBA represents the compilation of possible outcomes and encompasses the area predicted to be potentially affected based on 100 simulations for each spill scenario under annualised weather conditions. Because of this, the EMBA is large, covering areas that may not be affected by any single spill event. Since the EMBA is generated with predictive tools, including numerical models and research findings that may not have been verified under field conditions (e.g., toxicity testing to derive effects thresholds), it carries a degree of uncertainty. The EMBAs presented in this chapter illustrate low-level exposure for all four scenarios combined for:

- Floating oil exposure
- Shoreline oil accumulation
- Dissolved hydrocarbons; and
- Shoreline hydrocarbons.

Where appropriate, descriptions of the Bass Strait environment (beyond the EMBA) are provided for context.

The 'environment' is defined in both sets of regulations as:

- Ecosystems and their constituent parts, including people and communities
- Natural and physical resources
- The qualities and characteristics of locations, places and areas
- The heritage value of places; and
- The social, economic and cultural features of these matters.

The operational area (a 500-m radius around the platform and either side of the raw gas pipeline) is described where this information exists.

The key sources of information used in developing this chapter include the:

- EPBC Act Protected Matters Search Tool (PMST) database (Department Climate Change, Environment, Energy & Water (DCCEEW), 2025a), conducted on 4th July 2025 (**Appendix 5**).

- Flora and Fauna Guarantee (FFG) Act Threatened List (Department of Energy, Environment & Climate Action (DEECA) 2025)
- Atlas of Living Australia (ALA).
- Victorian Biodiversity Atlas (VBA) (DEECA, 2025), conducted on 29 July 2025. (**Appendix 6**)

The relevant values and sensitivities considered in this chapter are inclusive of but not limited to the matters listed under Part 3 of the EPBC Act and threatened species listed on the FFG Act. The listed species considered are based on classifications from July 2025 for the EPBC Act and September 2025 for the FFG Act. It should be noted that listings are subject to regular changes in classifications in the future.

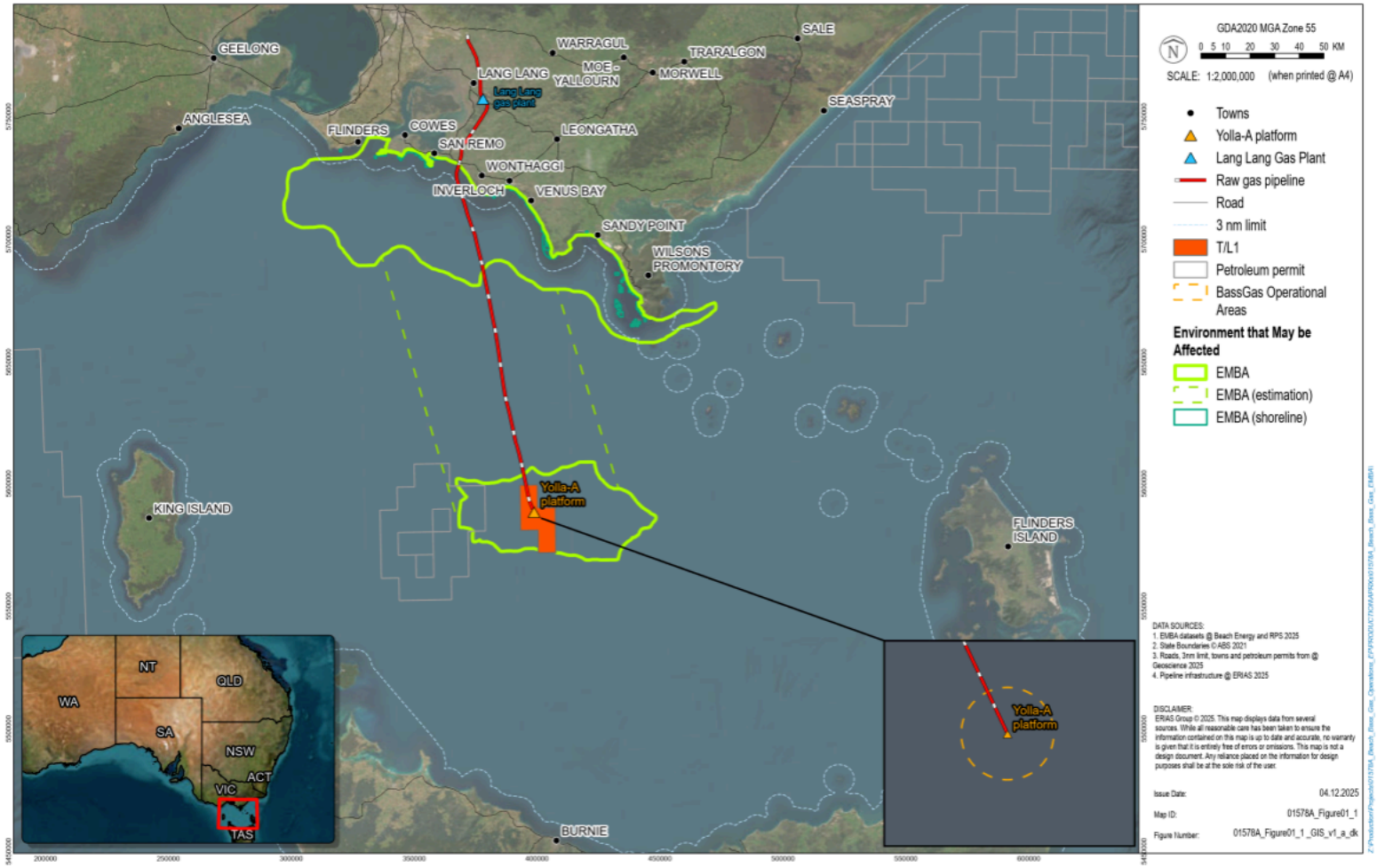


Figure 5.1: The BassGas EMBA and Operational areas within Bass Strait

Table 5.2 summarises the presence or absence of receptors and sensitivities within the operational area and EMBA.

Table 5.2: Presence of receptors 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			

Receptor	EMBA		Operational area* (commonwealth waters)
	Victoria (state waters)	Commonwealth	
Shorebirds			
Marine pests			
Cultural heritage values			
Shipwrecks			
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

5.3 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 (

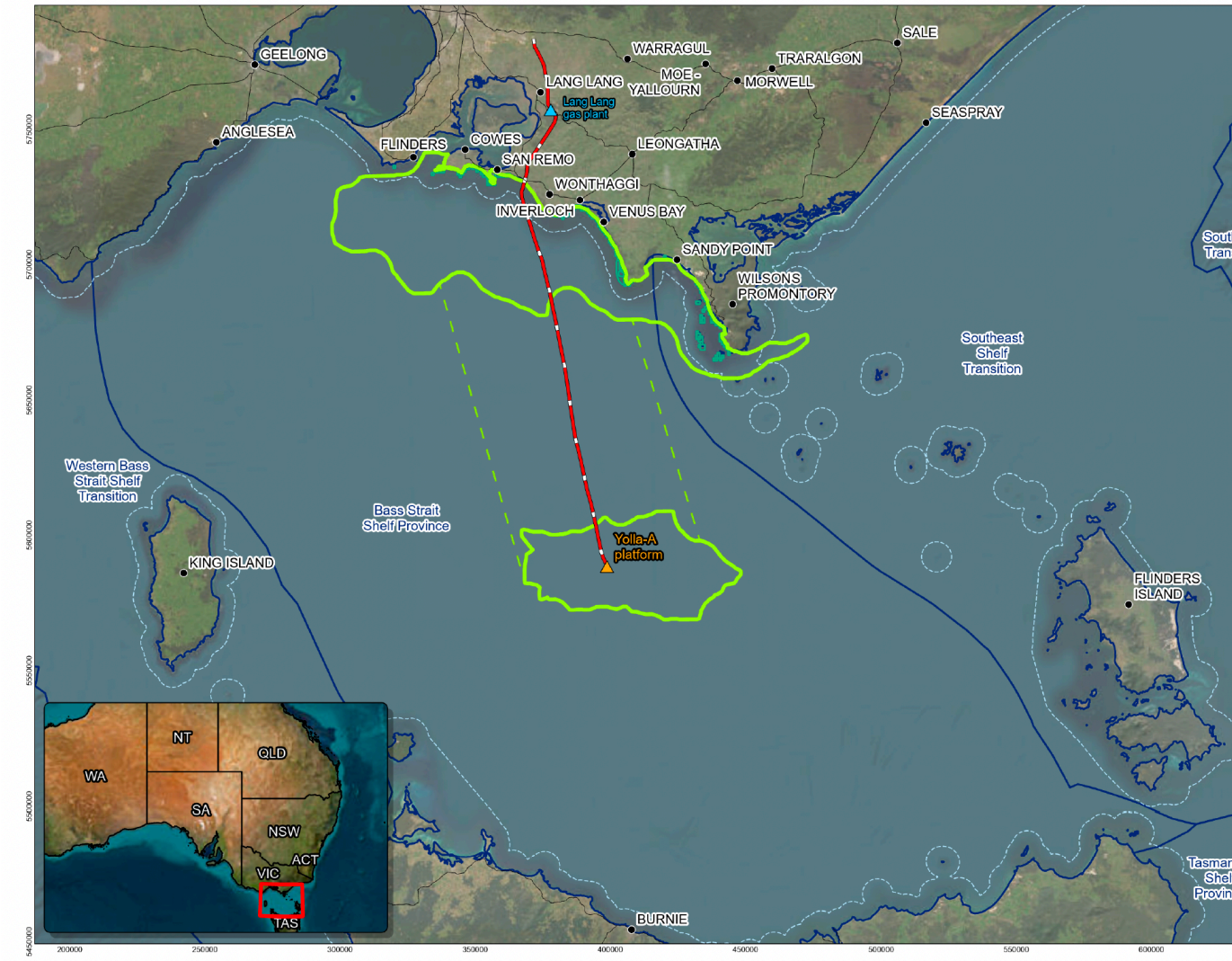


Figure 5.2) (DEH, 2006). At the mesoscale level, the development is located in the Central Bass Strait (CBS) bioregion, which is approximately 60,000 km^2 in size with water depths between 50 m at the margins and 80 m at the centre and is on the continental shelf (DEH, 2006). The central area of the CBS is predominantly mud substrate (DEH, 2006).

The following IMCRA mesoscale zones are intersected by the EMBA:

- Central Bass Strait.
- Flinders.
- Central Victoria.

- Victorian Embayments.



Figure 5.2: IMCRA provincial bioregions

5.4 Physical Environment

5.4.1 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.

5.4.2 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).

5.4.3 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.

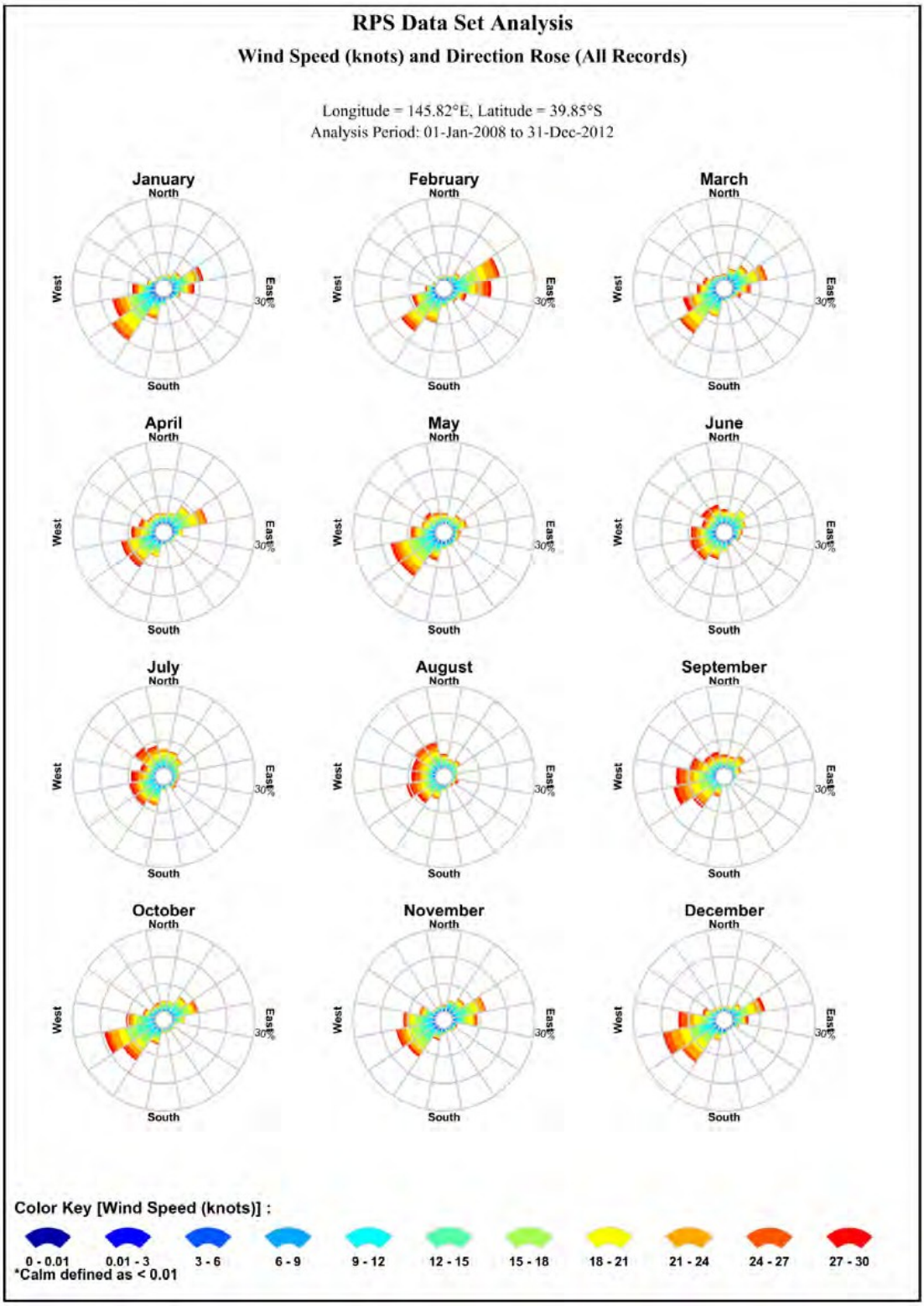
Figure 5.3 illustrates the monthly wind rose distributions from 2008 to 2012 (inclusive), with Figure 5.4 illustrating the modelled total wind distributions from 2008-2012 (inclusive), which clearly indicates that winds from the southwest dominate this region.

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

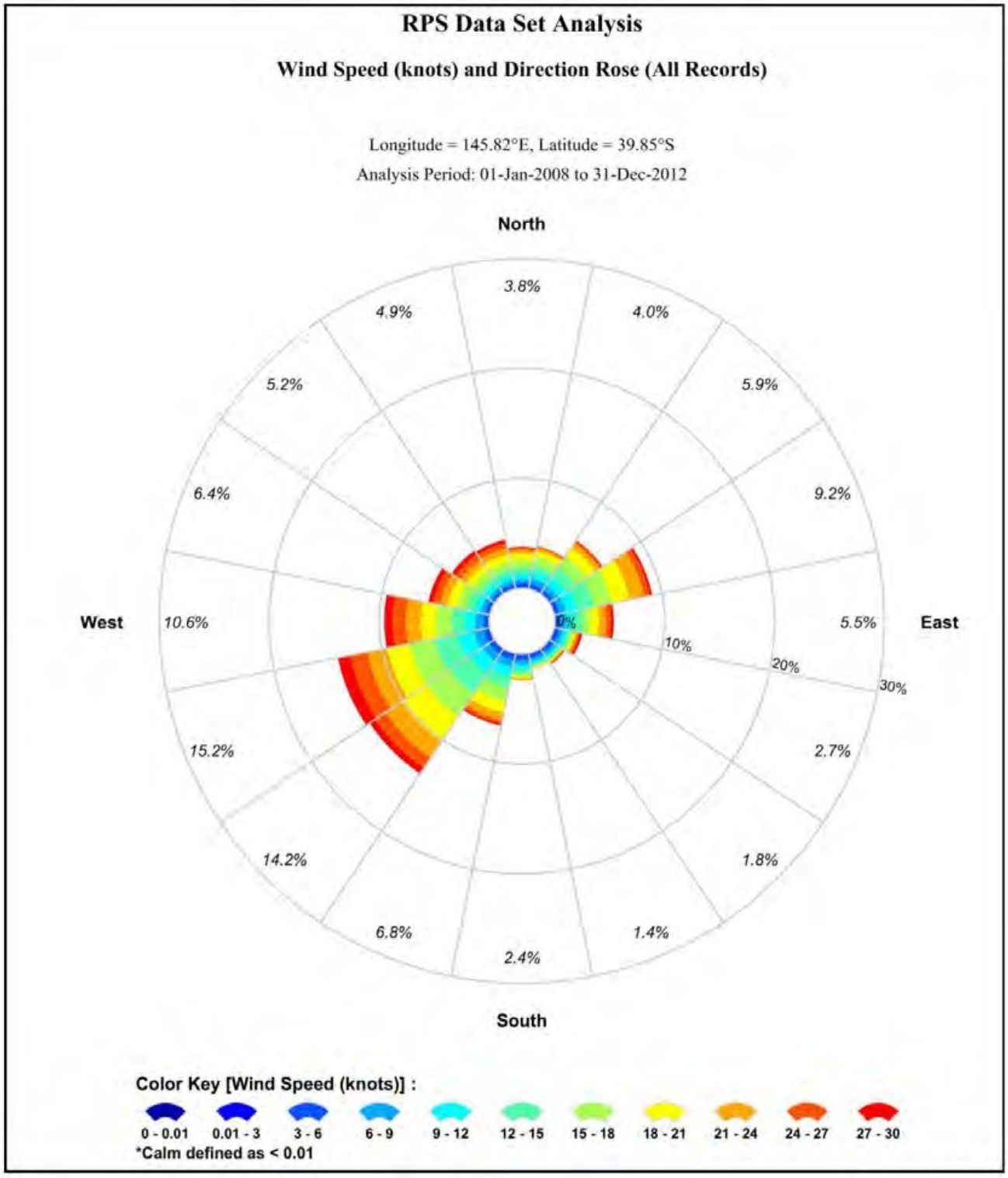
Month	Average wind speed (knots)	Maximum wind speed (knots)	General direction (from)
November	15.0	42.2	West-southwest
December	16.7	40.3	West-southwest
Minimum	**15.0**	**36.9**	-
Maximum	**19.3**	**48.8**	-

Source: RPS (2020).



Source: RPS (2020). The convention for defining wind direction is the direction the wind blows from

Figure 5.3: 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 5.4: Modelled annual wind rose distributions from 2008-2012 (inclusive) for the representative wind station closest to Yolla-A

5.4.4 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).

5.4.5 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.
Oceanography

5.4.6 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:

7. 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.

8. 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.

9. 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 5.5 illustrates the major ocean currents in south-eastern Australian waters during summer and winter. Figure 5.6 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 5.7 shows the total surface current rose distributions for the same time period. This data indicates that surface currents flow predominantly eastwards.

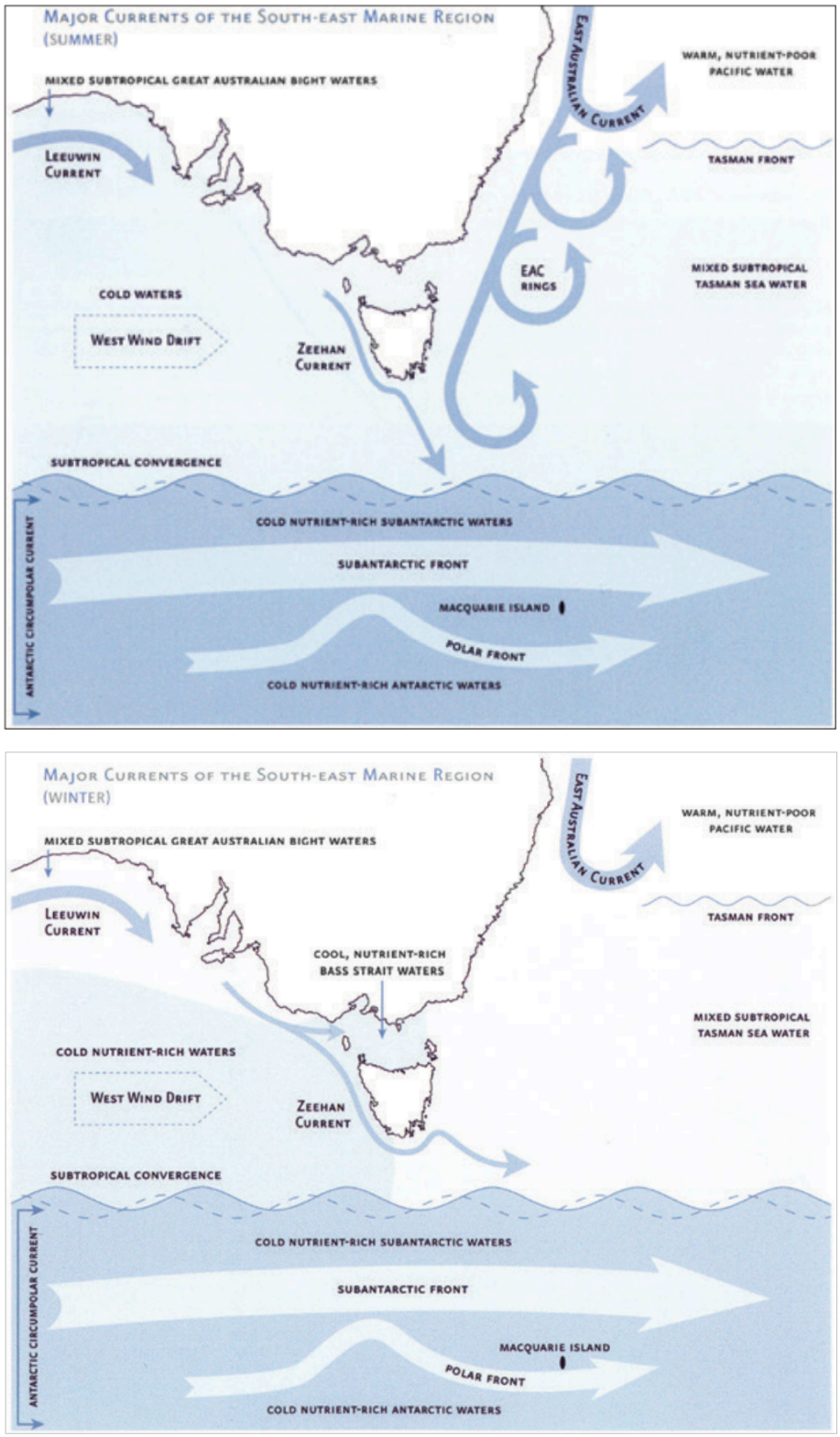
Semi-diurnal astronomical tides provide the major water level variations in the region with four current reversals each day and a relatively small tidal range of about 1.3 m. The tidal range at the Yolla platform location is estimated to be about 2.3 m at spring tides and 1.7 m at neap tides and the 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

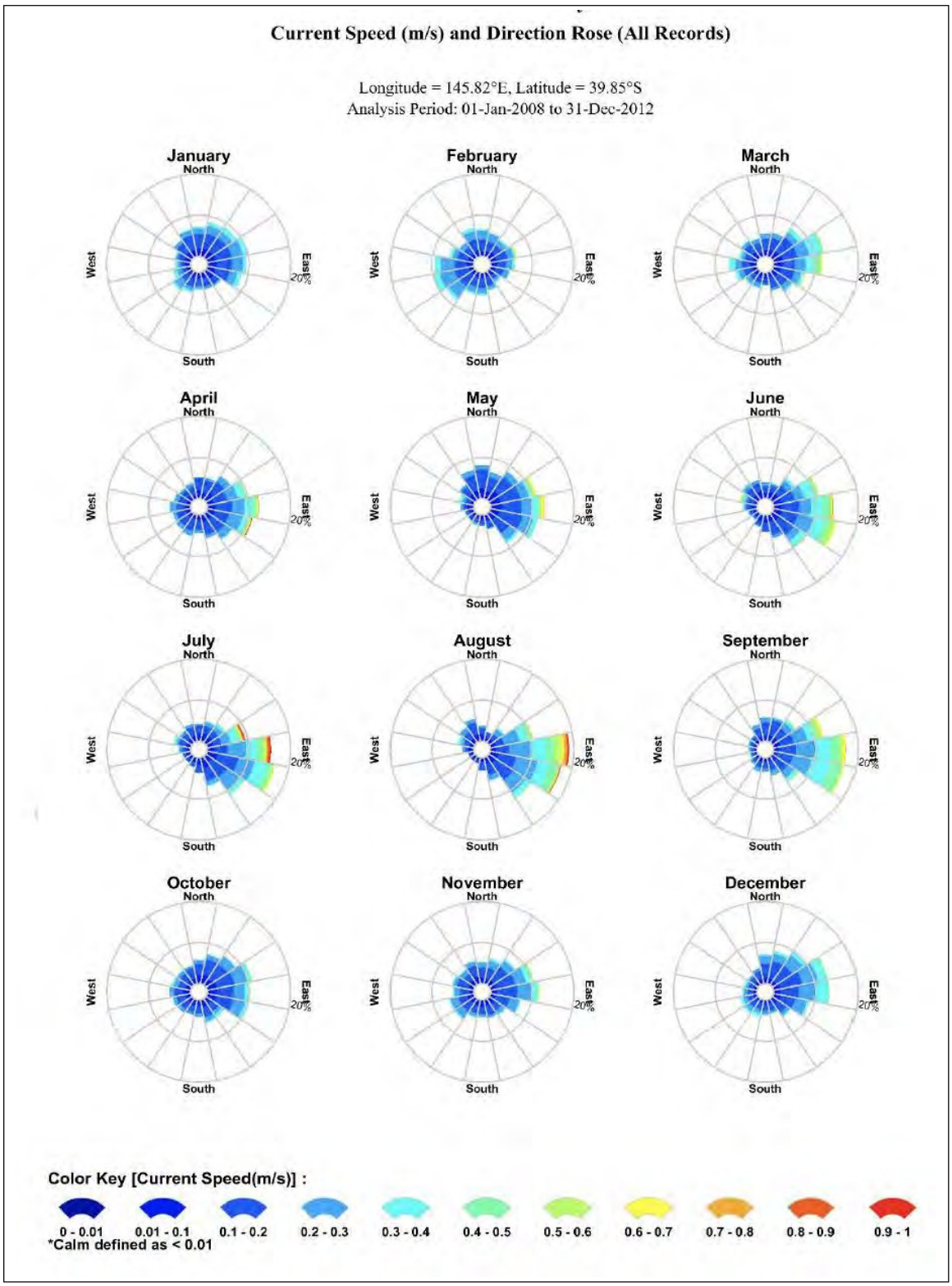
Minimum	0.16	0.48	-
Maximum	0.22	1.02	

Source: RPS (2020).



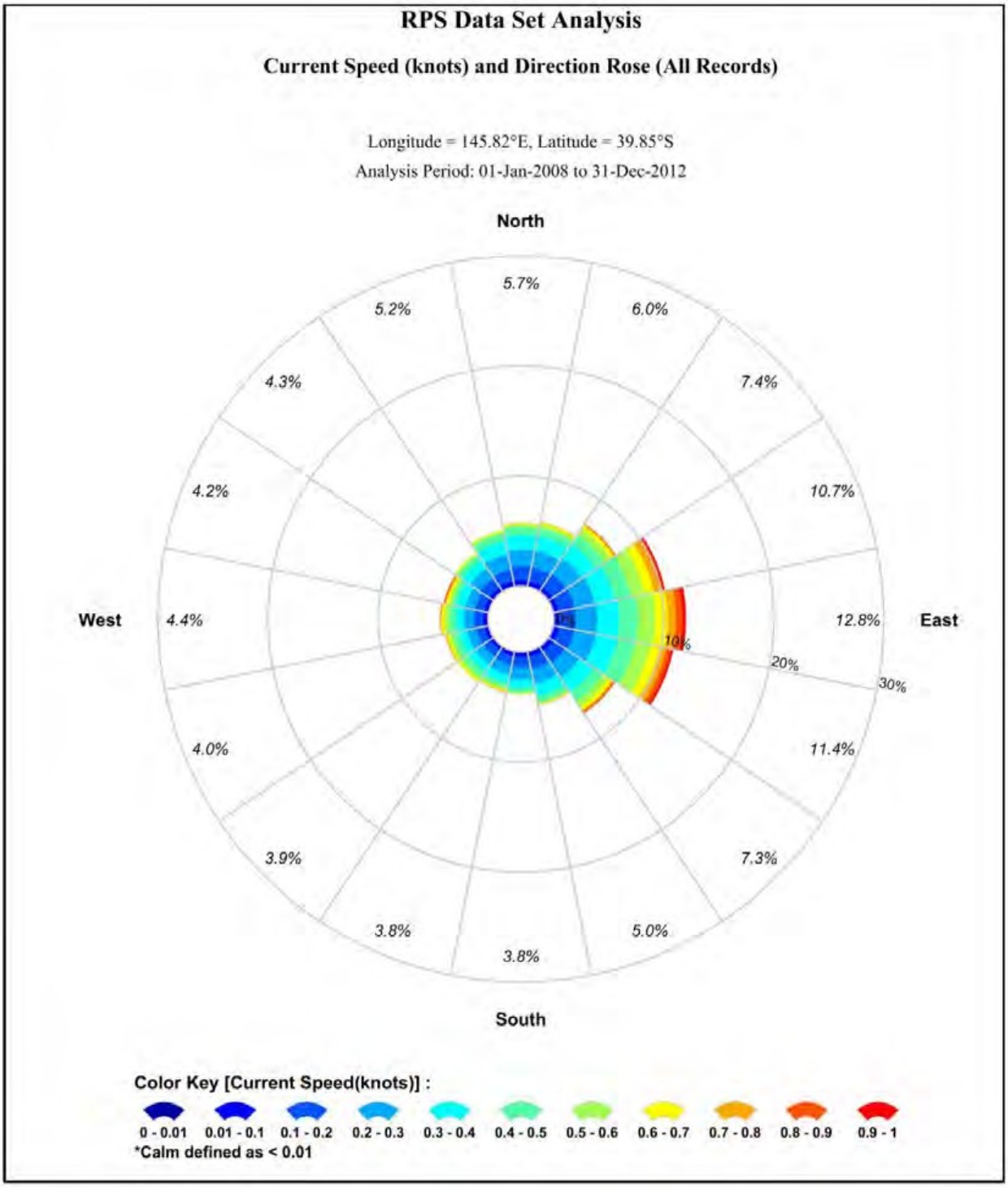
Source: DoE (2015a).

Figure 5.5: 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 5.6: 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 5.7: Annual surface water current plots from 2008-2012 (inclusive) near Yolla-A

5.4.7 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.

5.4.8 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).

5.4.9 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).

5.4.10 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).

5.4.11 Seabed

5.4.11.1Bass Strait

The bathymetry of Bass Strait shown in

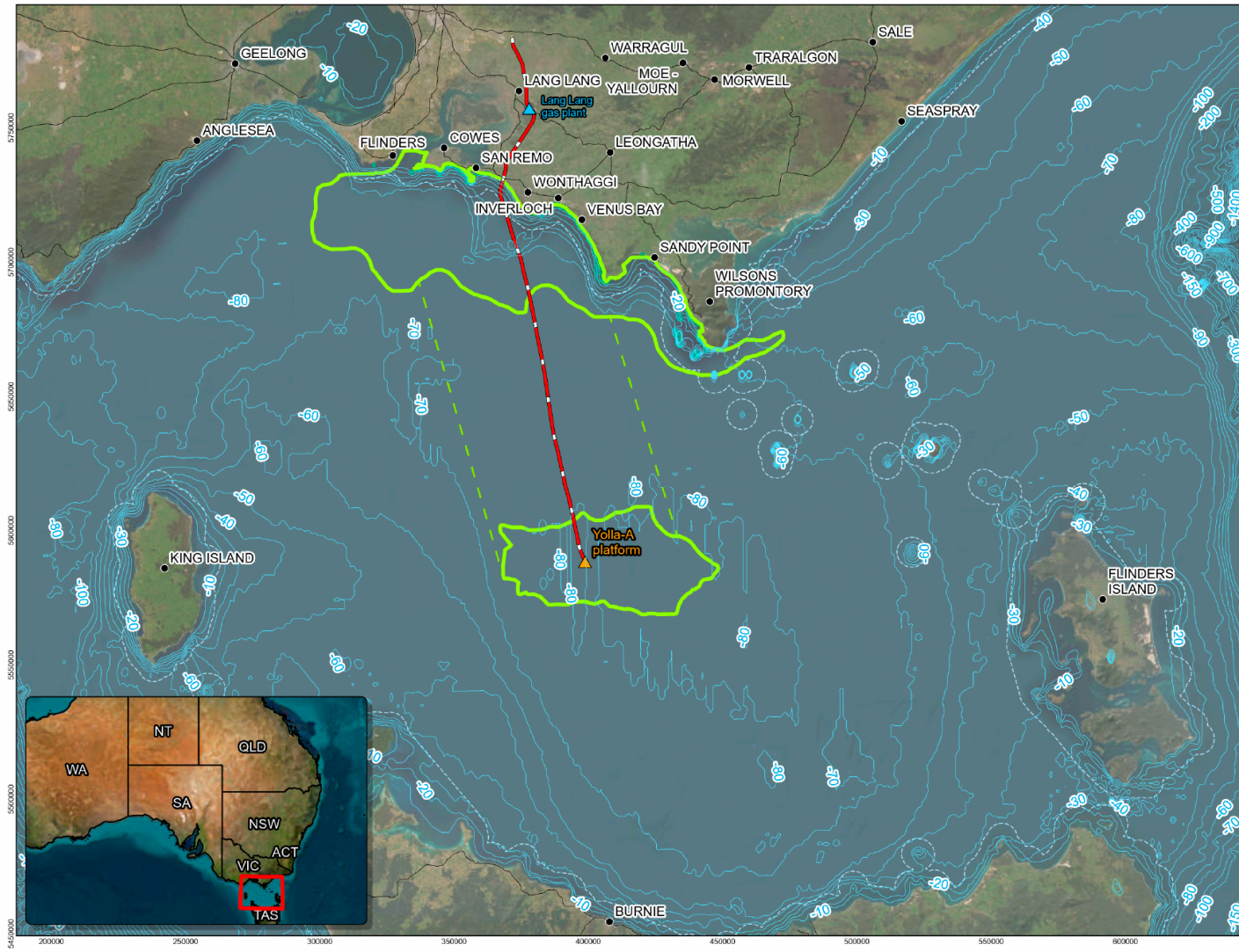


Figure 5.8 illustrates that the seafloor is gently sloping with water depths increasing gradually from the shore to reach a maximum of about 80 m at the Yolla-A platform.

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.

1. 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.

2. 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). Nevertheless, a rich abundance of faunal communities may be present among the sands including species of molluscs, bivalves, annelids, crustaceans, and echinoderms.

3. 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).

5.4.11.2Yolla 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

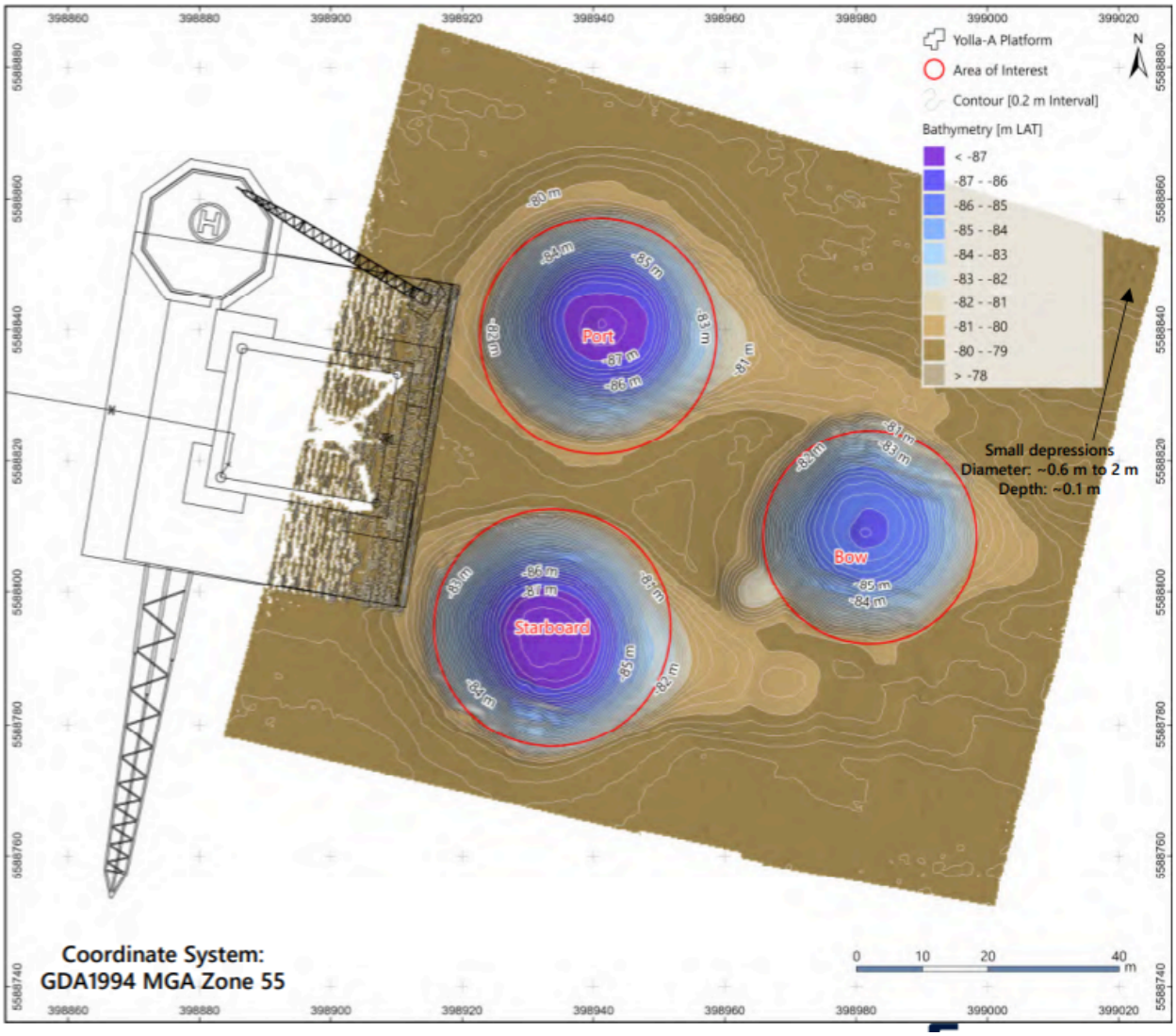


Figure 5.9, and the approximate dimensions are 5 m below mean seabed level and approximately 36 m in diameter. The shape and depth is preserved in a clay seabed base and the total spud can volume has not substantially changed over the course of surveys conducted between 2007 and 2024 (Fugro, 2007; Neptune, 2014; 2015, Beach, 2024).

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.

5.4.11.3 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

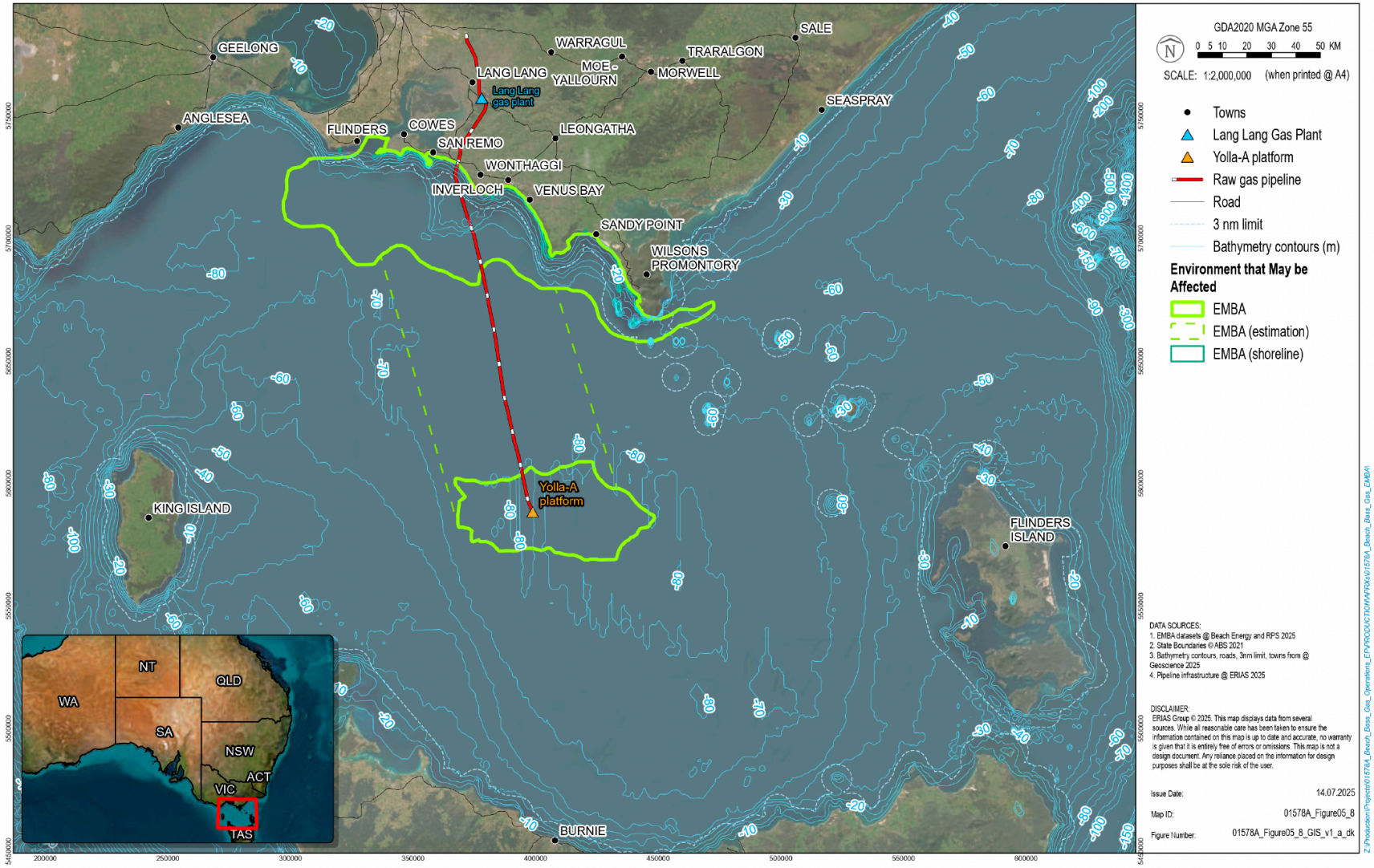


Figure 5.8: Bathymetry of Bass Strait and the EMBA

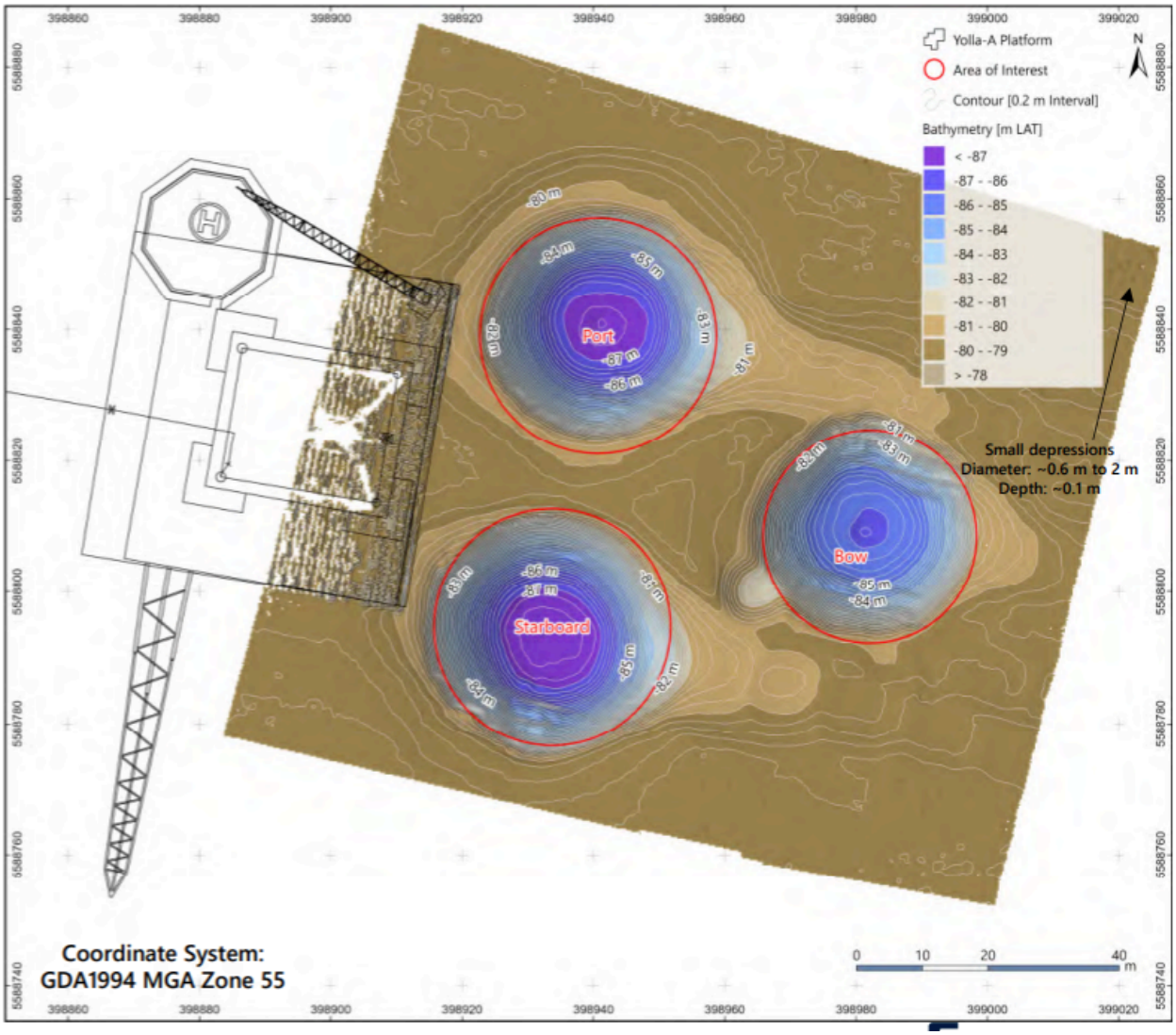


Figure 5.9: Yolla-A Platform Spudcan Depressions (Furgo, 2024)

5.4.11.4EMBA

This section describes the seabed in the areas intersected by the EMBA moving from the western parts of the EMBA to the eastern areas.

- The seabed at the western entrance to Western Port Bay is predominantly reef before transitioning to subtidal sandy sediments and seagrass communities further into the bay.

- Phillip Island – the southern nearshore seabed of Phillip Island is consists of subtidal rocky reef with intermittent patches of sandy substrate. On the western coast, sandy sediments are dominant with patches of subtidal reef. The northern and eastern coast nearshore seabed is dominated by sandy substrate, intertidal mud-sand flats and seagrass communities. Some marine areas on the northeast

coast of Phillip Island are under special management areas or designated MNP. The EMBA also intersects the Bass River delta, which is under a special management arrangement and comprises intertidal mud-sand flat, sandy sediments and seagrass communities.

- Kilcunda – immediately south of Venus Bay, the seabed continues to be dominated by sandy substrates. West of Anderson Inlet, there are extensive areas of subtidal rocky reef (up to 1 km wide in some areas) and other areas of reef and reef/sediment. A 2-km wide section of the seabed occurs within the Bunurong MNP. The seabed becomes sandier closer to San Remo.

- Cape Liptrap – the EMBA intersects Waratah Bay (which comprises mostly sandy seabed and some reef offshore Walkerville), and the western part of Cape Liptrap. The seabed in this area is a combination of sandy sediment, reef sediment and subtidal rocky reef, with sandy sediment being most dominant in the more northern parts of the shoreline.

- Wilsons Promontory West and East – Wilsons Promontory Marine National Park is intersected by the EMBA and are dominated by sandy sediments, with important natural values such as shallow subtidal reefs, intertidal rocky shores, sandy beaches, seagrass, and subtidal soft substrates (Young et al., 2023).

5.4.12 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 5.5.4), Australian fur-seals and New Zealand fur-seals (see Section 5.5.6). 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 (see Plate 5.1). 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.

- 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).



- Sandy beach at Venus Bay (view north), with the Cape Liptrap Coastal Park in the foreground

Plate 5.1: Shorelines of the Kilcunda section of the EMBA

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 5.4.2
	National Heritage-listed places	No places listed. Section 5.4.3
	Ramsar Wetlands	Section 5.4.4
	Threatened ecological communities, threatened and migratory species	Throughout Sections 5.4.6 – 5.4.7 and Section 5.5
	Commonwealth marine areas	No places listed. Section 5.4.1
	Great Barrier Reef Marine Park	Not applicable
Other matters protected by the EPBC Act	Commonwealth heritage-listed places	No places listed. Section 5.4.5
	Listed Marine Species	Section 5.5
	Whales and Other Cetaceans	Section 5.5.5
	Australian Marine Parks	Section 5.4.1
Victorian protected areas and FFG species	MNPs, marine parks and sanctuaries	Section 5.4.9
	Coastal (onshore) conservation reserves	Section 5.4.9
	FFG threatened species	Throughout Section 5.5

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 14 AMPs in the South-east Commonwealth Marine Reserves Network – none of these are intersected by the operational area or EMBA.

The BassGas development does not overlap any AMPs. Figure 5.10 illustrates the locations of the AMPs.

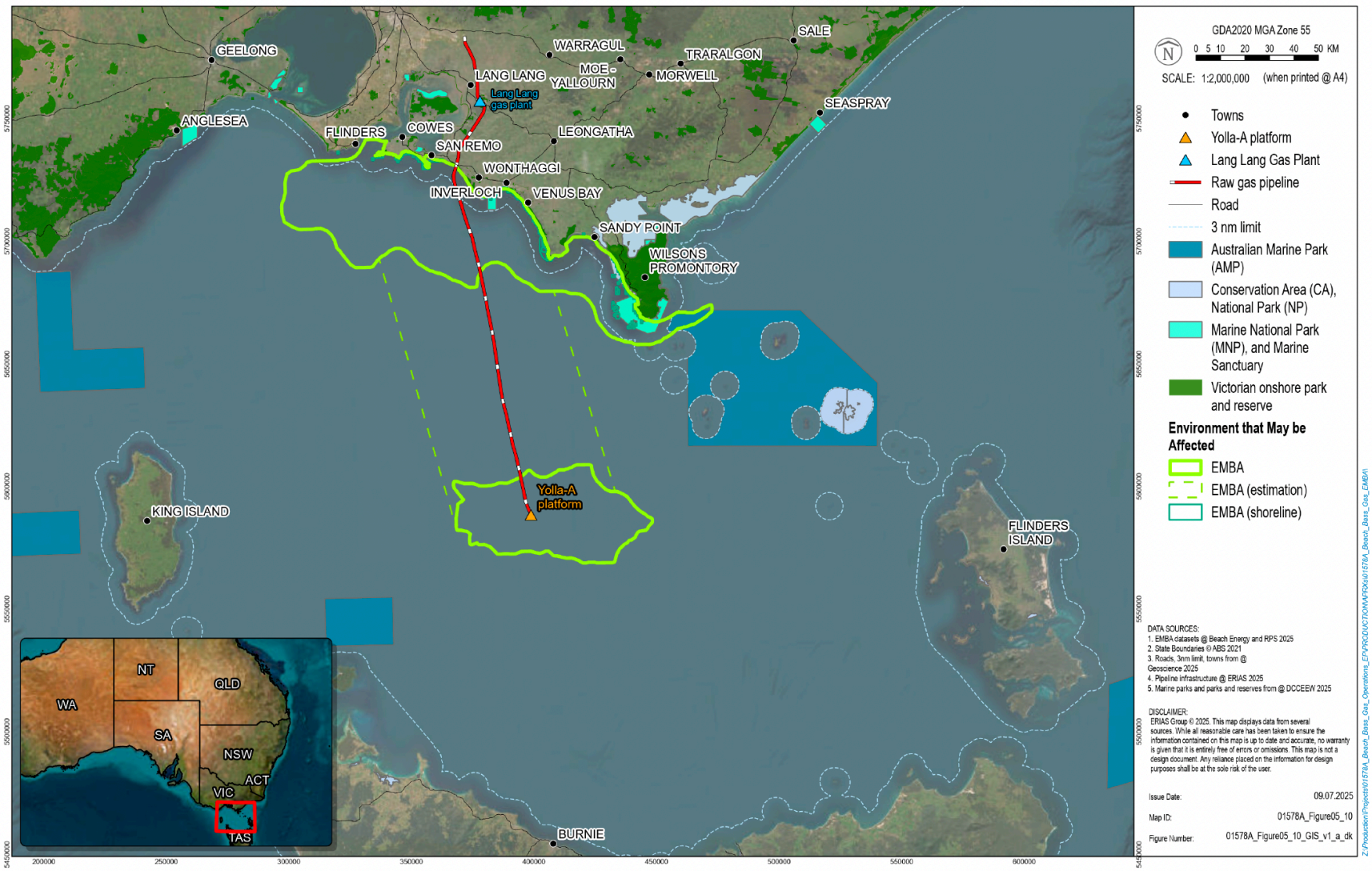


Figure 5.10: Protected Areas in the EMBA

5.5.2 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.

5.5.3 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, 2025e), of which Australia has 120 National Heritage places. These places are protected under Chapter 5, Part 15 of the EPBC Act. No National Heritage listed places occur within the operational area or intersected by the EMBA.

5.5.4 Wetlands of International Importance

Australia has 67 wetlands of international importance ('Ramsar wetlands') that cover more than 8.3 million hectares (as of July 2025) (DCCEEW, 2022). Ramsar wetlands are those that are representative, rare 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.

The 'Western Port Ramsar Site' is intersected by EMBA which is described further in Section 5.4.4.1.

5.5.4.1 Western Port

Western Port is located approximately 60 km south-east of Melbourne, Victoria and in 1982 a large portion was specified of international importance especially as waterfowl habitat. The area consists of large shallow intertidal areas divided by deeper channels with adjacent narrow strips of coastal land (DELWP, 2017).

Western Port Bay is valued for its terrestrial and marine flora and fauna, cultural heritage, recreational opportunities and scientific value. The area has substantial intertidal areas supported by mangroves, saltmarsh, seagrass communities and unvegetated mudflats, which are significant as shorebird habitat. Additionally, the saltmarsh and mangroves filter pollutants, trap and process nutrients, stabilise sediments and protect the shoreline from erosion (DELWP, 2017). The intertidal mudflats provide a significant food source for migratory waders, making it one of the most significant areas in south-east Australia for these birds. The interaction between critical processes and components provide habitat for many waterbirds. The mangrove and saltmarsh vegetation are of regional, national and international significance because of the role in stabilising the coastal system, nutrient cycling in the bay and providing wildlife habitat (Ross, 2000). There are three marine parks within the Ramsar site (Yaringa, French Island and Churchill Island MNPs). There are numerous community and government projects that help monitor, protect, raise awareness and educate the community about the Ramsar site wetland (Brown and Root, 2010).

Western Port is protected under the Western Port Ramsar Site Management Plan (DELWP, 2017), which describes the values as:

- Supports a diversity and abundance of fish and recreational fishing.

- The soft sediment and reef habitats support a diversity and abundance of marine invertebrates.
- Supports bird species, including 115 waterbird species, of which 12 are migratory waders of international significance.
- Provides important breeding habitat for waterbirds, including listed threatened species.
- Provides habitat to six species of bird and one fish species that are listed as threatened under the EPBC Act.
- Rocky reefs comprise a small area within the Ramsar site, but includes the intertidal and subtidal reefs at San Remo, which support a high diversity, threatened community and Crawfish Rock, which supports 600 species (Shapiro, 1975).
- The Western Port Ramsar Site has three MNPs, one National Park and has been designated as a Biosphere.
- Reserve under the UNESCO's Man and the Biosphere program.
- The Ramsar site is within the traditional lands of the Boonwurrung, who maintain strong connections to the land and waters.
- The site contains the commercial Port of Hastings that services around 100 - 150 ships per year and contributes significantly to the region's economy with $16.2 million in revenue in 2022-2023.

5.5.5 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 and the lighthouses themselves are not considered part of the EMBA. The nearest place is the Wilsons Promontory Lighthouse (95 km northeast of Yolla-A), which occurs on a prominent rocky headland.

5.5.6 Threatened Ecological Communities

Threatened Ecological Communities (TECs) provide wildlife corridors and/or habitat refuges for many plant and animal species, and listing a TEC provides a form of landscape or systems-level conservation (including threatened species). The PMST Report identifies the following marine TECs as potentially occurring in the EMBA:

- Giant Kelp Marine Forests of South East Australia.
- Assemblages of species associated with open-coast salt-wedge estuaries of western and central Victoria.
- Subtropical and Temperate Coastal Saltmarsh.

Only TECs that are associated with the marine environment are described here as the remaining TECs are terrestrial and will not be within EMBA. There are no TECs in the operational area. TECs mapped in relation to the EMBA are presented in Figure 5.11.

5.5.6.1 Giant Kelp Marine Forests of South East Australia

The Giant Kelp Marine Forests of South East Australia TEC is listed as endangered under the EPBC Act and is mapped as occurring within small coastal parts of the EMBA including the southern coastline of Phillip Island. TECs are protected as MNES under Part 13, Section 181 of the EPBC Act.

According to the Approved Conservation Advice for Giant Kelp Marine Forests of South East Australia (DSEWPC, 2012a), giant kelp (*Macrocystis pyrifera*) is a large brown algae that grows on rocky reefs from the sea floor at typically 8 m below sea level and deeper. Its fronds grow vertically toward the water surface, in cold temperate waters off southeast Australia. It is the foundation species of this TEC in shallow coastal marine ecological communities. The kelp species itself is not protected, rather, it is communities of closed or semi-closed giant kelp canopy at or below the sea surface that are protected (DSEWPC, 2012a).

Giant kelp is the largest and fastest growing marine algae. Its presence on a rocky reef adds vertical structure to the marine environment that creates significant habitat for marine fauna, increasing local marine biodiversity. Species known to shelter within the kelp forests include weedy sea dragons (*Phyllopteryx taeniolatus*), six-spined leather jacket (*Mesuchenia freycineti*), brittle star (*Ophiuroid* spp), urchins, sponges, blacklip abalone (*Tosia* spp) and southern rock lobster (*Jasus edwardsii*).

The large biomass and productivity of the giant kelp also provide a range of ecosystem services to the coastal environment. Giant kelp is a cold-water species and as sea surface temperatures have risen on the east coast of Australia over the last 40 years, due in part from the poleward movement of the East Australian Current, it has been progressively lost from its historical range (DSEWPC, 2012a; Bennett et al., 2016). Warming waters are also associated with the range extension of tropical species southwards. For example, the sea urchin (*Centrostephanus rodgersii*) is of particular concern to giant kelp populations with increasing populations around southern Australia causing overgrazing and creation of urchin barrens (Bennett et al., 2016).

Giant kelp grows at depths up to approximately 28 m below sea level in Australia (Layton et al., 2020). They are photoautotrophic organisms that depend on photosynthetic capacity to supply the necessary organic materials and energy for growth. The largest extent of the ecological community is in Tasmanian coastal waters (outside of the EMBA).

5.5.6.2 Assemblages of species associated with open-coast salt-wedge estuaries of western and central Victoria ecological community

The assemblages of species associated with open-coast salt-wedge estuaries of western and central Victoria TEC is listed as endangered under the EPBC Act. According to the Approved Conservation Advice, this TEC is the assemblage of native plants, animals and micro-organisms associated with the dynamic salt-wedge estuary systems that occur within the temperate climate, microtidal regime (< 2 m), high wave energy coastline of western and central Victoria (TSSC, 2018). The ecological community currently encompasses 25 estuaries in the region defined by the border between South Australia and Victoria and the most southerly point of Wilsons Promontory (TSSC, 2018).

Salt-wedge estuaries are usually highly stratified, with saline bottom waters forming a 'salt-wedge' below the inflowing freshwater layer of riverine waters. The dynamic nature of salt-wedge estuaries has important implications for their inherent physical and chemical parameters, and ultimately for their biological structure and ecological functioning. Some assemblages of biota are dependent on the dynamics of these salt-wedge estuaries for their existence, refuge, increased productivity and reproductive success. The ecological community is characterised by a core component of obligate estuarine taxa, with associated components of coastal, estuarine, brackish and freshwater taxa that may reside in the estuary for periods of time and/or utilise the estuary for specific purposes (e.g., reproduction, feeding, refuge, migration) (TSSC, 2018).

5.5.6.3 Subtropical and temperate coastal saltmarsh

The Subtropical and Temperate Coastal Saltmarsh TEC is listed as vulnerable under the EPBC Act. According to the Conservation Advice, this TEC occurs in a relatively narrow strip along the Australian coast, within the boundary along 23°37′ latitude along the east coast and south from Shark Bay on the west coast of Western Australia (TSSC, 2013). The community is found in coastal areas which have an intermittent or regular tidal influence.

The coastal saltmarsh community consists mainly of salt-tolerant vegetation including grasses, herbs, sedges, rushes and shrubs. Succulent herbs, shrubs and grasses generally dominate and vegetation is generally less than 0.5 m in height (Adam, 1990). In Australia, the vascular saltmarsh flora may include many species, but is dominated by relatively few families, with a high level of endism at the species level.

The saltmarsh community is inhabited by a wide range of infaunal and epifaunal invertebrates and low and high tide visitors such as fish, birds and prawns (Adam, 1990). It is often an important nursery habitat for fish and prawn species. Insects are also abundant and an important food source for other fauna. The dominant marine residents are benthic invertebrates, including molluscs and crabs (Ross et al., 2009).

The coastal saltmarsh community provides extensive ecosystem services such as the filtering of surface water, coastal productivity and the provision of food and nutrients for a wide range of adjacent marine and estuarine communities and stabilising the coastline and providing a buffer from waves and storms. Most importantly, the saltmarshes are one of the most efficient ecosystems globally in sequestering carbon, due to the biogeochemical conditions in the tidal wetlands being conducive to long-term carbon retention. A concern with the loss of saltmarsh habitat is that it could release the huge pool of stored carbon to the atmosphere (TSSC, 2013).

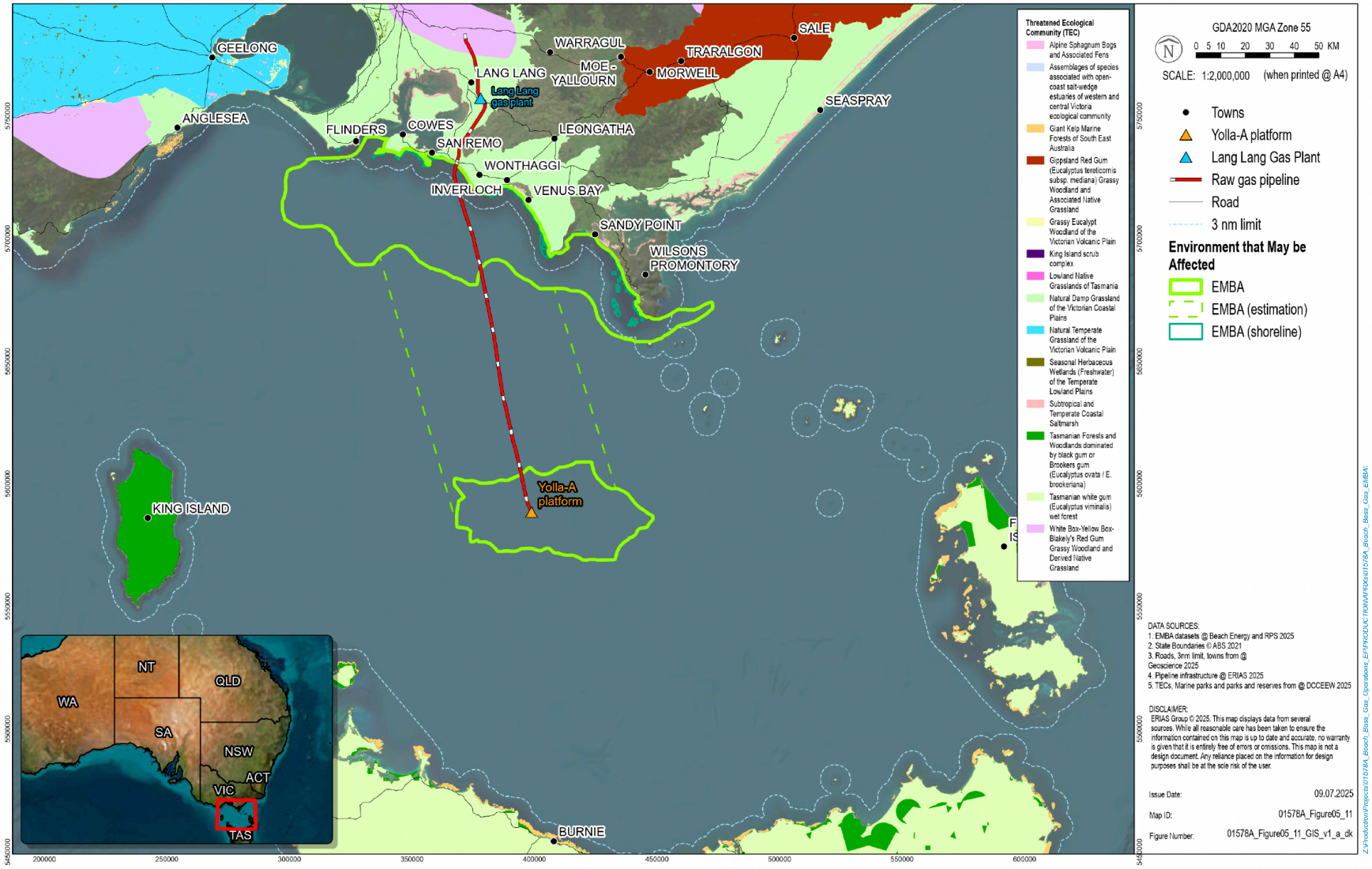


Figure 5.11: TECs in Victoria

5.5.7 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.

The operational area or the EMBA does not intersect any KEFs.

5.5.8 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 (

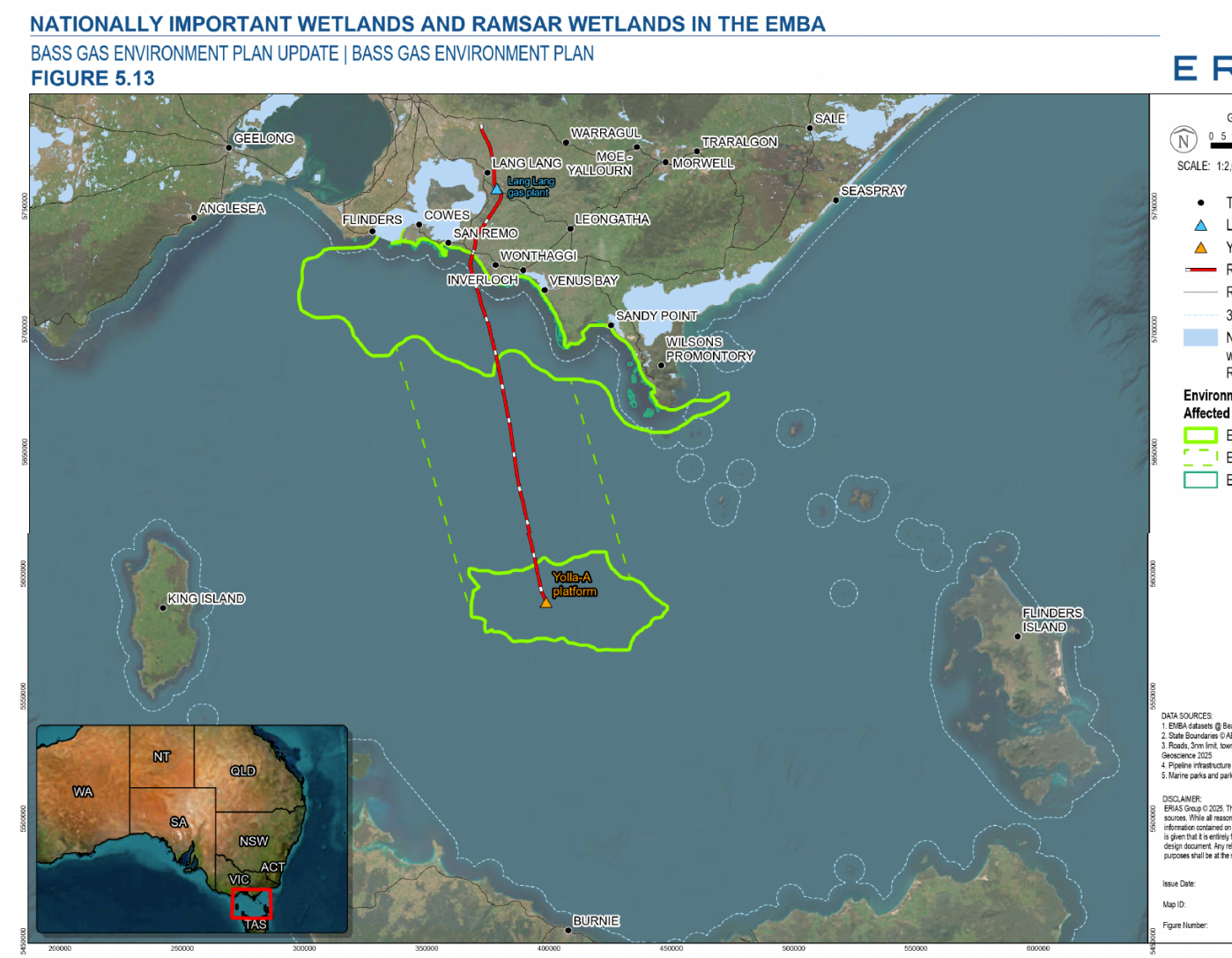


Figure 5.12). Many of these NIW would only be intersected by the EMBA if they are open to the sea at the time of a spill. The NIWs intersected by the EMBA are described below based on DAFF (2020f):

- 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 endangered orange-bellied parrot by supporting saltmarsh vegetation.

- Western Port (VIC083) – Western Port is also a wetland of international significance and is described in Section 5.4.4. 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.

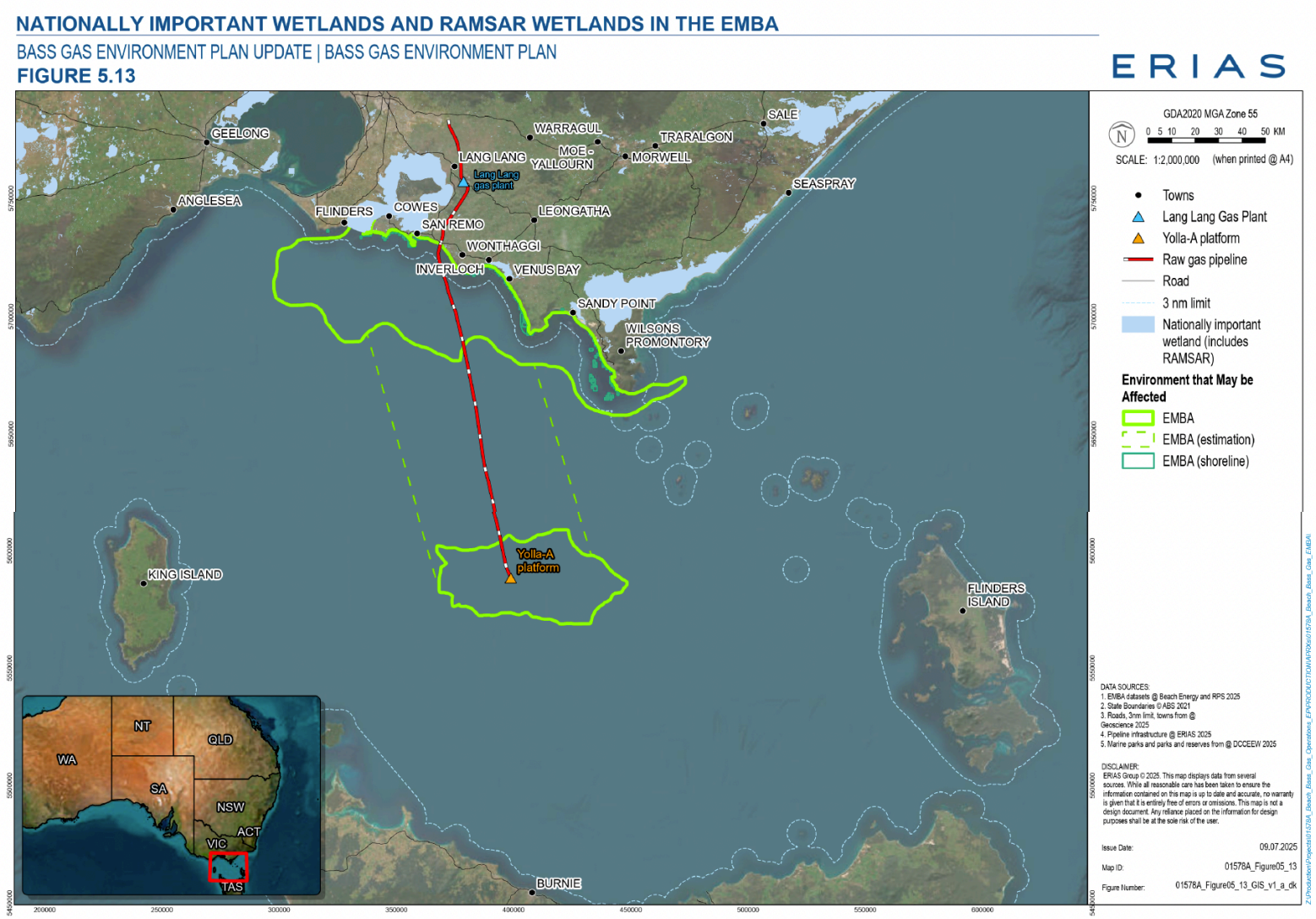


Figure 5.12: Nationally important wetlands and Ramsar wetlands in the EMBA

5.5.9 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, moving west to east along the EMBA.

5.5.10 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).

The operational area does not intersect any Tasmanian marine protected areas. The EMBA overlaps with one onshore protected area, Rodondo Island Nature Reserve shown in **Error! Reference source not found.**.

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 (where the EMBA intersects shorelines)		
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).

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 (@ July 2025)	Conservation dependent
	Vulnerable
	Endangered
	Critically endangered
FFG Act status (@ September 2025)	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 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

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*) (described in Section 5.4.4) 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 Marine Birds

The EPBC PMST identifies 64 bird species that utilise the marine environment as threatened or migratory whose habitat or migratory path may occur within the EMBA (listed in Table 5.10). These primarily comprise 14 albatross, eight petrels, three parrots, three shearwaters, two godwits, four terns, one swift, two curlew, one prion, four snipes, three gulls, seven plovers, two tattlers and seven sandpipers.

Four bird species are listed as critically endangered, nine are endangered and 29 are listed as vulnerable. The light-mantled sooty albatross was not listed in the EPBC PMST, however, is a marine species and is listed as critically endangered by the FFG and therefore has been included in Table 5.10.

Many of the bird species listed in Table 5.10 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). Species listed as threatened are described in this section.

DCCEEW published the National Recovery Plan for Albatrosses and Petrels in 2022 which covers 27 listed species of albatross and petrels that breed in or forage around Australian waters. The plan stipulates actions to protect breeding habitats and its commitments to international agreements. Additionally, the Wildlife Conservation Plan for Seabirds (CoA, 2020a) and the National Recovery Plan for the Orange Bellied Parrot in 2016 (DELWP, 2016) and most recently updated in October 2021.

Table 5.10: 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	Known	-	Critically endangered
Numenius madagascariensis	Eastern curlew	Yes	Known	-	
Lathamus discolor	Swift parrot	-	Known	-	
Neophema chrysogaster	Orange-bellied parrot	-	Known	-	
EPBC Act-listed endangered species					
Thalassarche cauta	Shy albatross	Yes	Likely	Foraging (likely to occur)	Endangered
Limosa limosa	Black-tailed godwit	Yes	Known	-	Critically endangered
Rostratula australis	Australian painted snipe		Likely	-	
Thalassarche chrysostoma	Grey-headed albatross	Yes	May	-	Endangered
Macronectes giganteus	Southern giant petrel	Yes	Likely	-	
Tringa nebularia	Common greenshank	Yes	Known	-	
Charadrius mongolus	Lesser sand plover	Yes	Known	-	
Diomedea sanfordi	Northern royal albatross	Yes	Likely	-	-
Pterodroma leucoptera leucoptera	Gould's petrel	-	May	-	-
EPBC Act-listed vulnerable species					
Diomedea exulans (sensu lato)	Wandering albatross	Yes	Likely	Foraging (known to occur)	Critically endangered
Thalassarche carteri	Indian yellow-nosed albatross	Yes	Likely	Foraging (known to occur)	Endangered

Scientific name	Common name	Listed migratory species	Presence in EMBA	BIA within the EMBA	FFG Act status
Thalassarche bulleri	Buller's albatross	Yes	May	Foraging (known to occur)	
Thalassarche impavida	Campbell albatross	Yes	Likely	Foraging (known to occur)	-
Thalassarche melanophris	Black-browed albatross	Yes	Likely	Foraging (known to occur)	-
Phoebetria fusca	Sooty albatross	Yes	Likely	-	
Diomedea epomophora (sensu stricto)	Southern royal albatross	Yes	Likely	-	
Sterna (Sternula) albifrons	Little tern	Yes	May	-	Critically endangered
Sternula nereis nereis	Australian fairy tern	-	Known	-	
Calidris tenuirostris	Great knot	Yes	Known	-	
Xenus cinereus	Terek sandpiper	Yes	Known	-	
Macronectes halli	Northern giant petrel	Yes	Likely	-	
Arenaria interpres	Ruddy turnstone	Yes	Known		Endangered
Calidris canutus	Red knot	Yes	Known	-	
Pluvialis squatarola	Grey plover	Yes	Known	-	
Thinornis cucullatus cucullatus	Eastern hooded plover	-	Known	-	
Charadrius leschenaultii	Greater sand plover	Yes	Likely	-	Vulnerable
Hirundapus caudacutus	White-throated needletail	Yes	Known	-	
Diomedea antipodensis	Antipodean albatross	Yes	Likely	-	
Diomedea antipodensis gibsoni	Gibson's albatross	Yes	Likely	-	-
Thalassarche salvini	Salvin's albatross	Yes	Likely	-	
Thalassarche steadi	White- capped albatross	Yes	Known	-	

Scientific name	Common name	Listed migratory species	Presence in EMBA	BIA within the EMBA	FFG Act status
Pterodroma mollis	Soft-plumaged petrel	-	May	-	
Fregetta grallaria grallaria	White-bellied storm-Petrel	-	Likely	-	
Halobaena caerulea	Blue petrel	-	May	-	
Gallinago hardwickii	Latham's snipe	Yes	Known	-	
Neophema chrysostoma	Blue-winged parrot	-	Known	-	
Calidris acuminata	Sharp-tailed sandpiper	Yes	Known	-	-
Ardenna grisea	Sooty shearwater	Yes	May	-	
EPBC Act-listed not threatened species					
Ardenna tenuirostris	Short-tailed shearwater	Yes	Known	Breeding and foraging (known to occur)	
Eudyptula minor	Little penguin	-	Known	Breeding and foraging (known to occur)	-
Pelagodroma marina	White-faced storm-petrel	-	Known	Foraging (known to occur)	Endangered
Pelecanoides urinatrix	Common diving petrel	-	Known	Foraging (known to occur)	-
Tringa brevipes	Grey-tailed tattler	-	Known	-	Critically endangered
Tringa glareola	Wood sandpiper	Yes	Known	-	
Tringa stagnatilis	Marsh sandpiper	Yes	Known	-	
Numenius phaeopus	Whimbrel	Yes	Known	-	
Phalacrocorax fuscescens	Black-faced cormorant	Yes	Known	-	Endangered
Haliaeetus leucogaster	White-bellied sea-eagle	-	Known	-	
Actitis hypoleucos	Common sandpiper	Yes	Known	-	Vulnerable

Scientific name	Common name	Listed migratory species	Presence in EMBA	BIA within the EMBA	FFG Act status
Limosa lapponica baueri	Bar-tailed godwit	Yes	Known	-	
Pluvialis fulva	Pacific golden plover	Yes	Known	-	
Larus dominicanus	Kelp gull	-	Known	-	-
Larus pacificus	Pacific gull	-	Known	-	-
Pachyptila turtur subantarctica	Fairy prion (southern)	-	Known	-	
Pandion haliaetus	Osprey	Yes	Known	-	
Calidris melanotos	Pectoral sandpiper	Yes	Known	-	
Limicola falcinellus	Broad-billed sandpiper	Yes	Known	-	
Recurvirostra novaehollandiae	Red-necked avocet	-	Known	-	
Calidris ruficollis	Red-necked stint	Yes	Known	-	-
Myiagra cyanoleuca	Satin flycatcher	-	Known	-	
Charadrius ruficapillus	Red-capped plover	-	Known	-	
Charadrius bicinctus	Double- banded plover	-	Known	-	
Himantopus Himantopus	Pied stilt	-	Known	-	
Chroicocephalus novaehollandiae	Silver gull	-	Known	-	
Thalasseus bergii	Crested tern	Yes	Known	-	
Tringa incana	Wandering tattler	Yes	Known	-	
Calidris alba	Sanderling	Yes	Known	-	
Rhipidura rufifrons	Rufous fantail	-	Known	-	
Apus pacificus	Fork-tailed swift	Yes	Likely	-	
Ardenna carneipes	Flesh-footed shearwater	Yes	Likely	-	
Gallinago stenura	Pin-tailed snipe	Yes	Likely	-	

Scientific name	Common name	Listed migratory species	Presence in EMBA	BIA within the EMBA	FFG Act status
Gallinago megala	Swinhoes snipe	Yes	Likely	-	
Numenius minutus	Little curlew	Yes	Likely	-	
Sterna striata	White-fronted tern	-	Likely	-	
Monarcha melanopsis	Black-faced monarch	-	May	-	
Bubulcus ibis	Cattle egret	-	May	-	
Stercorarius antarcticus	Brown skua	Yes	May	-	
Motacilla flava	Yellow wagtail	Yes	May	-	
Merops ornatus	Rainbow bee-eater	-	May	-	-
FFG Act-listed species					
Phoebetria palpebrata	Light-mantled sooty albatross	-	-	-	Critically endangered

5.6.4.1 True seabirds

Albatross and Petrels

Albatross and petrels account for 22 of the EPBC Act-listed seabird species and are considered the most dispersive and oceanic of all birds, spending more than 95% of their time foraging the Southern Ocean in search of prey and usually only returning to land to breed (DSEWPC, 2011a).

Albatrosses prefer small, remote islands in the Southern Ocean for breeding (DSEWPC, 2011a). Albatross Island is the closest breeding habitat to Yolla-A platform (approximately 110 km to the southwest) and is not within the EMBA. The petrel species listed in Table 5.10 are widely distributed throughout the southern hemisphere. They nest on isolated islands and breed on sub-Antarctic and Antarctic islands. The northern giant-petrel and southern giant-petrel share the same breeding areas listed for the albatross (DSEWPC, 2011a). Outside the breeding season (October to February), petrels disperse widely and move north into sub-tropical waters (DSEWPC, 2011a). Most petrel species feed on krill, squid, fish, other small seabirds and carrion of marine mammals (DSEWPC, 2011a).

Seabirds spend much of their lives at sea in search of prey (crustaceans and fish) only to return to land for a short time to breed and raise chicks. The Victorian and Tasmanian coastlines and the islands in Bass Strait provide feeding and nesting areas for coastal and migratory bird species (DSEWPC, 2011a). Consequently, there is a large variety of seabirds that utilise Bass Strait.

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 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.

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). 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 proximity of breeding locations among the Furneaux Group (Flinders Island, etc).

5.6.4.2 True Shorebirds

Plovers

The seven EPBC Act-listed plovers that may occur within the opertional area (double-banded (*Charadrius bicinctus*), greater sand (*Charadrius leschenaultii*), lesser sand (*Charadrius mongolus*), red-capped (*Charadrius ruficapillus*), Pacific golden (*Pluvialis fulva*), grey (*Pluvialis squatarola*) and hooded plover (*Thinornis rubricollis*)) are medium- to large-sized migratory wading birds that have wide- ranging coastal habitats comprising estuaries, bays, mangroves, damp grasslands, sandy beaches, sand dunes, mudflats and lagoons (Flegg, 2002), with roosting also taking place on sand bars and spits.

Plovers feed on a range of molluscs, worms, crustaceans and insects. Plovers (with the exception of the hooded and red-capped plovers) breed in Asia and the Arctic region and are present in Australia throughout the year, depending on the species. The hooded plover and red-capped plover breed in Australia, building their nests in sandy oceanic beaches. The location of these nests presents the greatest threat to this species' population, as nests, eggs and chicks are vulnerable to predation and trampling (DCCEEW, 2014a; BirdLife Australia, 2019). The sandy beaches of the Ninety Mile Beach are recognised habitat for the hooded plovers.

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.

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.

Godwits

There are two EPBC Act-listed godwit species that may occur within the EMBA, the bar-tailed (*Limosa lapponica*) and black-tailed godwit (*Limosa limosa*). Godwits are large waders that are found around all coastal regions of Australia during the southern hemisphere summer (breeding in Europe during the northern hemisphere summer), though the largest numbers remain in northern Australia. Godwits are commonly found in sheltered bays, estuaries and lagoons with large intertidal mudflats or sandflats, or spits and banks of mud, sand or shell-grit where they forage on intertidal mudflats or sandflats, in soft mud or shallow water and occasionally in shallow estuaries (BirdLife Australia, 2019). They have been recorded eating annelids, crustaceans, arachnids, fish eggs and spawn and tadpoles of frogs, and occasionally seeds. The Nooramunga Marine and Coastal Park (133 km to the north-east of Yolla-A) has

recorded the largest concentrations of bar tailed godwit in south-eastern Australia. Godwits may be present along shorelines of the EMBA.

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.

Snipes

There are four EPBC-Act listed snipe species that may occur within the EMBA (Latham's (*Gallinago hardwickii*), Swinhoe's (*Gallinago megala*), pin-tailed (*Gallinago stenura*) and Australian painted (*Rostratula australis*)). These snipe species (other than the Australian painted snipe, which is endemic to Australia) are present during the southern hemisphere summer (breeding in Asia and Russia in the northern hemisphere summer). They are medium-sized waders that roost among dense vegetation around the edge of wetlands during the day and feed at dusk, dawn and during the night on seeds, plants, worms, insects and molluscs. The pin-tailed snipe is currently listed in the BirdLife Australia Rarities Committee (BARC) which reviews rare sightings of birds, presently the pin-tailed snipe has sightings in Western Australia and the Australian Capital Territory that are under review by BARC and are unlikely to be sighted in Victoria or to occur within the EMBA (BirdLife Australia, 2025). The Swinhoe's snipe has a non-breeding distribution in northern Australia across Queensland, Northern Territory and Western Australia and is unlikely to been sighted in Victoria or within the EMBA (DataZone BirdLife, 2025). The Australian painted snipe and Latham's snipe are known to occur in Victoria, the Australian painted snipe inhabits coastline from the Southern Australian border to Lakes Entrance and the Latham's snipe inhabits all of the Victorian coastline (DataZone BirdLife, 2025). Snipes may be present along shorelines of the EMBA.

Swift parrot

The swift parrot (*Lathamus discolour*) is a small parrot that has rapid, agile flight. 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.

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). 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. 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).

Tattlers

The two EPBC Act-listed tattler species grey-tailed (*Tringa brevipes*) and wandering tattler (*Tringa incana*) are a small, foraging shorebird with long wings and tail. Their breeding habitat is along rocky rivers in the remote mountains of eastern Siberia during June and July. They then migrate along the East Asian-Australasian Flyway towards Australia. They are usually seen in small flocks along sheltered coasts with reefs and rock platforms or intertidal mudflats. They are also found in intertidal rocky, coral or stony reefs, platforms and islets that are exposed at high tide, as well as shores of rock, shingle, gravel and shells and on intertidal mudflats in embayments, estuaries and coastal lagoons fringed with mangroves. They feed by day on polychaete worms, molluscs, crustaceans, insects and, occasionally, fish (BirdLife Australia, 2019). These tattlers may be present in the EMBA during the Australian summer.

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).

Brolga

The brolga (*Antigone rubicunda*) (listed as endangered under the FFG Act) is a large grey crane found across tropical northern Australia, southwards through north-east and east central areas of Queensland as well as New South Wales and Victoria. It inhabits large open wetlands, grassy plains, coastal mudflat and irrigated croplands and, less frequently, mangrove-lined creeks and estuaries. Brolgas are omnivorous, feeding on both plants and animal matter but primarily on tubers and some crops (BirdLife Australia, 2019).

As its preferred habitat is poorly represented among the shoreline of the EMBA, it is unlikely that brolgas will be encountered in the EMBA.

Egrets

One EPBC Act-listed egret, the cattle egret (*Bubulcus ibis*) is listed as a marine fly over species and has a broad distribution across Australia, occurring across all of Victoria and therefore intersects with the EMBA (DataZone BirdLife, 2025).

Little penguins

There is one species of penguin, the little penguin (*Eudyptula minor*) which has a BIA (foraging) that is intersected by the EMBA off the south coast of Phillip Island and a breeding BIA located on onshore Phillip Island (Figure 5.13). 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 5.11 summarises little penguin daily and seasonal behaviour.

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 5.11: 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

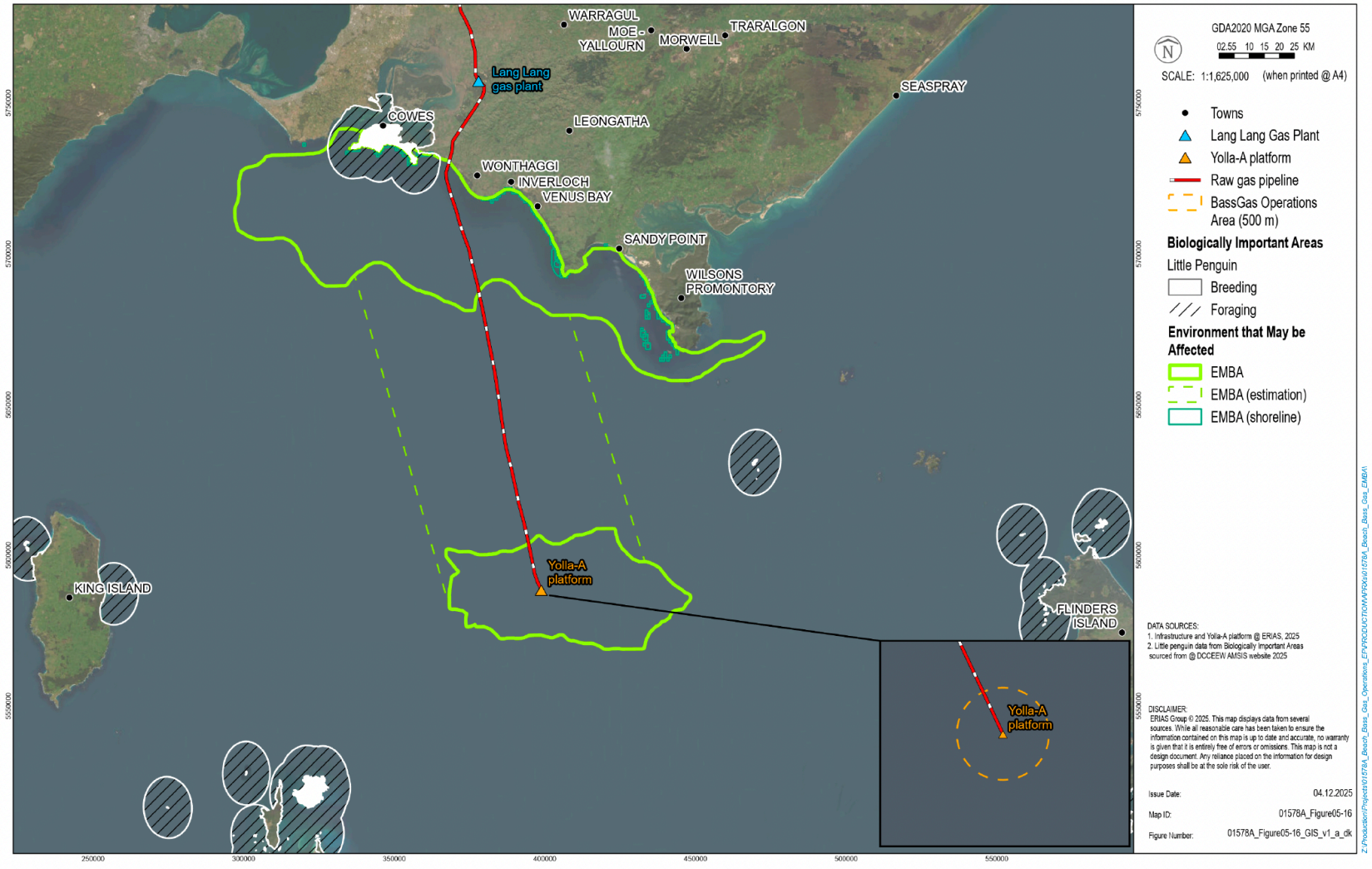


Figure 5.13: Little Penguin Breeding and Foragin BIA

5.6.5 Cetaceans

The PMST identifies that seven whale and eight dolphin species may reside within or migrate through the operational area and EMBA, as listed in Table 5.12. 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.

Figure 5.14 illustrates the presence and absence of the threatened cetacean species through the year.

The following recovery plans are in place in Australia for listed cetacean species:

- Conservation Management Plan for the Blue Whale (DoE, 2015d).
- National Recovery Plan for the Southern Right Whale (DCCEEW, 2024).

The fin and sei whale publicly available Conservation Advice documents prepared by the TSSC under the EPBC Act (TSSC, 2015b; TSSC, 2015c).

Annual presence of threatened cetaceans are described in Figure 5.14. Details are provided in relevant sections.

Table 5.12: 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	FFG Act status
EPBC Act-listed endangered whales					
Balaenoptera musculus	Blue whale	Yes	Likely	Foraging (likely to be present), known foraging area (known to be present) for pygmy blue	Endangered
Eubalaena australis	Southern right whale	Yes	Known	Breeding	Endangered
EPBC Act-listed vulnerable whales					
Balaenoptera physalus	Fin whale				
Balaenoptera borealis	Sei whale	Yes	Likely	-	-
EPBC Act-listed not threatened whales					
Megaptera novaeangliae	Humpback whale	Yes	Known		
Caperea marginata	Pygmy right whale	Yes	May	-	-
Balaenoptera acutorostrata	Minke whale	-	May		
EPBC Act-listed not threatened dolphins					
Orcinus orca	Killer whale	Yes	Likely	-	-

Scientific name	Common name	Listed migratory species	Presence in EMBA	BIA within the EMBA	FFG Act status
Pseudorca crassidens	False killer whale				
Tursiops aduncus	Indian bottlenose dolphin	-	Likely	-	-
Lagenorhynchus obscurus	Dusky dolphin	Yes	May	-	-
Delphinus delphis	Common dolphin	-	-	-	-
Grampus griseus	Risso's dolphin	-	-	-	-
Tursiops truncates s. str.	Bottlenose dolphin	-	May	-	-
Globicephala macrorhynchus	Short-finned pilot whale	-	-	-	-
FFG Act-listed dolphin					
Tursiops australis	Burrunan Dolphin	-	-	-	Critically endangered

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		
Humpback whale				Non-peak	Peak			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 5.14: Annual presence and absence of EPBC listed threatened cetacean species migrating through Victoria

Blue Whale

Blue whales (*Balaenoptera musculus*) are the largest living animals on earth, growing to a length of over 30 m, weighing up to 180 tonnes and living to 90 years (DCCEEW, 2015d). The DCCEEW (2015d) recognises three overlapping populations:

- Antarctic blue whale population (*B. musculus intermedia*) are those blue whales occupying or passing through Australian waters that feed on krill predominantly if not exclusively in Antarctic waters.
- Indo-Australian pygmy blue whales (*B. musculus brevicauda*) are those pygmy blue whales occupying or passing through waters from Indonesia to western and southern Australia and are not generally found in Antarctic waters. They appear to feed in more temperate waters.
- Tasman-Pacific pygmy blue whales (*B. musculus brevicauda*) are those pygmy blue whales generally considered to be occupying or passing through waters in southeast Australia, New Zealand and the Pacific Ocean and are not generally found in Antarctic waters. They appear to feed in more temperate waters.

The Antarctic sub-species has been acoustically detected off the west and north coasts of Tasmania, predominantly from May to December. Based on the seasonality of recordings, these areas possibly form part of their migratory route, breeding habitat or a combination of the two (DCCEEW, 2015d).

Indo-Australian pygmy blue whales inhabit Australian waters as far north as Scott Reef, the Kimberley region and west of the Pilbara, and as far south as southwest Australia across to the Great Australian Bight and the Bonney Upwelling, and to waters as far east off Tasmania (Figure 5.15). They have known feeding grounds in the Perth Canyon off Western Australia and the Bonney Upwelling System and adjacent waters off Victoria, South Australia and Tasmania. These areas are utilised from November to May. They migrate between these feeding aggregation areas, northwards and southwards along the west coast of Australia, to breeding grounds that are likely to include Indonesia.

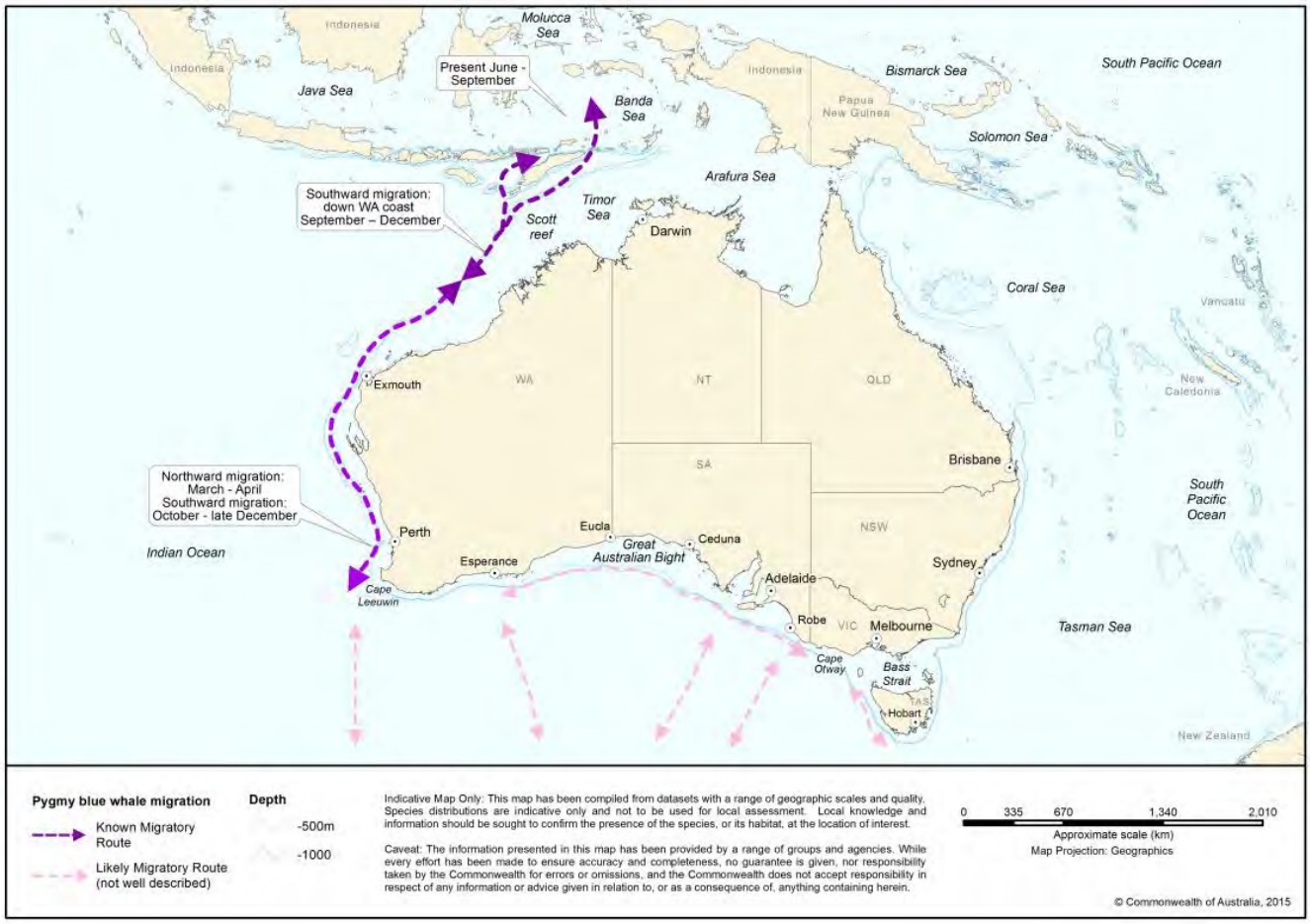


Figure 5.15: Pygmy blue whale migration routes

The Tasman-Pacific pygmy blue whale is the subspecies that migrates through Bass Strait and is found in waters north of 55°S (DCCEEW, 2015d). Blue whales are a highly mobile species that feed on krill (euphausiids).

The BIA for 'likely foraging' for the pygmy blue whale covers most of Bass Strait, including the operational area and EMBA, with known foraging areas (abundant food source/annual high use area) occurring off the southwest Victorian coast (Figure 5.16).

The time and location of the appearance of blue whales in the South-east Marine Region generally coincides with the upwelling of cold water in summer and autumn along the southeast South Australian and southwest Victoria coast (the Bonney Upwelling) and the associated aggregations of krill that they feed on (DCCEEW, 2015d; Gill and Morrice, 2003). This is a key feeding area for the species. The Bonney Upwelling generally starts in the eastern part of the Great Australian Bight in November or December and spreads eastwards to the Otway Basin around February as southward migration of the sub-tropical high-pressure cell creates favourable winds for upwelling.

Pygmy blue whales predominately occupy the western area of the Bonney Upwelling from November to December, and then move southeast during January to April, though the within-season distribution trends in Bass Strait are unknown (DCCEEW, 2015d).

Studies have been undertaken on the pygmy blue whale migration in Australia. Satellite tagging studies demonstrated that the pygmy blue whales migrate north to winter in Indonesian waters where they are likely to partake in breeding and calving, and south during summer to feed in upwelling zones such as the Bonney Upwelling and the Perth Canyon (Marine Mammal Protected Areas Task Force, 2025). Both subspecies of blue whales (Antarctic blue whales and pygmy blue whales) migrate through Bass Strait (where the EMBA is located) (Marine Mammal Protected Areas Task Force, 2025). Antarctic blue whales have been recorded using Bass Strait from November through till May, whereas the pygmy blue whale subspecies have been recorded during April and June (Marine Mammal Protected Areas Task Force, 2025). Blue whale sightings are predominantly made in the west of Bass Strait, closer to the Bonney Upwelling. The EMBA is not located in this main area; however, sightings have occurred near the EMBA (see Figure 5.16 and Figure 5.17below).

Data was collated by NESP to evaluate blue whale presence in relation to the Gippsland Offshore Renewable Energy declaration area (Evans 2024). This data was collated from multiple open-sourced resources, predominantly Atlas of Living Australia. The data demonstrated 470 presences of blue whales from 1918 – 2021 across predominantly Victoria, South Australia and Tasmania with some limited sightings in New South Wales and Queensland (Evans 2024). Approximately 27 sightings were recorded in the vicinity of the EMBA (west of Wilsons Promontory, and east of Cape Otway).

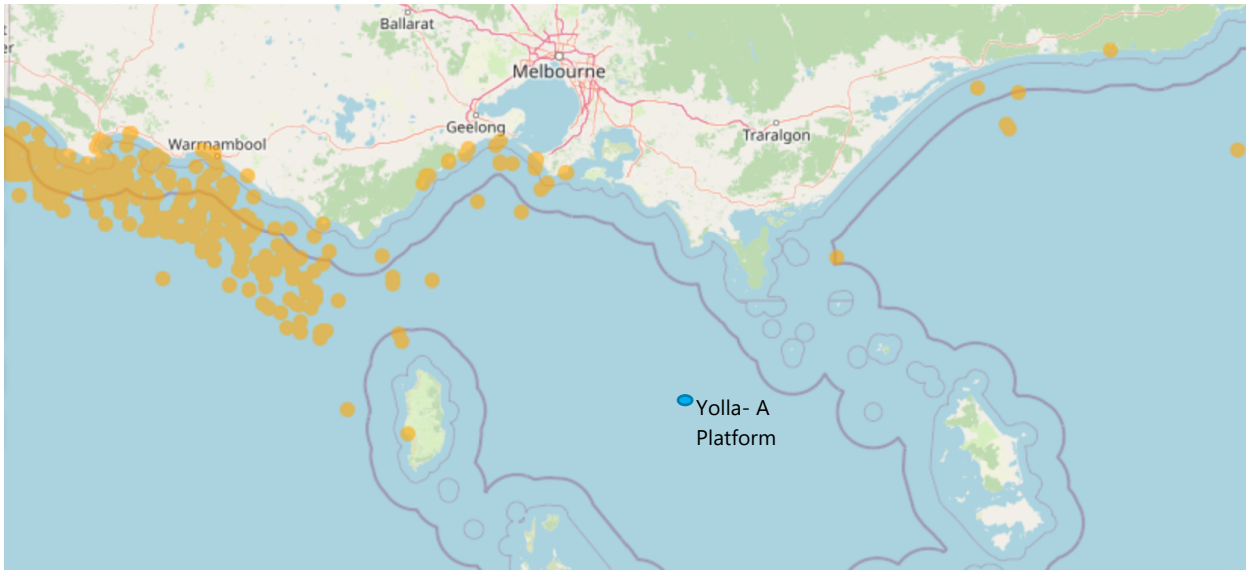


Figure 5.16: Blue whale sightings (orange dots) in Victoria and South Australia (source: Atlas of Living Australia).

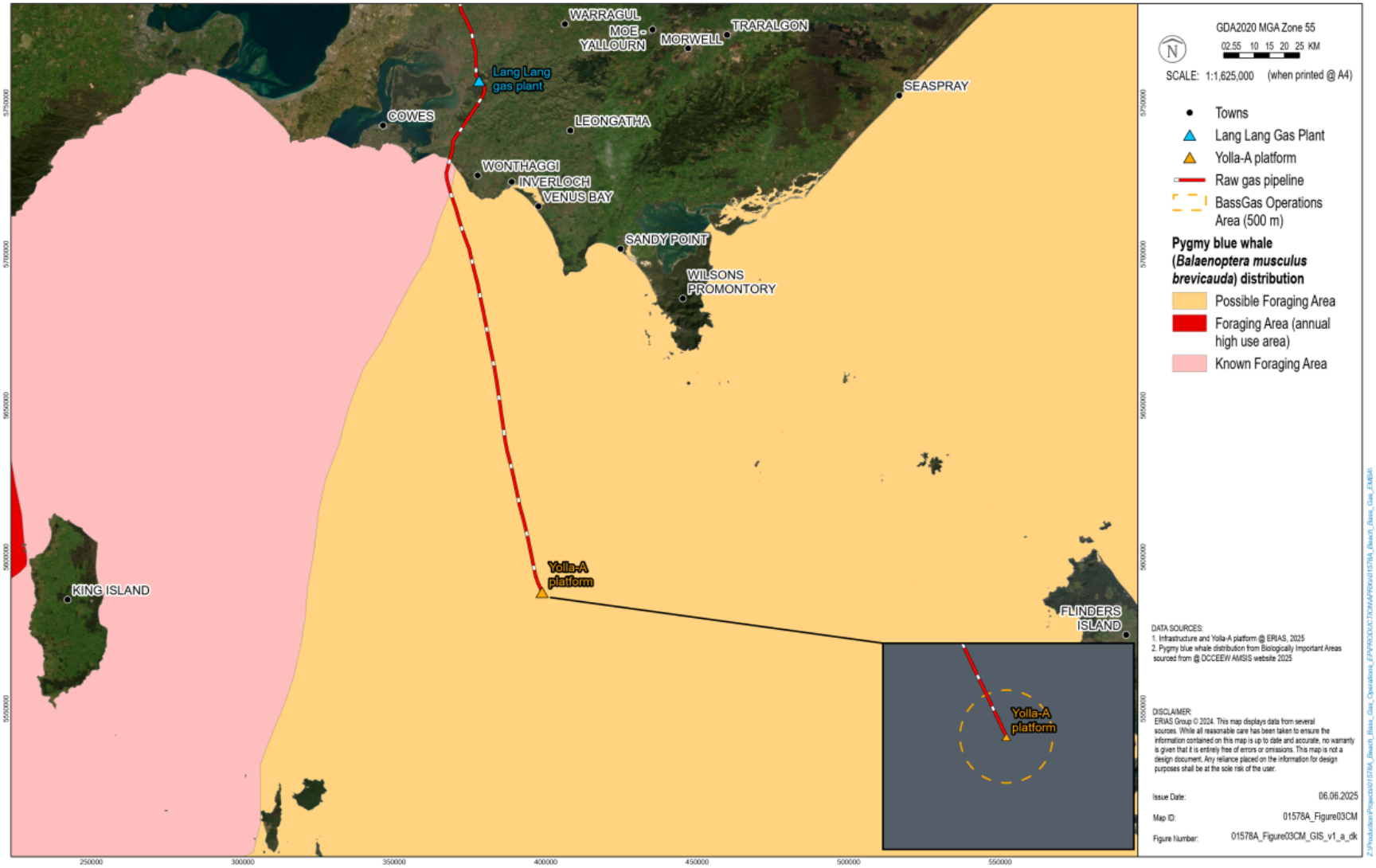


Figure 5.17: Pygmy blue whale distribution near the Yolla-A platform

An underwater noise logger was deployed near to Yolla-A from April to October 2004 during the platform's construction period. 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). It should be noted that the survey was undertaken over 20 years ago and did not capture data for a whole year, potentially missing the blue whale's summer presence. Research published in 2018 used passive acoustics to understand blue whale presence in southern Australia with a passive acoustic monitor deployed in central Bass Strait, nearby the Yolla-A platform. The results found Tasman-Pacific pygmy blue whales eastward of Bass Strait, Indo-Australian pygmy blue whales were present west of Bass Strait and Antarctic blue whale calls were present along the entire southern Australian coastline (McCauley et al., 2018). Bass Strait was identified as the only area where all calls have been recorded from each sub-species within the same season (McCauley et al., 2018), The overlap area means sub species can intermingle, overlap songs and potentially interbreed demonstrating Bass Strait's importance for blue whales. The Tasman-Pacific pygmy whale appeared consistently in Bass Strait. It was noted in the research that Bass Strait presents a calm and quiet area when compared with the open ocean, potentially acting as a resting area (McCauley et al., 2018).

Southern Right Whale

Southern right whales (*Eubalaena australis*) 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).

Nineteenth century whaling drastically reduced southern right whale numbers. An estimated 55,000 to 70,000 whales were present in the southern hemisphere in the late 1700s (DSEWPC, 2012b). By the 1920s there may have been fewer than 300 individuals remaining throughout the southern hemisphere (DSEWPC, 2012b). Other reports suggest the number of individuals in Australia was reduced to 1,500 (Charlton et al., 2014). The current Australian population estimates the western population at 2,549 individuals and 268 individuals for the eastern population with no increase in mother-calf pairs at the only eastern Australian calving ground, Logan's Beach in Warnambool (DCCEEW, 2024).

The southern right whale is typically distributed between 16°S and 65°S in the southern hemisphere and is present off the Australian coast between April and October (DCCEEW, 2024) (Figure 5.18).

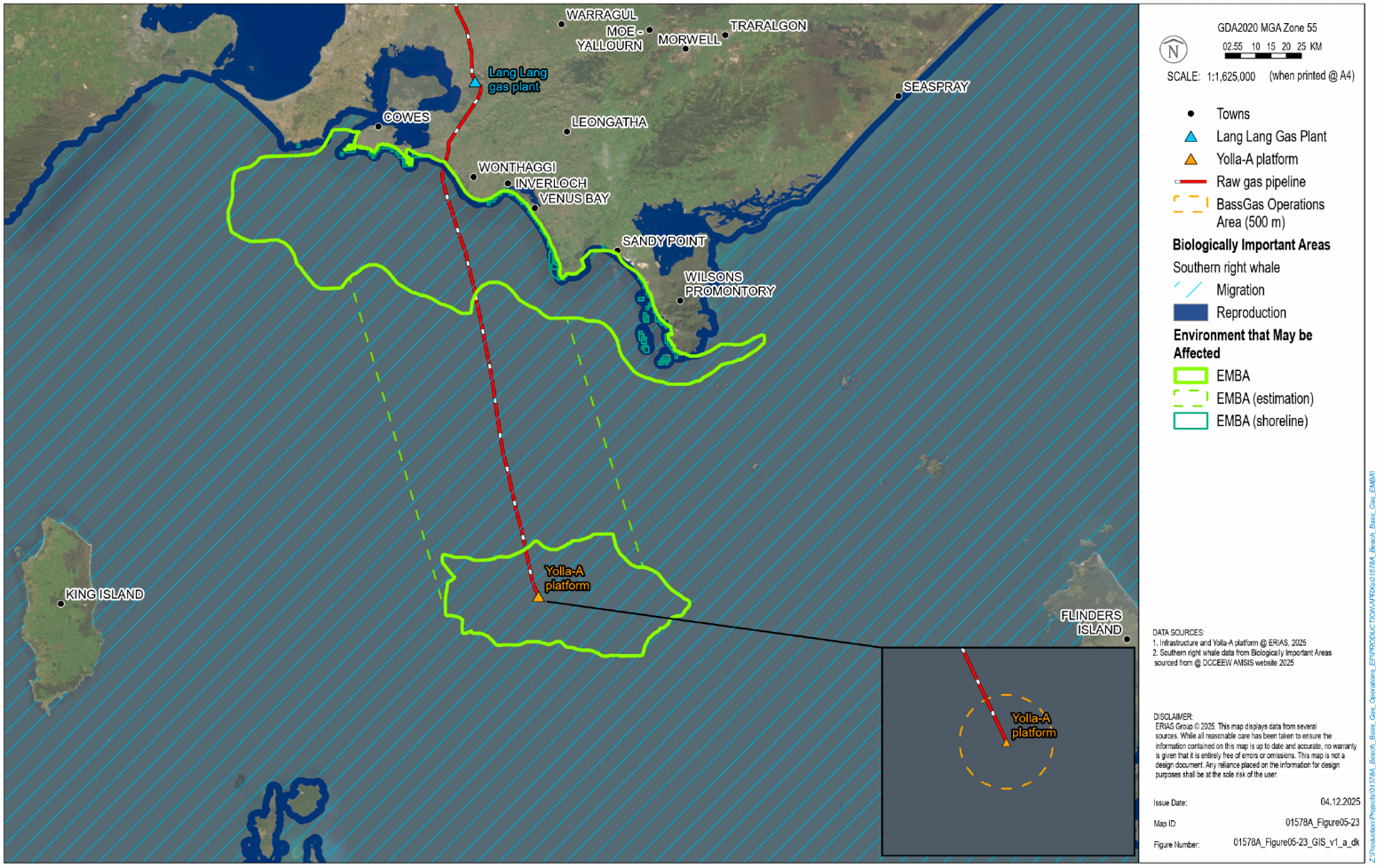
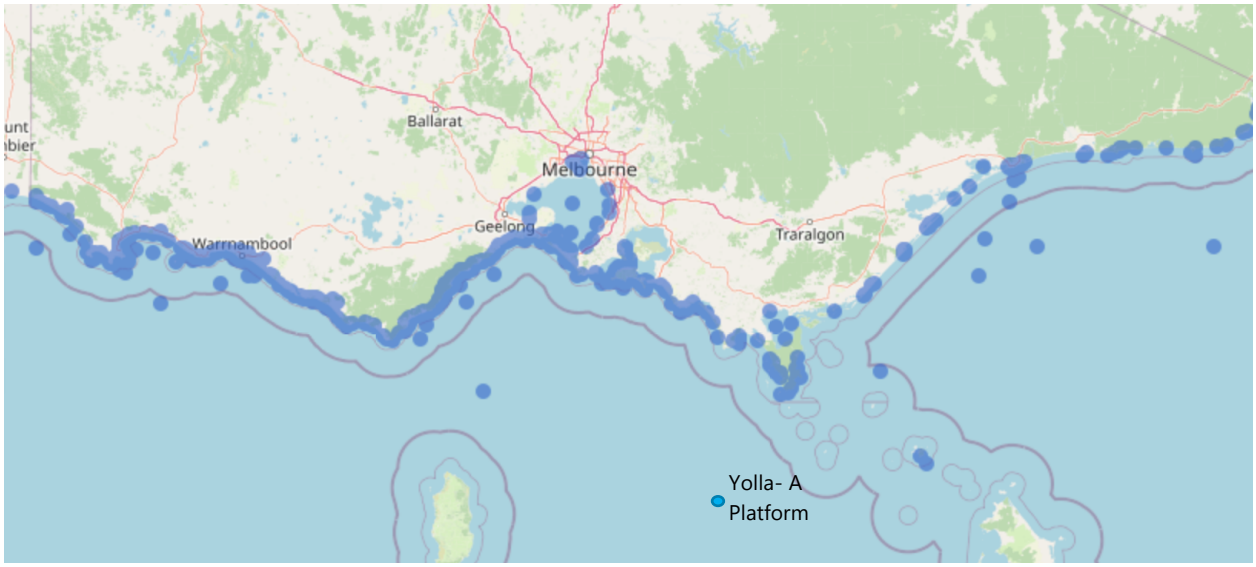


Figure 5.18: Southern Right Whale BIA

Southern right whales tend to be distinctly clumped in aggregation areas (DSEWPC, 2012b). Aggregation areas are well known with a well-recognised area at Logan's Beach in Warnambool, Victoria. The number of whales visiting Victoria is a small fraction of the main population that spends winter along the coasts of South Australia and Western Australia (DSEWPC, 2012b). A number of additional aggregation areas for southern right whales are emerging that might be of importance particularly to the south-eastern population. In these areas, small but growing numbers of non-calving whales regularly aggregate for short periods of time. These areas include coastal waters off Peterborough, Port Campbell, Port Fairy and Portland in Victoria located more than 400 km west of the BassGas development, with waters less than 10 m deep preferred (DSEWPC, 2012b).

The NCVA identifies a BIA for migration/resting of the southern right whale through all of Bass Strait (Figure 5.18). The closest known aggregation/breeding/calving area to the BassGas Development is at Logan's Beach on the coast near Warrnambool approximately 425 km to the west. The area around Wilson's Promontory is a migration/resting area where breeding may occur. The southeast Tasmanian coast is designated as a migration/resting area where breeding is likely to occur.

Critical habitat for the southern right whale is not defined under the EPBC Act (DCCEEW 2024) though the BIA shown in Figure 5.18 around the coastline of Victoria, Tasmania and sections of South Australia and Western Australia may be considered critical habitat as female southern right whales show calving site fidelity, which combined with their low and slow reproductive rate make calving sites of critical importance to the species recovery (DCCEEW, 2024). Although the EMBA may not be within the southern right whale's calving site, there are numerous sightings recorded on the Atlas of Living Australia (2025) as shown in Figure 5.19, demonstrating their presence within the EMBA.



Source: Atlas of Living Australia

Figure 5.19: Southern right whale sightings in Victoria

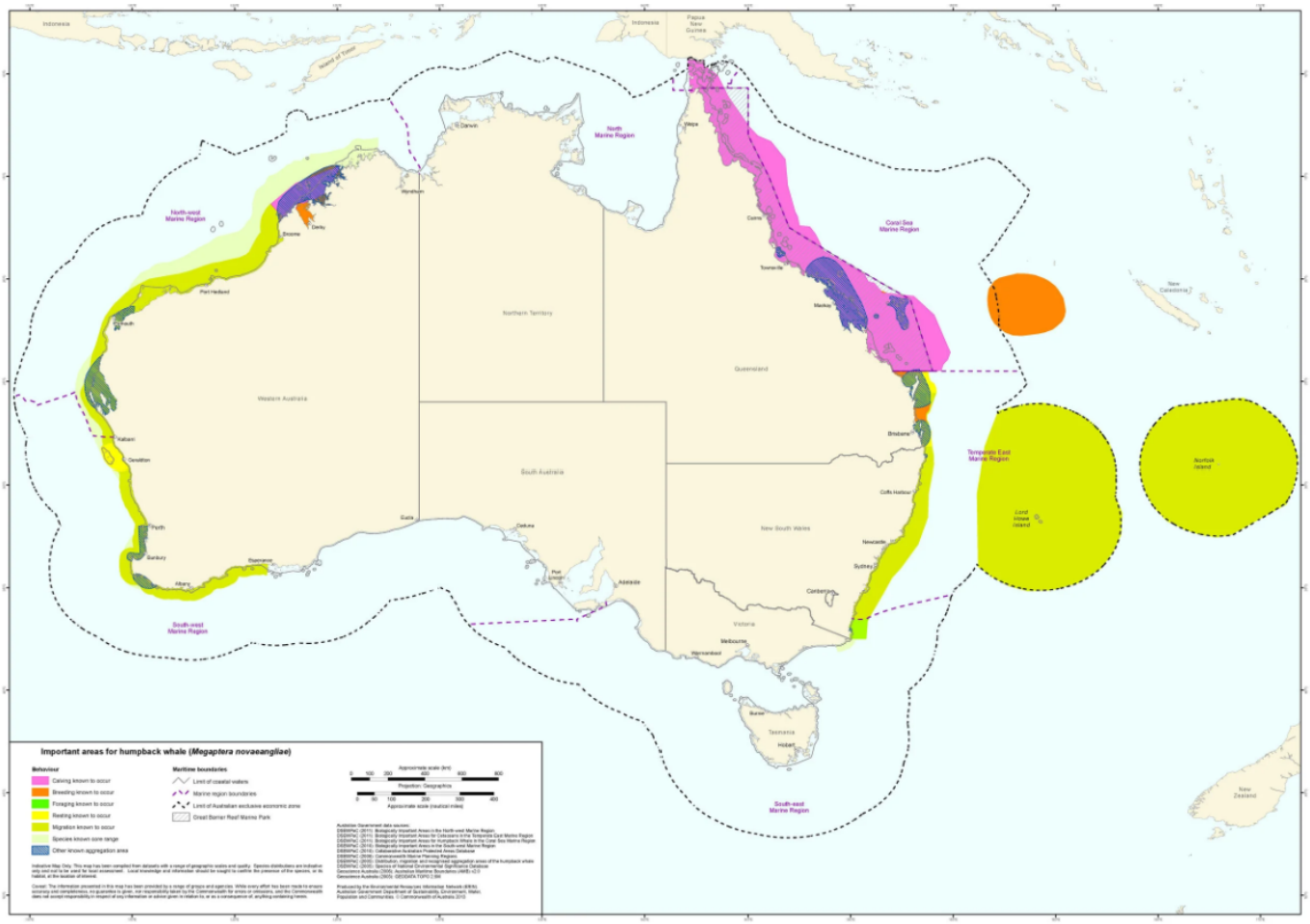
Humpback Whale

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).

The EPBC Act officially removed the humpback whale from its threatened list, where it was previously classified as 'vulnerable'. This was largely due to its substantial recovery from historical whaling. The species remains protected due to its listing as a migratory species on the EPBC Act. The southern humpback whale (*Megaptera novaeangliae australis*) was recently removed from its critically endangered listing on the FFG Act in September 2025, the primary piece of Victorian legislation that provides for the conservation of biodiversity. Humpback whales are found in Australian offshore and Antarctic waters. They primarily feed on krill in Antarctic waters south of 55°S. The eastern Australian population of humpback whales is referred to as Group E1 by the International Whaling Commission, one of seven distinct breeding stocks in the southern hemisphere (TSSC, 2015d).

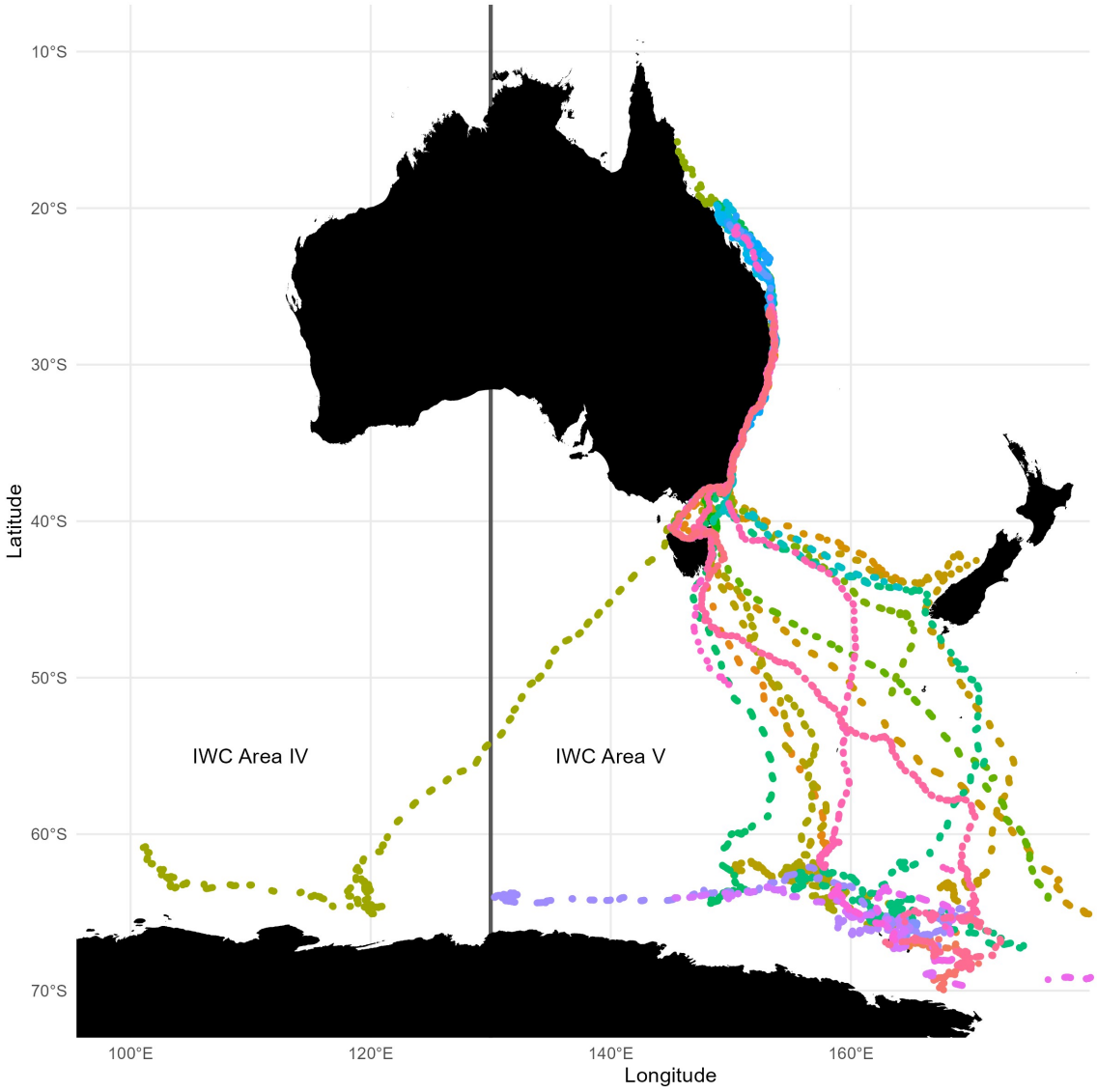
Bass Strait represents part of the core range of the E1 Group. Migration is the predominant activity of humpback whales in Bass Strait, however emerging evidence suggests they utilise Bass Strait for feeding and calving activities as well (Hutchinson et al., 2025).

Humpback whales migrate from their summer feeding grounds in Antarctic waters northward up the Australian east coast to their breeding and calving grounds in sub-tropical and tropical inshore waters (Figure 5.20) (TSSC, 2015d). The northern migration off the southeast coast starts in April with the southern migration occurring from August to November (Hutchinson et al., 2025). This migration tends to occur close to the coast along the continental shelf boundary in waters about 200 m deep (TSSC, 2015d) (Figure 5.21).



Source: World Wildlife Fund 2025

Figure 5.20: Important areas for humpback whales



Source: Andrews et al., 2023

Figure 5.21: Humpback whale migration routes along the east coast of Australia using satellite tags

The conservation advice for the humpback whale (TSSC, 2015d) identifies vessel strike and anthropogenic noise as threats to the species. The operational area and EMBA overlap the core migration range of humpback whales. Operators on Yolla-A regularly observe humpback whales close to the platform during their migration season (Plate 5.2), noting that they appear inquisitive and closely approach the platform, mill around and perform fluke slapping. Humpback whales migrate through the EMBA during April to December on both their northern and southern migrations.

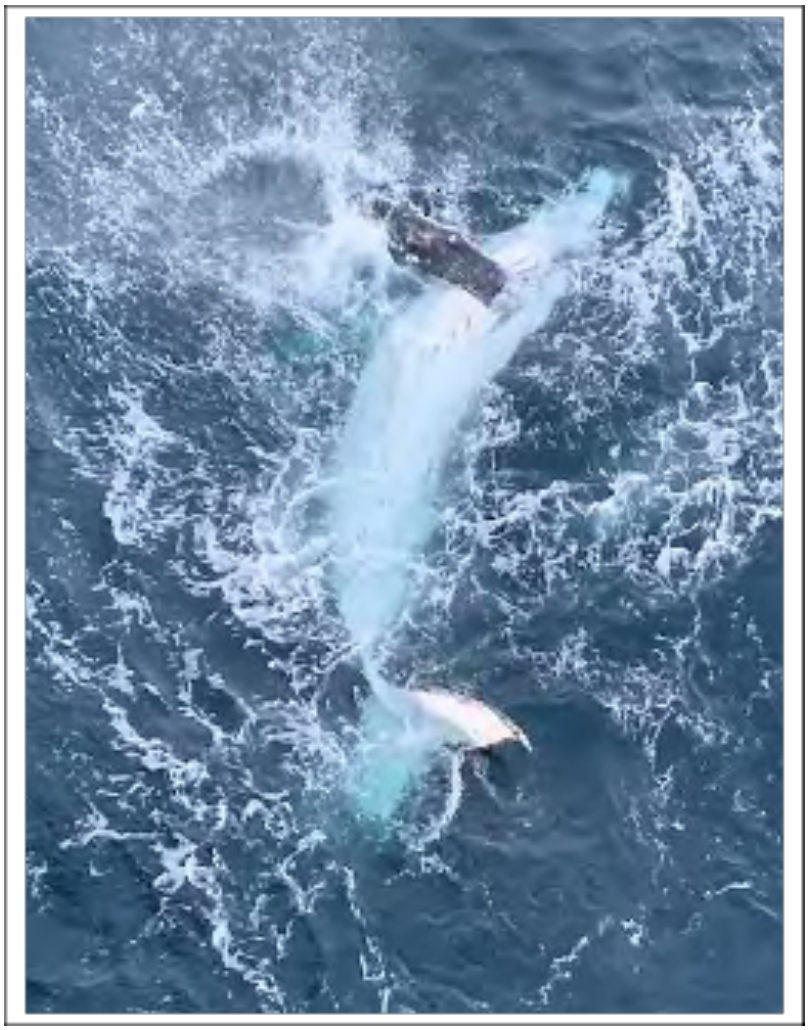


Plate 5.2. A humpback whale observed from Yolla-A

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.

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.

Pygmy right whale

Pygmy right whales (*Caperea marginata*) are a little-studied, elusive baleen whale species found in temperate and sub- Antarctic waters in oceanic and inshore locations. The species, which has never been hunted commercially, is thought to have a circumpolar distribution in the southern hemisphere between about 30°S and 55°S. Distribution appears limited by the surface water temperature as they are almost always found in waters with temperatures ranging from 5° to 20°C (Baker, 1985).

There are few confirmed sightings of pygmy right whales at sea (Reilly et al., 2008), with few records from eastern Victoria and no population estimates available for Australian waters. There have been five occurrences of a pygmy right whale in Bass Strait however none within the EMBA (ALA 2025). The largest reported group sighted (100+) occurred near Portland in June 2007 (Gill et al., 2008).

Given the limited sightings off eastern Victoria and the absence of a BIA designation in Australian waters, pygmy right whales, if present, are likely to be infrequent visitors within the operational area or EMBA.

Dusky dolphin

The dusky dolphin (*Lagenorhynchus obscurus*) is primarily found from approximately 55°S to 26°S though sometimes further north associated with cold water currents. They are considered to be primarily an inshore species but can also be oceanic when cold currents are present (Gill et al., 2000; Ross, 2006).

Only 13 reports of the dusky dolphin have been made in Australia since 1828 (the very first described specimen of the species by French naturalists was from off the coast of Tasmania in 1826 and key locations are yet to be identified (Bannister et al., 1996).

The dusky dolphin can occur across southern Australia from Western Australia to Tasmania and there are confirmed sightings near Kangaroo Island and off Tasmania. No key localities or critical habitats in Australian waters have been identified (Bannister et al., 1996).

Given the lack of sightings in Australian waters and the absence of a BIA designation in Australian waters, dusky dolphins, if present, are likely to be infrequent visitors within the operational area or EMBA.

Killer whale

The killer whale (*Orcinus orca*) is the largest member of the dolphin family and is thought to be the most cosmopolitan of all cetaceans. It appears to be more common in cold deep waters though killer whales have often been observed along the continental slope and shelf particularly near seal colonies (Bannister et al., 1996).

The killer whale is widely distributed from polar to equatorial regions and has been recorded in all Australian waters with concentrations around Tasmania. Recognised key locations for orcas in Australia are the Bonney Upwelling, Bremer Sub-basin and Ningaloo Reef (Hutchings et al., 2025). The habitat of killer whales includes oceanic, pelagic and neritic (relatively shallow waters over the continental shelf) regions in both warm and cold waters (DAFF, 2020b).

In Victoria, sightings of killer whales peak in June/July where they have been observed feeding on sharks, sunfish and Australian fur seals (Mustoe, 2008). The breeding season is variable and the species moves seasonally to areas of food supply (Bannister et al., 1996; Morrice et al., 2004).

It is possible that killer whales may occur in the EMBA, however given the distance to the nearest seal colonies is approximately 100 km from Yolla-A, the area around Yolla-A and the pipeline is unlikely to represent an important habitat for killer whales and if present, are likely to be infrequent visitors within the operational area or EMBA.

Burrunan dolphin

The Burrunan dolphin (*Tursiops australis*) is a species of bottlenose dolphin only recognised as a separate species in 2011. The species is listed as critically endangered under the FFG Act (and is not listed under the EPBC Act).

Only two resident populations of Burrunan dolphin are known to occur, comprising about 63 individuals in the Gippsland Lakes and 120 individuals in Port Phillip Bay (DEECA 2025). It is unclear whether migration occurs between these sites, though the Marine Mammal Foundation notes that there are genetic similarities between the dolphins in the Gippsland Lakes and around Tasmania's Freycinet Peninsula (ABC, 2017). The taxonomic validity of this new species has been questioned by the Committee for Taxonomy for the International Society for Marine Mammology (DRI, 2016). The Marine Mammal Foundation believes a transient group of male dolphins swim between Gippsland and eastern Tasmania to breed with two different populations of female dolphins. Thus, Burrunan dolphins may be present in the EMBA, though not in high numbers given that their resident populations are outside the 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 5.13), including the Australian fur seal (*Arctocephalus pusillus doriferus*) and the New Zealand fur-seal (long-nosed fur seal) (*Arctophoca forsteri*). The New Zealand fur seal is also listed as vulnerable under the FFG Act. Two additional pinniped species have been included in Table 5.13 due to their conservation listings under the FFG. These are the Subantarctic fur-seal (*Arctocephalus tropicalis*) and the Australian sea-lion (*Neophoca cinerea*) both listed as endangered.

Table 5.13: 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 australis forsteri	New Zealand fur-seal	-	May	-	Vulnerable
Arctocephalus pusillus	Australian fur-seal	-	Known	-	-
FFG Act-listed species					
Arctocephalus tropicalis	Subantarctic fur-seal	-	-	-	Endangered
Neophoca cinerea	Australian sea-lion	-	-	-	

Australian fur-seal

The Australian fur-seal is common in the operational area and EMBA and is a listed marine species under the EPBC Act. Australian fur-seals are regularly observed at the Yolla-A platform jacket (Plate 5.3) and at the seabed around the platform jacket during inspection and maintenance activities (Plate 5.4).

Australian fur seals are endemic to south-eastern Australian waters and have a relatively restricted distribution around the rocky islands of Bass Strait. 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 largest of the established colonies occur at Lady Julia Percy Island (26% of the breeding population and 360 km west of Yolla-A) and at Seal Rocks (25% of the breeding population and 160 km west of Yolla-A), in Victoria. These areas are located within the EMBA.

Other Australian fur-seal breeding colonies in Bass Strait include:

- Rag Island (1,000 fur seal & 270 pups in 2007, 122 km northeast of Yolla-A).
- Kanowna Island (15,000 adults and 3,000 pups, 85 km northeast of Yolla-A).
- Anser Group of Islands (all more than 87 km northeast of Yolla-A).
- The Skerries (394 km northeast of Yolla-A) – 11,500 individuals and 3,000 pups (in 2002); and
- Judgment Rock in the Kent Island Group (~2,500 pups per year, 135 km east of Yolla-A) (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) – a haul-out site where the seals are present most of year.
- Gabo Island (435 km northeast of Yolla-A) – 30-50 individuals.
- The Hogan Island group (120 km northeast of Yolla-A) – about 300 animals.

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 ledges

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.



Plate 5.4 Fur-seals observed around the Yolla-A platform.

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 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).

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.

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.

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) – about 300 individuals.
- 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. Breeding colonies in Bass Strait recorded by Shaughnessy (1999) and OSRA mapping that are within the EMBA are listed below:

- Kanowna Island (10,700 adults and 2,700 pups, 85 km northeast of Yolla-A).
- Anser Group of Islands (all more than 87 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 (1,000 fur seal & 235 pups in 2006, 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 5.7.5.

There are 39 fish species (31 of which are seahorses and pipefish, the signathid family) recorded in the EPBC Act PMST (DCCEEW, 2020a) as potentially occurring in the EMBA. 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 5.13 lists the fish species known or likely to occur in the EMBA including two freshwater and two estuarine species that have a portion of their lifecycle in marine ecosystems and therefore potentially occur within the EMBA.

The following recovery plans are in place for the below listed fish species:

- National recovery plan for the Dwarf Galaxias (*Galaxiella pusilla*) (Department of Sustainability and Environment, 2010b) and was most recently update in October 2021.
- Recovery Plan for the White Shark (*Carcharodon carcharias*) (DSEWPaC, 2013b) and was most recently updated in October 2021.
- Recovery Plan for the Grey Nurse Shark (*Carcharias taurus*) (DoE, 2014b) and was most recently updated in October 2021.

Table 5.14: 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	-	May	-	Endangered
Prototroctes maraena	Australian grayling	Vulnerable	-	Likely	-	Endangered
FFG Act-listed estuarine species						
Lovettia sealii	Australian whitebait	-	-	-	-	Critically endangered
Mugilogobius platynotus	Flatback mangrovegoby	-	-	-	-	Endangered
EPBC Act-listed oceanic species						
Carcharodon carcharias	Great white shark	Vulnerable	Yes	Known	Foraging (known to occur)	Endangered
Galeorhinus galeus	School shark, eastern school shark	Conservation dependent	-	May	-	-
Carcharius taurus	Grey nurse shark, east coast population	-	Yes	May	-	Critically endangered
Isurus oxyrinchus	Shortfin mako	-	Yes	Likely	-	-
Lamna nasus	Porbeagle	-	Yes	Likely	-	-
Seriolella brama	Blue warehou	Conservation dependent	-	Known	-	Conservation dependent
FFG Act-listed oceanic species						
Sphyrna lewini	Scalloped hammerhead	-	-	-	-	Conservation dependent

Scientific name	Common name	Listed threatened species	Listed migratory species	Presence in EMBA	BIA within the EMBA	FFG Act status
EPBC Act-listed pipefish, pipe horse, seahorse and sea dragons						
Heraldia nocturna	Eastern upside-down pipefish	-	-	May	-	-
Hippocampus abdominalis	Big-bellied seahorse					
Hippocampus breviceps	Short-head seahorse					
Hippocampus minotaur	Bullneck seahorse					
Histiogamphelus briggsii	Brigg's crested pipefish					
Histiogamphelus cristatus	Rhino pipefish					
Hypselognathus rostratus	Knifesnout pipefish					
Kaupus costatus	Deepbody pipefish					
Kimblaeus bassensis	Trawl pipefish					
Leptoichthys fistularius	Brushtail pipefish					
Lissocampus caudalis	Australian smooth pipefish					
Lissocampus runa	Javelin pipefish					
Maroubra perserrata	Sawtooth pipefish					
Solegnathus robustus	Robust pipehorse					

Scientific name	Common name	Listed threatened species	Listed migratory species	Presence in EMBA	BIA within the EMBA	FFG Act status
Solegnathus spinosissimus	Spiny pipehorse					
Stigmatopora argus	Spotted pipefish					
Stigmatopora nigra	Widebody pipefish					
Stipecampus cristatus	Ringback pipefish					
MayUrocampus carinirostris	Hairy pipefish	-	-	May	-	-
Vanacampus margaritifer	Mother-of-pearl pipefish					
Vanacampus poecilolaemus	Longsnout pipefish					
Vanacampus phillipi	Port phillip pipefish					

Definitions and key as per Table 5.9.

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.

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.

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.

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 5.14). 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.

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 5.22)

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 5.22) 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.

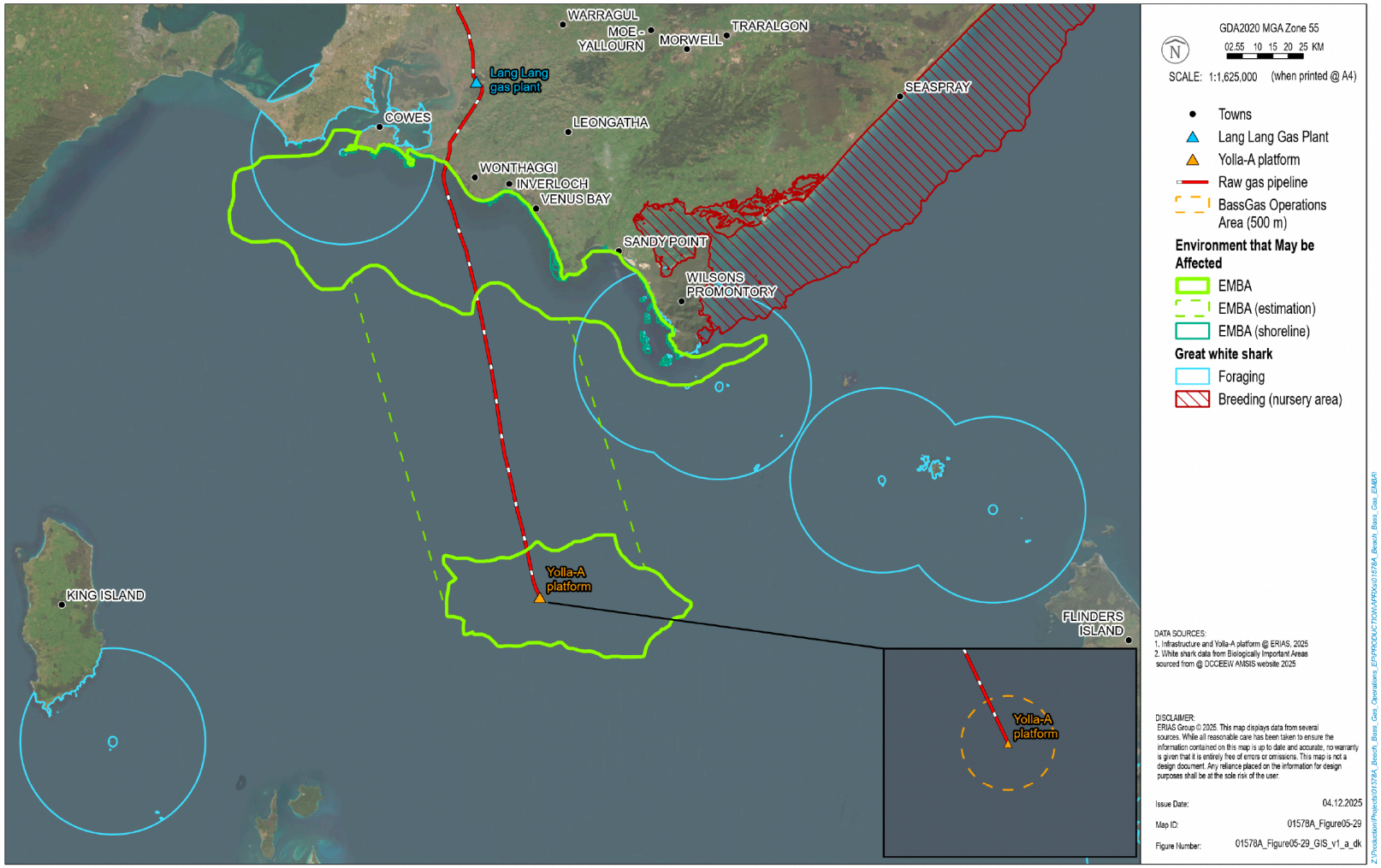


Figure 5.22: Great white shark BIA

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.

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 5.15. 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 5.15: 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	Known	-	Critically endangered
Caretta caretta	Loggerhead turtle				-
EPBC Act-listed vulnerable species					
Chelonia mydas	Green turtle	Yes	May	-	-

Definitions and key as per Table 5.9.

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.

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.

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 5.4.1), 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 5.23).

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 5.24). 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.

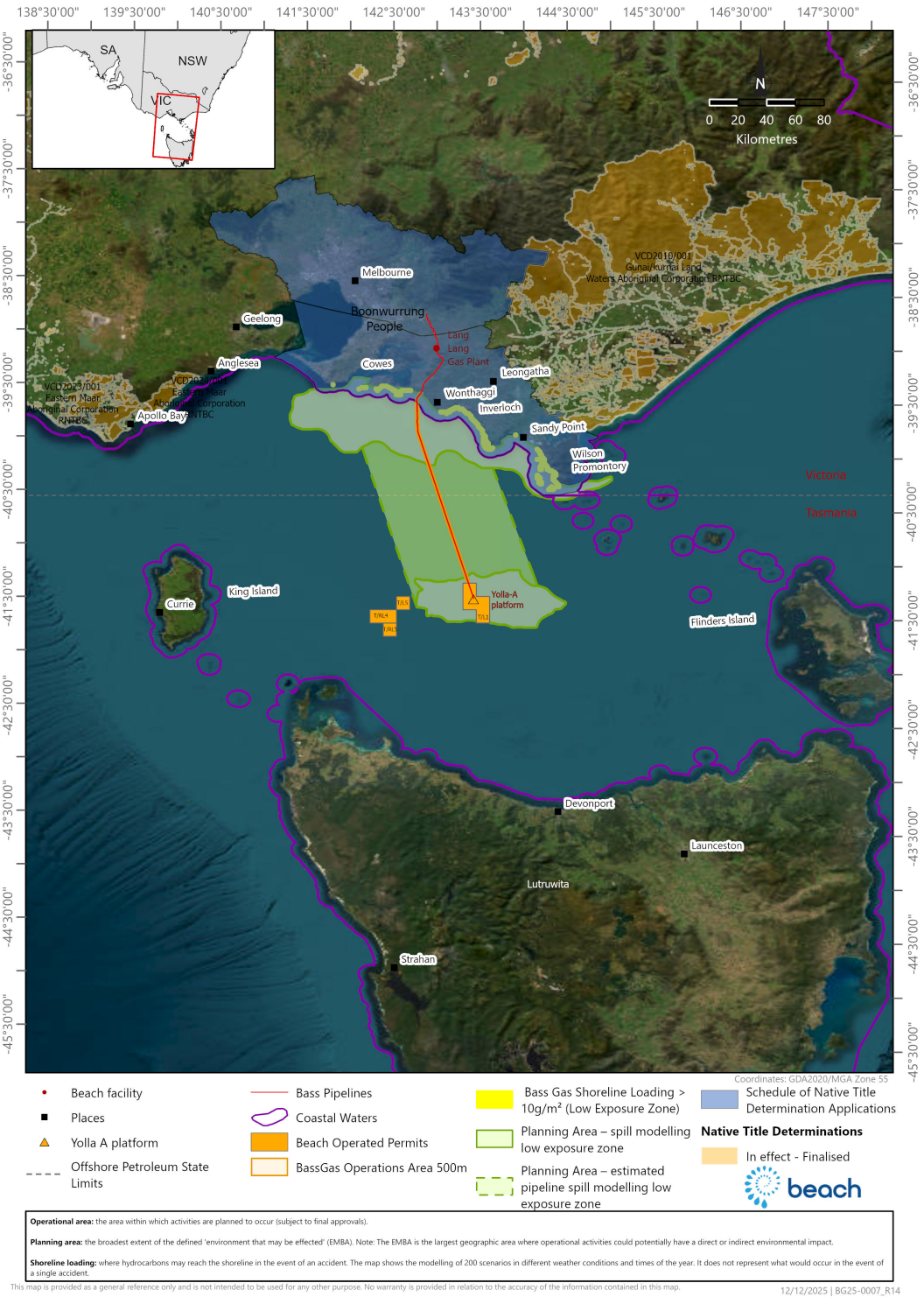


Figure 5.23: Native Title within and adjacent to the Planning Area

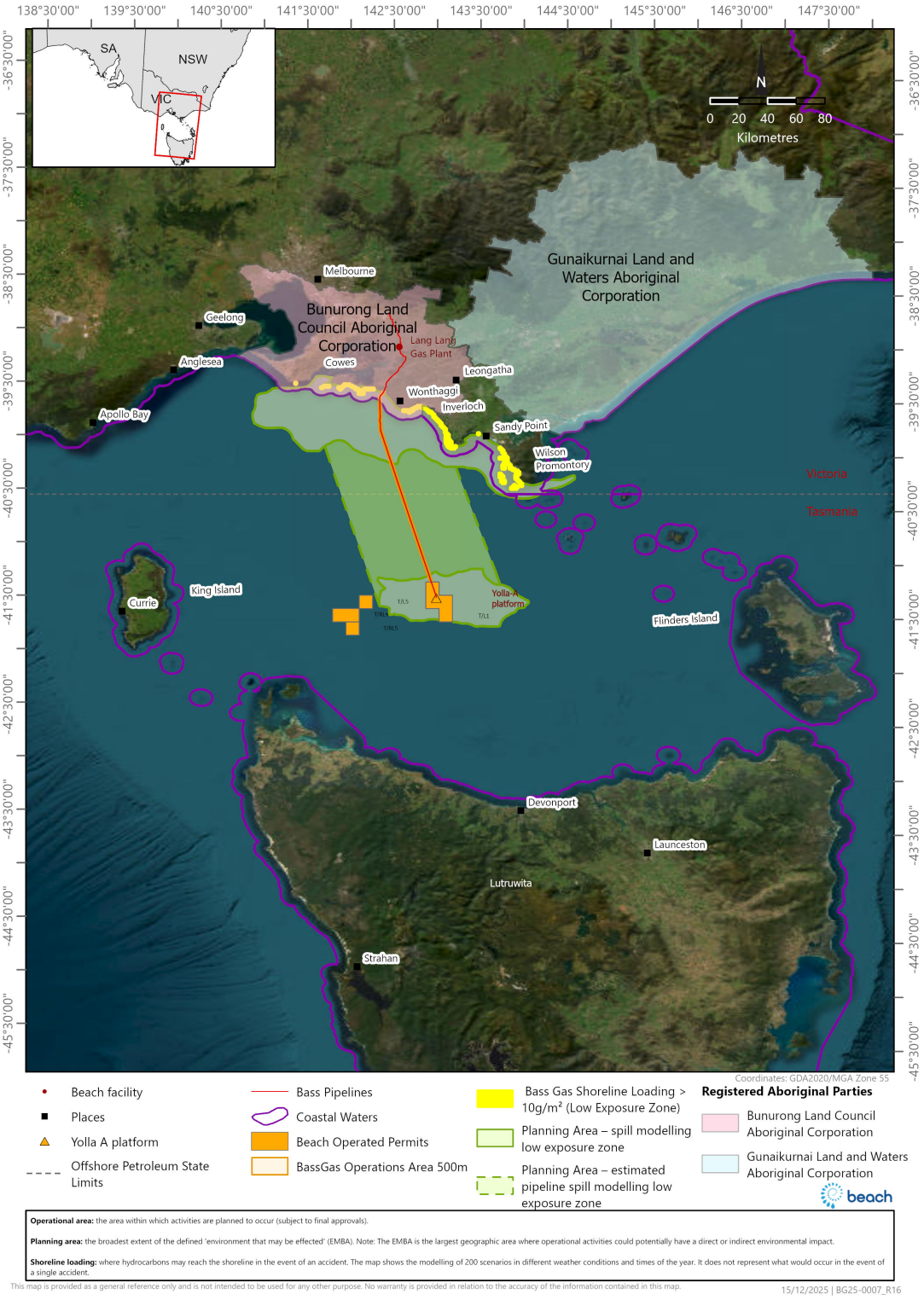


Figure 5.24: Victorian Registered Aboriginal Parties in the vicinity of the Project Area

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 5.24).

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 5.15 summarises the First Nations groups in relation to the Operational Area and Planning Area.

Table 5.16: 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.

5.7.3.8 Assessment of Potential Impacts and Risks to Cultural Values and Sensitivities

Section 7 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. Maritime Archaeological Heritage

5.7.3.9 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 5.25).

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.

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 the 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).

Lighthouses

There are numerous lighthouses in central Bass Strait (

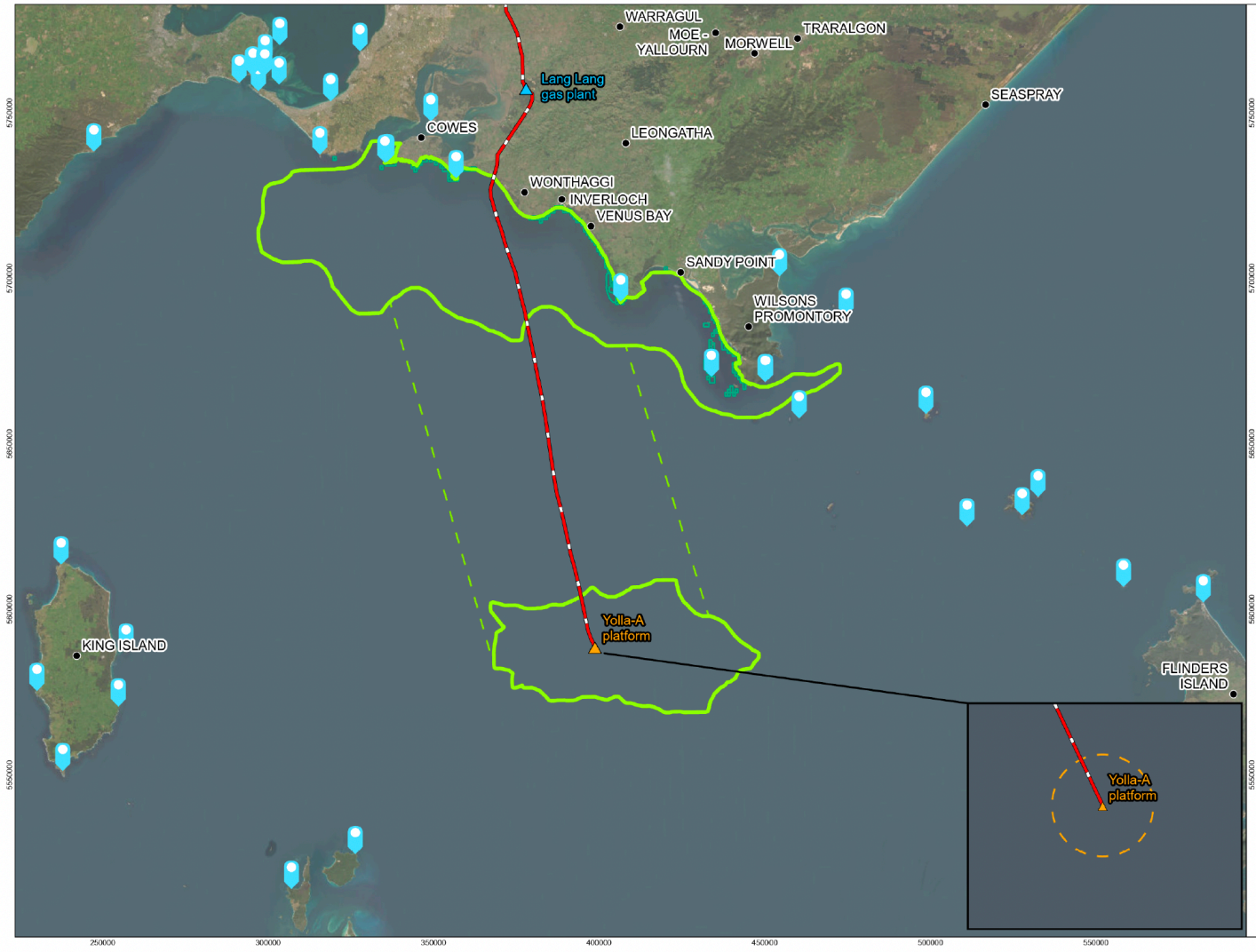


Figure 5.26), with the nearest lighthouse to Yolla-A being that on Citadel Island to the west of Wilsons Promontory, 100 km north of Yolla-A. There are 28 lighthouses in line of site to Yolla-A in the circle encompassing Wilsons Promontory, Flinders Island, King Island and the north coast of Tasmania.

All these lighthouses are located above the high-water mark and therefore outside the EMBA.

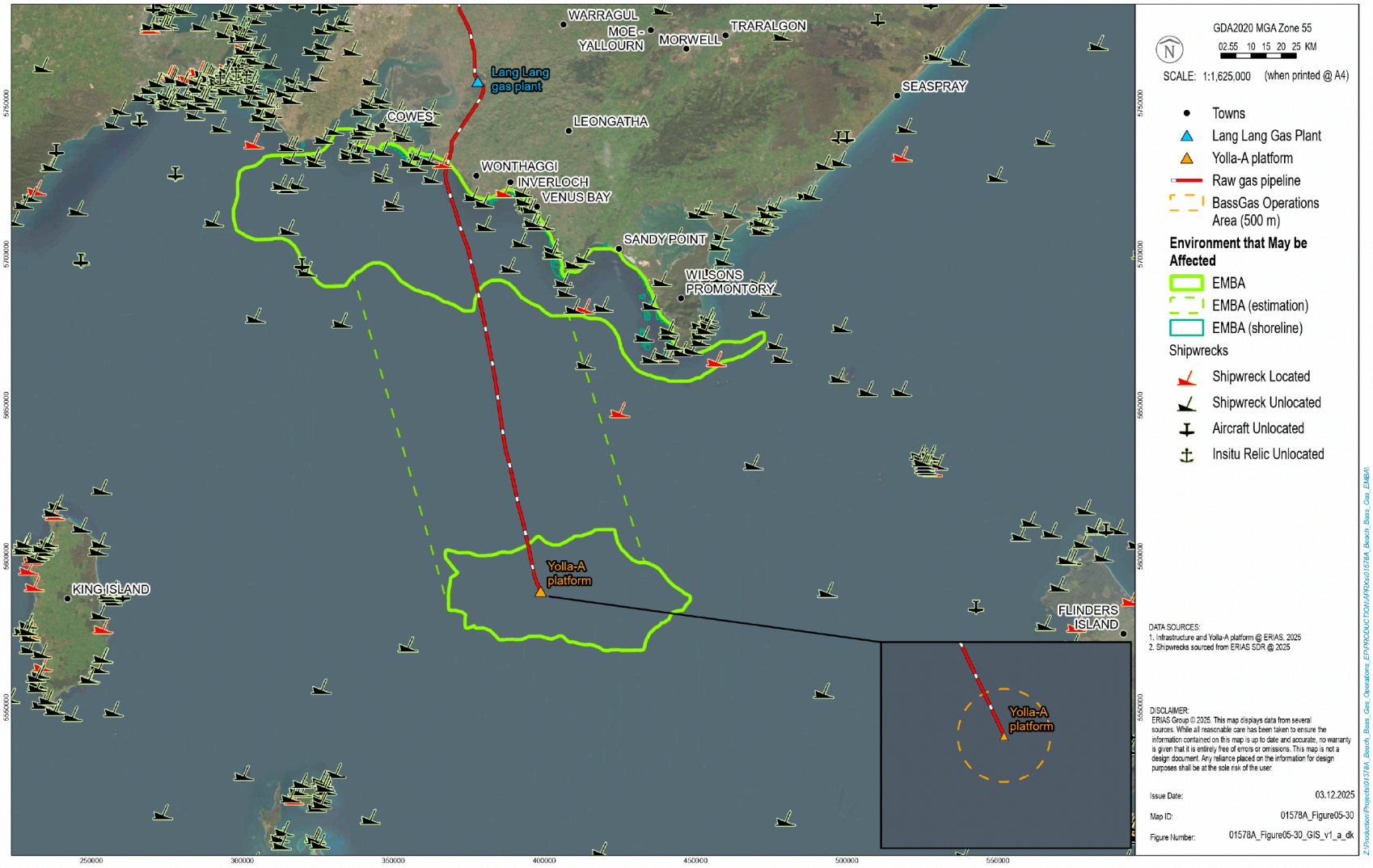


Figure 5.25: Known shipwrecks in the EMBA

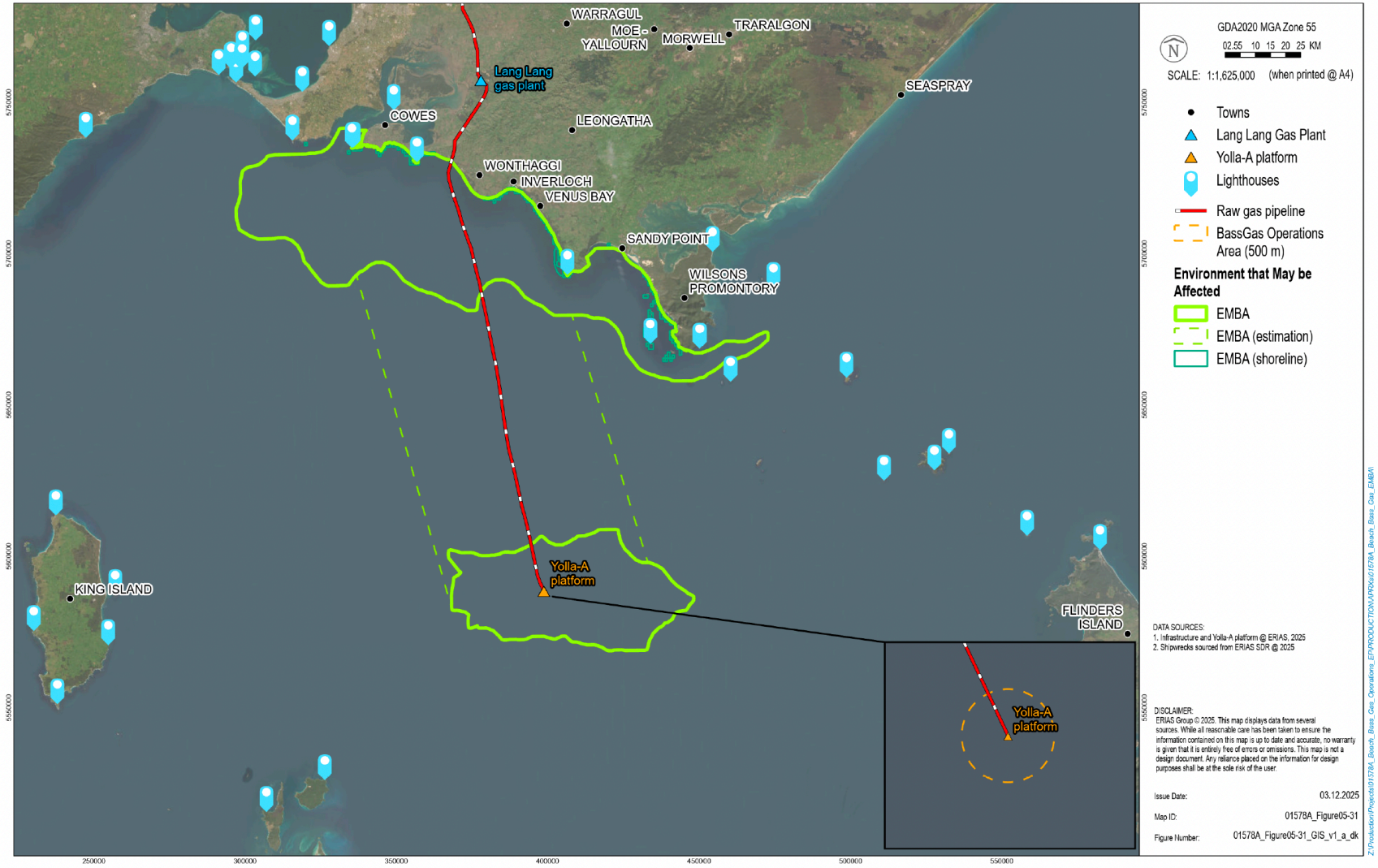


Figure 5.26: Bass Strait lighthouses

5.8 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 (2016) census data:

- Kilcunda has a population of 453 people and a median age of 53. 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 55.1% 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.

5.8.1 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).

5.8.2 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 5.27). 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.

5.8.3 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).

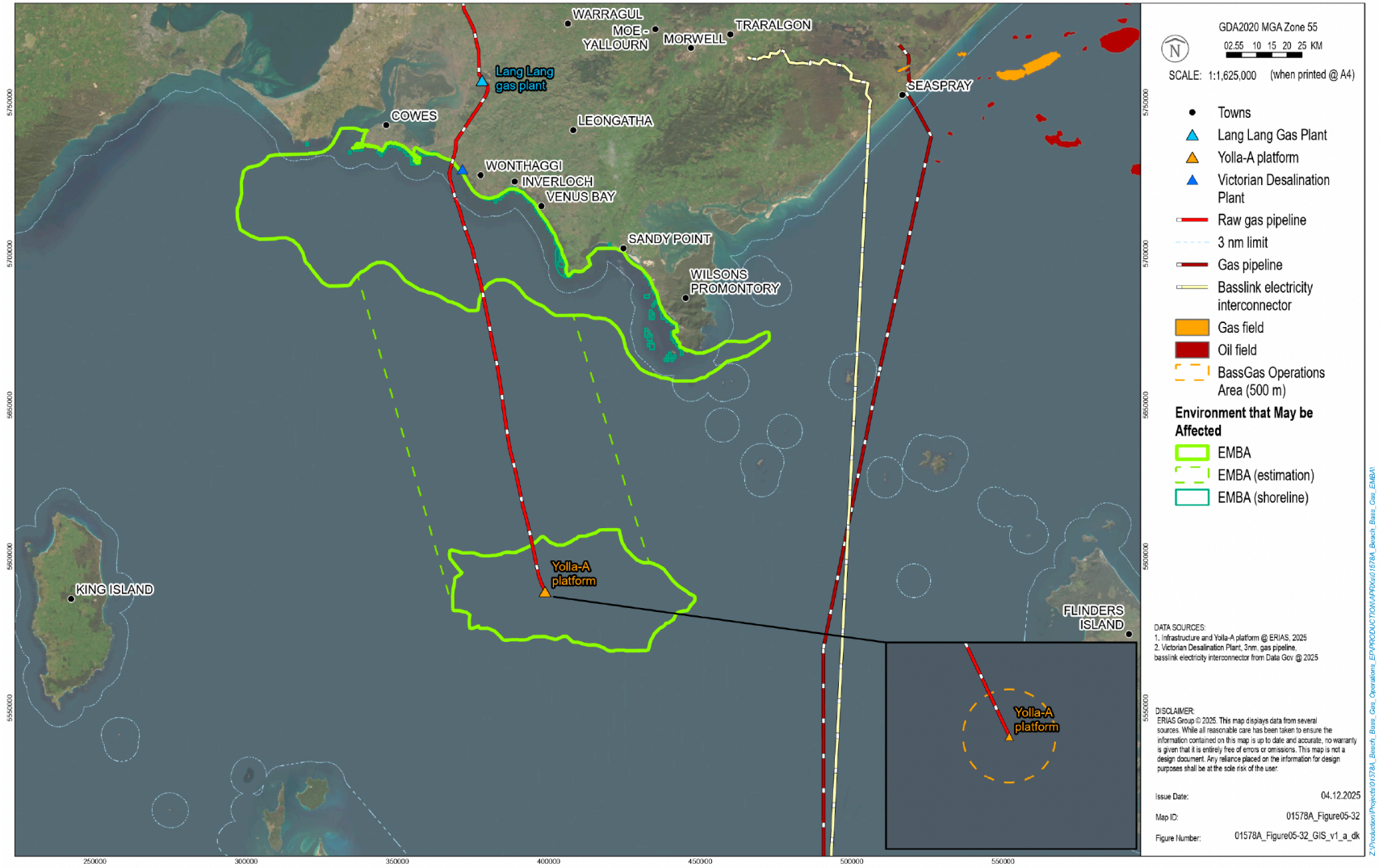


Figure 5.27: Bass Strait subsea infrastructure in the EMBA

5.8.4 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.

5.8.5 Commercial Fisheries

The operational area and EMBA intersect several Commonwealth-, Victorian- and Tasmanian-managed commercial fisheries. These are the described 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
- Eastern Tuna and Billfish Fishery
- Southern Bluefin Tuna Fishery
- Small Pelagic Fishery (eastern sub-area)
- Southern Squid Jig Fishery
- Southern and Eastern Scalefish.
- Shark (SESS) Fishery, incorporating.
    - Gillnet and Shark Hook sector

Table 5.16 summarises the key information for each of these fisheries and indicates that the Bass Strait Central Zone Scallop Fishery, the Small Pelagic Fishery, the Southern Squid Jig Fishery and the shark gillnet sector of the SESS Fishery are actively fishing in the EMBA. Detailed mapping is provided where there is overlap between recent fishing intensity and the EMBA.

As detailed in Table 4.3, 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 5.17: Commonwealth-managed commercial fisheries in the operational area and EMBA

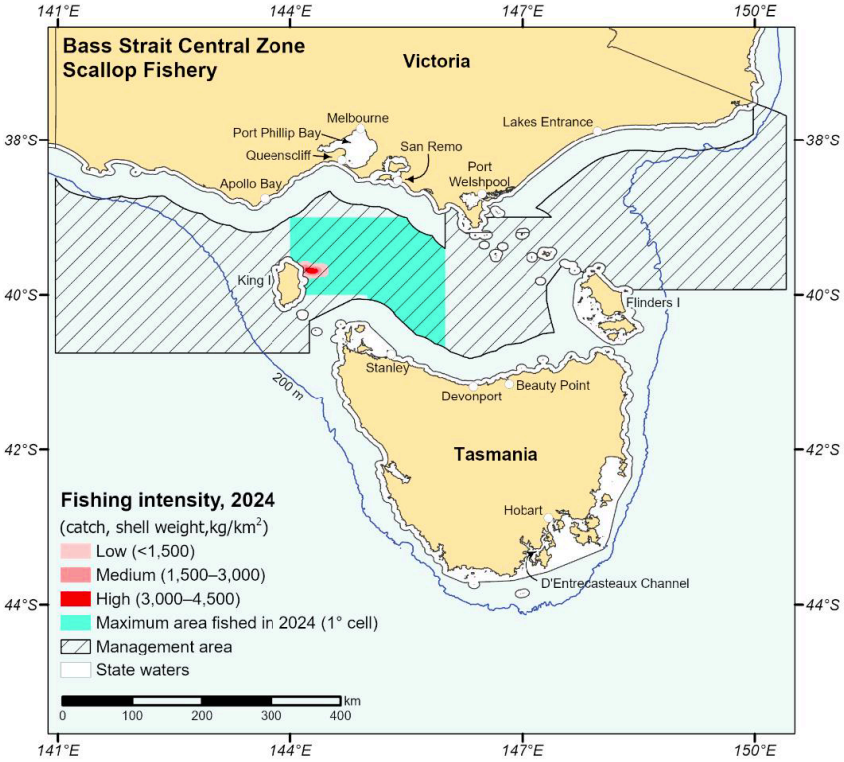
Fishery	Target species	Geographic extent of fishery	Does fishing occur in the EMBA?	Fishing season	Fishing methods, vessels and licences	Catch data and other information
Bass Strait Central Zone Scallop Fishery (Figure 5.28)	Commercial scallop (*Pecten fumatus*)	Central Bass Strait area that lies within 20 nm of the Victorian and Tasmanian coasts. Fishery does not operate in state waters. Fishing effort is concentrated east of King Island, off Apollo Bay and north of Flinders Island.	Yes. The EMBA intersects the fishery management area, but not the maximum area fished (2024)..	1st April to 31st December.	Towed scallop dredges that target dense aggregations ('beds') of scallops. 37 fishing permits are in place. 8 vessels were active in the fishery in 2024, a decrease from 26 active vessels in 2009, reflecting the 'boom or bust' nature of the fishery.	2023 – 2,063 tonnes worth $4.2 million 2024 – 1,106 tonnes worth $2.6 million. Scallop spawning occurs from winter to spring (June to November), with timing dependent on environmental conditions such as wind and water temperature.
Eastern Tuna and Billfish Fishery (Figure 5.29)	Albacore tuna (*Thunnus alulunga*), bigeye tuna (*T. obesus*), yellowfin tuna (*T. albacares*), broadbill swordfish (*Xiphias gladius*), striped marlin (*Tetrapturus audux*)	Fishery extends from Cape York in Queensland to the South Australian/Victorian border. Fishing occurs in both the AFZ and adjacent high seas.	No. The EMBA intersects the domestic fishery management area,, but not the maximum area fished (2024).	12-month season begins 1st March.	Pelagic longline is the key fishing method, with small quantities taken using minor line methods (such as handline, troll, rod and reel). Active long line vessel numbers were 38 in 2024 (down from about 150 in 2002). No Victorian or Tasmanian ports are used for land catches.	2023 – 3,846 tonnes worth $39.1 million 2024 – 4,599 tonnes worth $37.0 million. Spawning occurs through most of the year in water temperatures greater than 26°C (Wild Fisheries Research Program, 2012).

Fishery	Target species	Geographic extent of fishery	Does fishing occur in the EMBA?	Fishing season	Fishing methods, vessels and licences	Catch data and other information
Southern Bluefin Tuna (Figure 5.30)	Southern bluefin tuna (*Thunnus maccoyii*)	The fishery extends throughout all waters of the AFZ. The nearest fishing effort is concentrated along the NSW south coast around the 200 m depth contour.	No. The EMBA intersects the domestic fishery management area, but not the maximum area fished with longlines (2024)..	12-month season begins 1st December.	Purse sein catch in the Great Australian Bight for transfer to aquaculture farms off Port Lincoln in South Australia (five to eight vessels consistently fish this area). Port Lincoln is the primary landing port. On the east coast, pelagic longline fishing is the key fishing method. Active long line vessel numbers were 27 in 2024 (down from about 150 in 2002).	For the east coast pelagic longline catches are: 2023 – 1,323 tonnes worth $7.81 million 2024 – 1,799 tonnes worth $17.05 million.
Small Pelagic Fishery (eastern and western sub-area) (Figure 5.31)	Australian sardine (*Sardinops sagax*), jack mackerel (*Trachurus declivis*), blue mackerel (*Scomber australasicus*), redbait (*Emmelichthys nitidus*)	Operates in Commonwealth waters extending from southern Queensland around southern Western Australia.	Yes. The EMBA intersects the eastern and western subareas, but not the maximum area fished (2023).	12-month season begins 1st May.	Purse seine and mid-water trawl, with the latter being the main method. Thirty (31) entities held licences in 2018-19 using four active vessels. The main landing ports are in Tasmania, South Australia and New South Wales, along with Geelong in Victoria.	A Total Allowable Commercial Catch (TACC) in recent years has not been reached. Catch ($) values are confidential due to the small number of fishers. 2022 – 19,527 tonnes. 2023 – 21,010 tonnes.

Fishery	Target species	Geographic extent of fishery	Does fishing occur in the EMBA?	Fishing season	Fishing methods, vessels and licences	Catch data and other information
Southern Squid Jig Fishery (Figure 5.32)	Arrow squid (*Nototodarus gouldi*)	The fishery extends from the SA/WA border east to southern Queensland.	Yes. The EMBA intersects the southern squid jig fishery management area,, but not the maximum area fished (2024).	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. In 2024 there were 10 active vessels. Portland, Apollo Bay, Port Fairy, Geelong and Queenscliff are the primary landing ports.	2023 – 964 tonnes worth $4.0 million 2024 – 1,052 tonnes worth $3.42 million. The species' short life span, fast growth and sensitivity to environmental conditions result in strongly fluctuating stock sizes.
Southern and Eastern Scalefish and Shark Fishery (SESSF)						
Shark Gillnet and Shark Hook Sector (Figure 5.33)	Gummy shark (*Mustelus antarcticus*) is the key target species, with bycatch of elephant fish (*Callorhinchus milii*), sawshark (*Pristiophorus cirratus, P. nudipinnis*), and school shark (*Galeorhinus galeus*).	Waters from the NSW/Victorian border westward to the SA/WA border, including the waters around Tasmania, from the low water mark to the extent of the AFZ. Most fishing occurs in waters adjacent to the coastline in Bass Strait.	Yes. The EMBA intersects the Scalefish Hook Sector, Commonwealth Trawl Sector and Gillnet, Hook and Trap Sector (2024).	12-month season begins 1st May.	Demersal gillnet and a variety of line methods. Landing ports in Victoria are Lakes Entrance, San Remo and Port Welshpool. 2023 – 73 permits and 87 active vessels.	The SESS Fishery was the largest Commonwealth fishery in terms of volume produced. 2022 – 2,023 worth 21 million 2023 – 2,555 tonnes with no value assigned.
Commonwealth Trawl Sector (CTS) (Figure 5.34) and (Figure 5.35)	Key species targeted are eastern school whiting (*Sillago flindersi*), flathead (*Platycephalus*	Covers the area of the AFZ extending southward from Barrenjoey Point (north of Sydney) around the New South Wales,	Yes. The EMBA intersects the management area (SESSF Statistical Reporting Zone),	12-month season begins 1st May. Highest catches from September to April.	Multi gear fishery, but predominantly demersal otter trawl and Danish-seine methods. Primary landing ports in NSW, and Lakes	Logbook catches have been gradually declining since 2001. 2022 – 17,315 worth $80 million

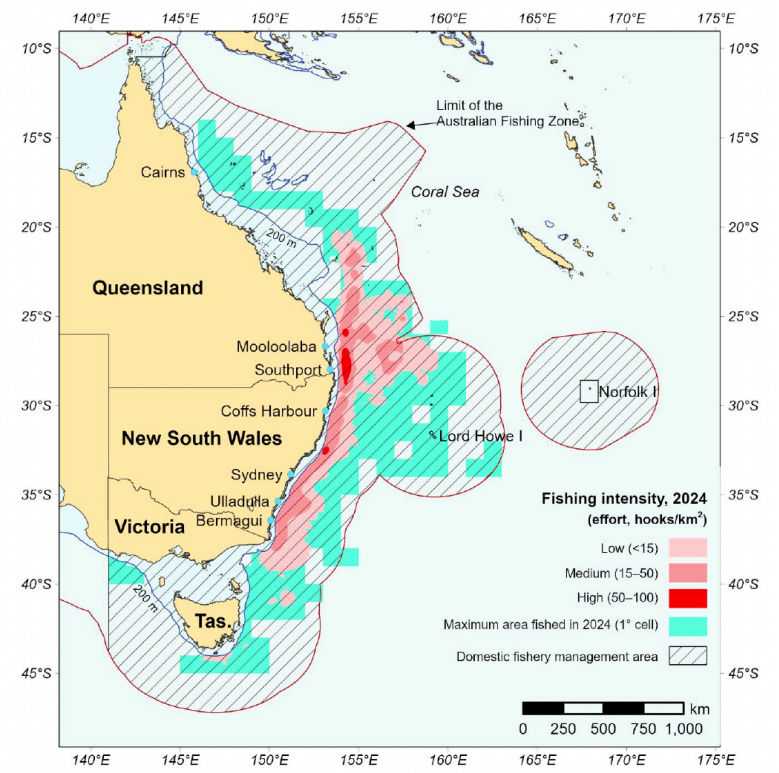
Fishery	Target species	Geographic extent of fishery	Does fishing occur in the EMBA?	Fishing season	Fishing methods, vessels and licences	Catch data and other information
	richardsoni), Blue grenadier, Orange roughy sp.	Victorian and Tasmanian coastlines to Cape Jervis in South Australia.	but not the maximum area fished (2023). Yes The EMBA intersects the Commonwealth trawl for Danish-seine maximum area fished and the management area fished (2023).		Entrance and Portland in Victoria. For 2023, there were 31 active trawl vessels and 18 Danish-seine vessels, and 57 Boat statutory fishing rights.	2023 – 11,246 tonnes with no value assigned.
Scalefish Hook Sector (SHS) (Figure 5.36)		Includes all waters off South Australia, Victoria and Tasmania from 3 nm to the extent of the AFZ.	Yes. The EMBA intersects the management area. but not the maximum area fished (2023).	12-month season begins 1st May. Effort highest from January to July.	Multi gear fishery, using different gear types in different areas or depth ranges. Predominantly demersal longline fishing methods, some of which are automated, and demersal gillnets. Victoria. For 2023, there were 12 active vessels and 37 Boat statutory fishing rights.	Logbook catches have been gradually declining since 2001. 2022 – 562 worth <$1 million 2023 – 717 tonnes with no value assigned.

Source: AFMA, 2025



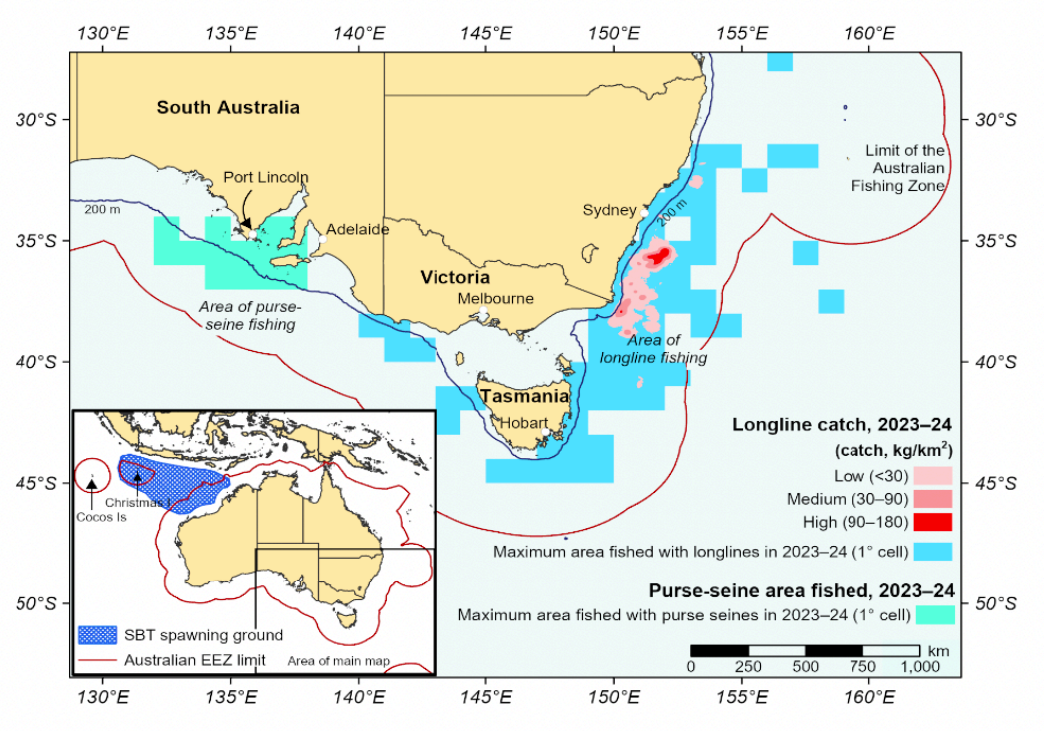
Source: Keller.K, Davis. K and Curtotti. R, 2025

Figure 5.28: Bass Strait Central Zone Scallop Fishery – area and relative fishing intensity, 2024



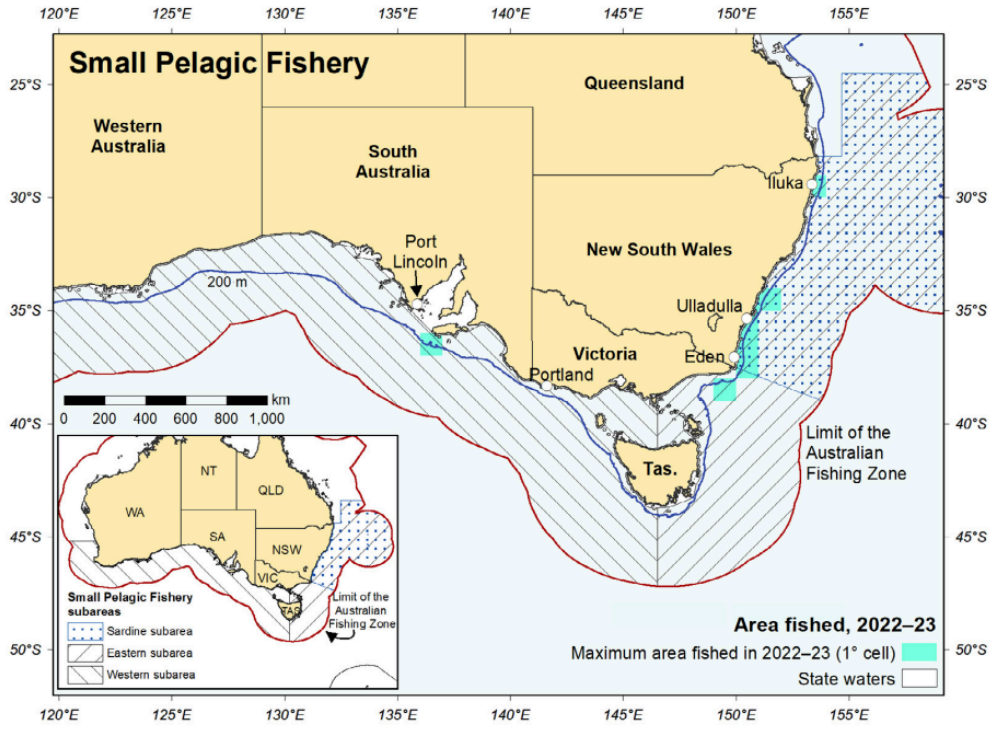
Source: Keller.K, Davis. K and Curtotti. R, 2025

Figure 5.29: Eastern Tuna and Billfish Fishery – fishing intensity, 2024



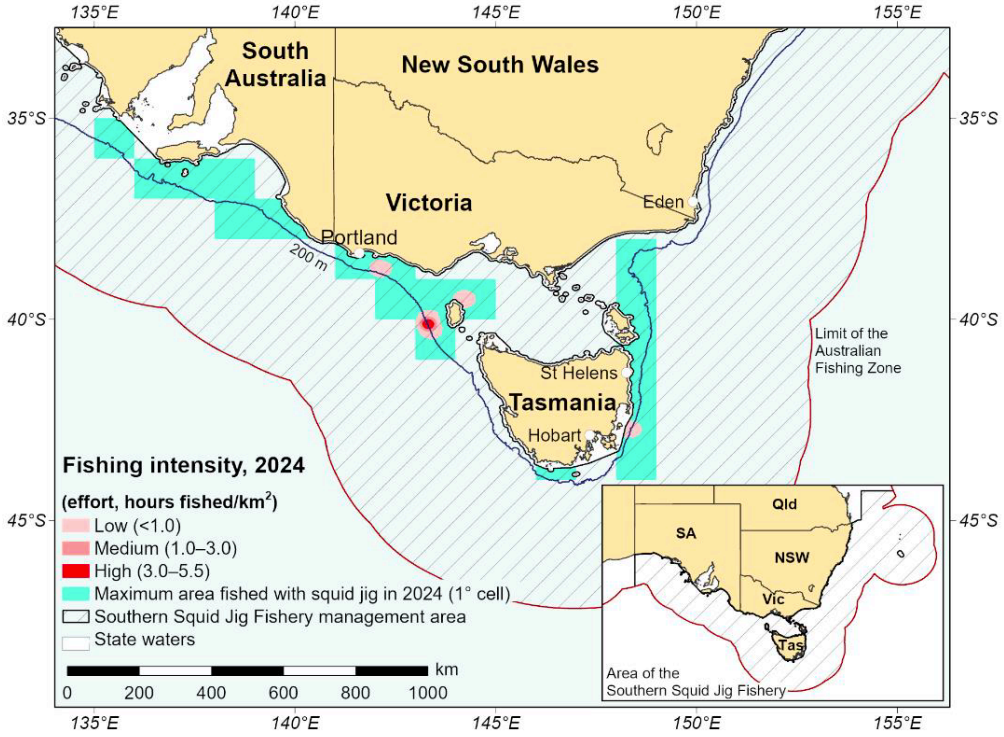
Source: Keller.K, Davis. K and Curtotti. R, 2025

Figure 5.30: Southern Bluefin Tuna Fishery – purse-seine area fished and longline catch, 2023–24 fishing season



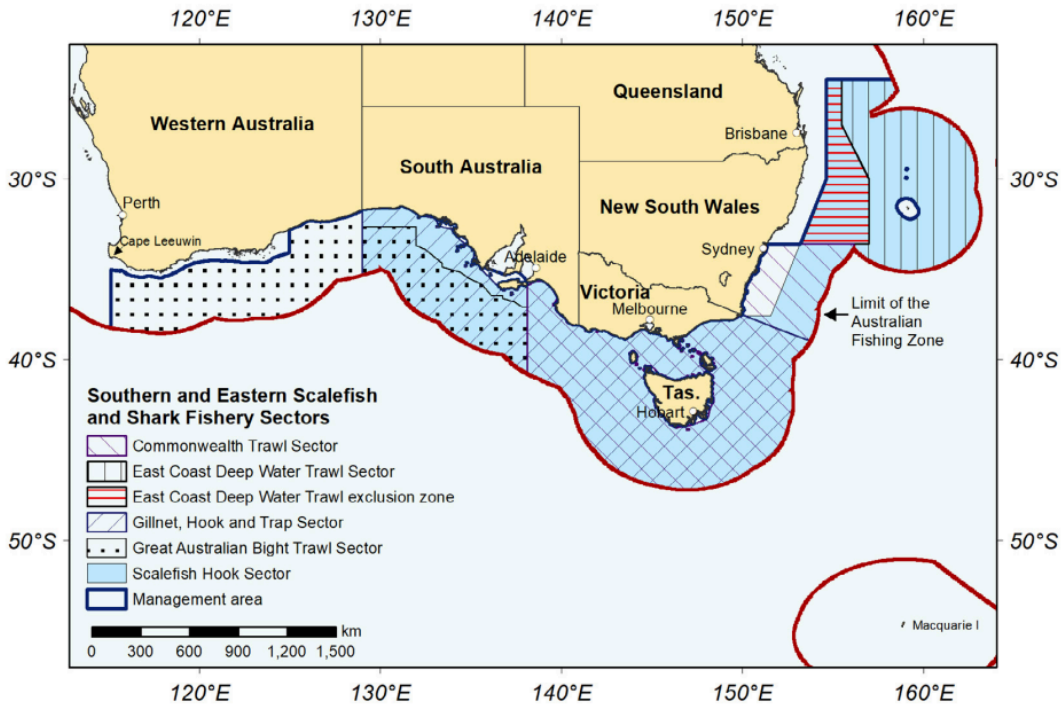
Source: Noriega. R, Davis. K and Tuynman. H, R, 2024

Figure 5.31: Area fished in the Small Pelagic Fishery, 2022–23 fishing season



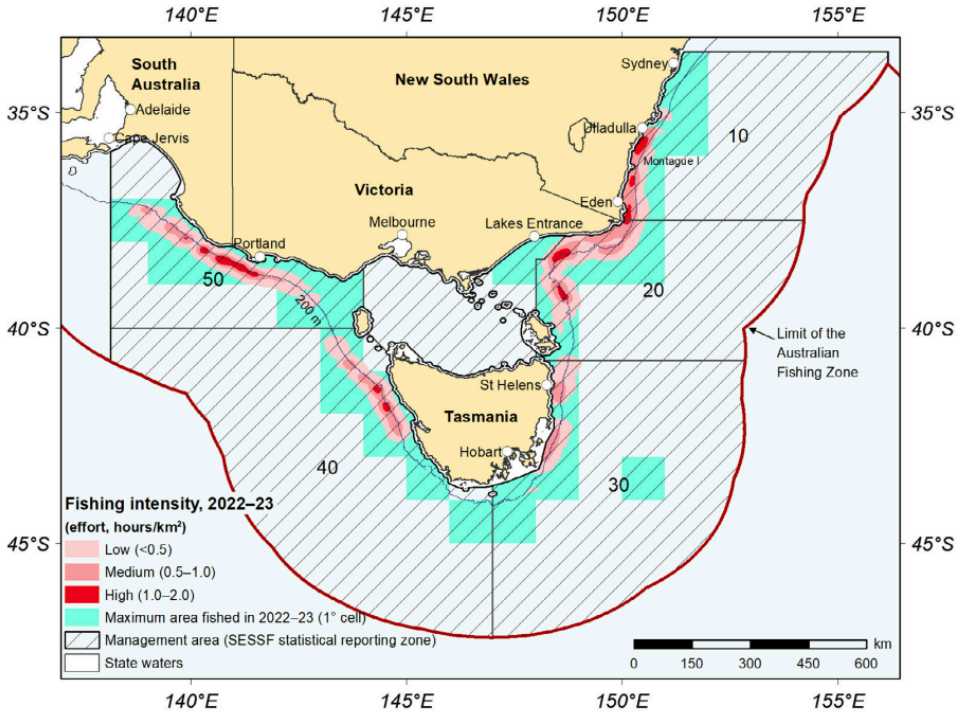
Source: Keller.K, Davis. K and Curtotti. R, 2025

Figure 5.32: Southern Squid Jig Fishery – fishing intensity, 2024



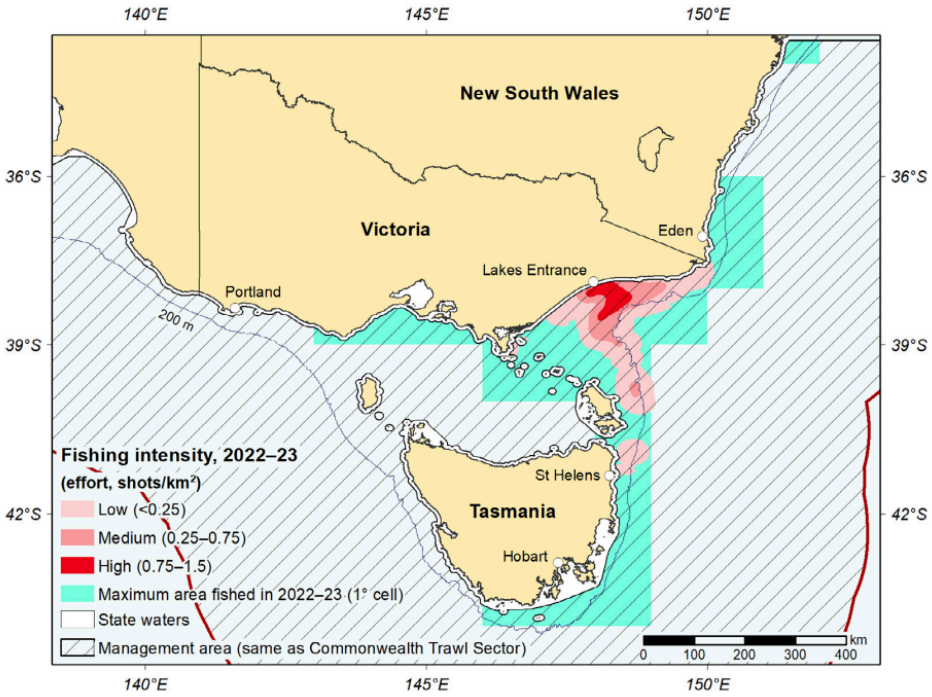
Source: Wright. D, Emery. T and Curtotti. R, 2024

Figure 5.33: Area and sectors of the Southern and Eastern Scalefish and Shark Fishery, 2023



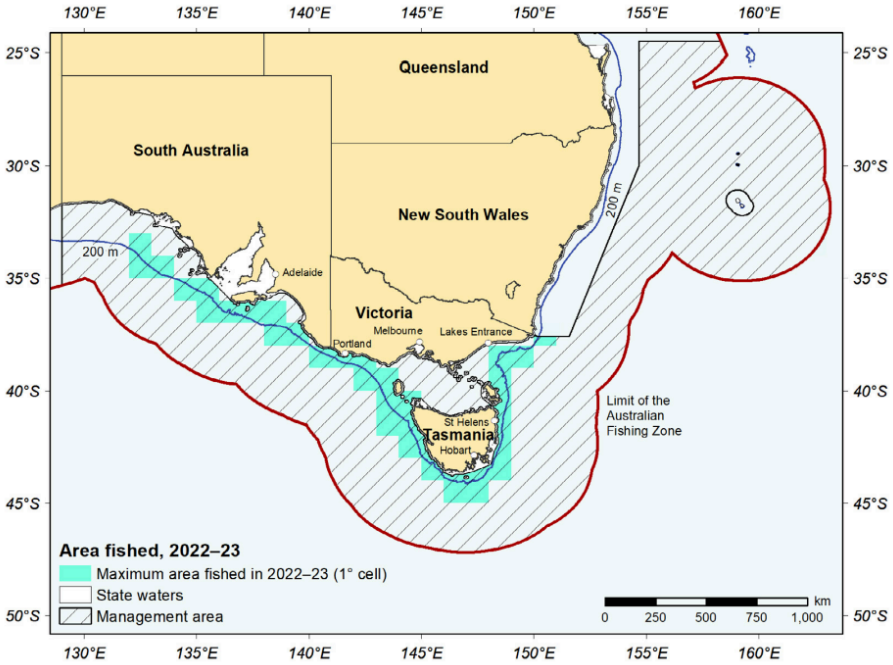
Source: Wright. D, Emery. T and Curtotti. R, 2024

Figure 5.34: Fishing intensity in the Commonwealth Trawl Sector for otter-board trawl, 2022–23 fishing season.



Source: Wright. D, Emery. T and Curtotti. R, 2024

Figure 5.35: Fishing intensity in the Commonwealth Trawl Sector for Danish-seine, 2022–23 fishing season



Source: Wright. D, Emery. T and Curtotti. R, 2024

Figure 5.36: Maximum area fished in the Scalefish Hook Sector, 2022–23 fishing season

Victorian-managed Fisheries

The VFA catch and effort grid cell network is based on divisions of 10′ latitude (approximately 10 nm) and 12.1′ longitude (approximately 12.1 nm). The RGP intersects catch and effort cells G27, H27, H28, J28 and K28, L28, L29, M29, N29, P29 and Q29 (Figure 5.37).

Table 5.18 provides the Victorian managed commercial fisheries in the operational area and EMBA summarises the key information for each of these fisheries and indicates that all the above-listed fisheries, except the seaweed and shellfish fisheries, are actively fishing in the EMBA.

Victorian-managed commercial fisheries with access licences that authorise harvest in the waters of the operational area and EMBA include the following:

- Bass Trait Scallop Fishery
- Abalone Fishery
- Rock Lobster Fishery
- Wrasse Fishery
- Pipi Fishery (eastern zone)
- Giant crab (western zone)

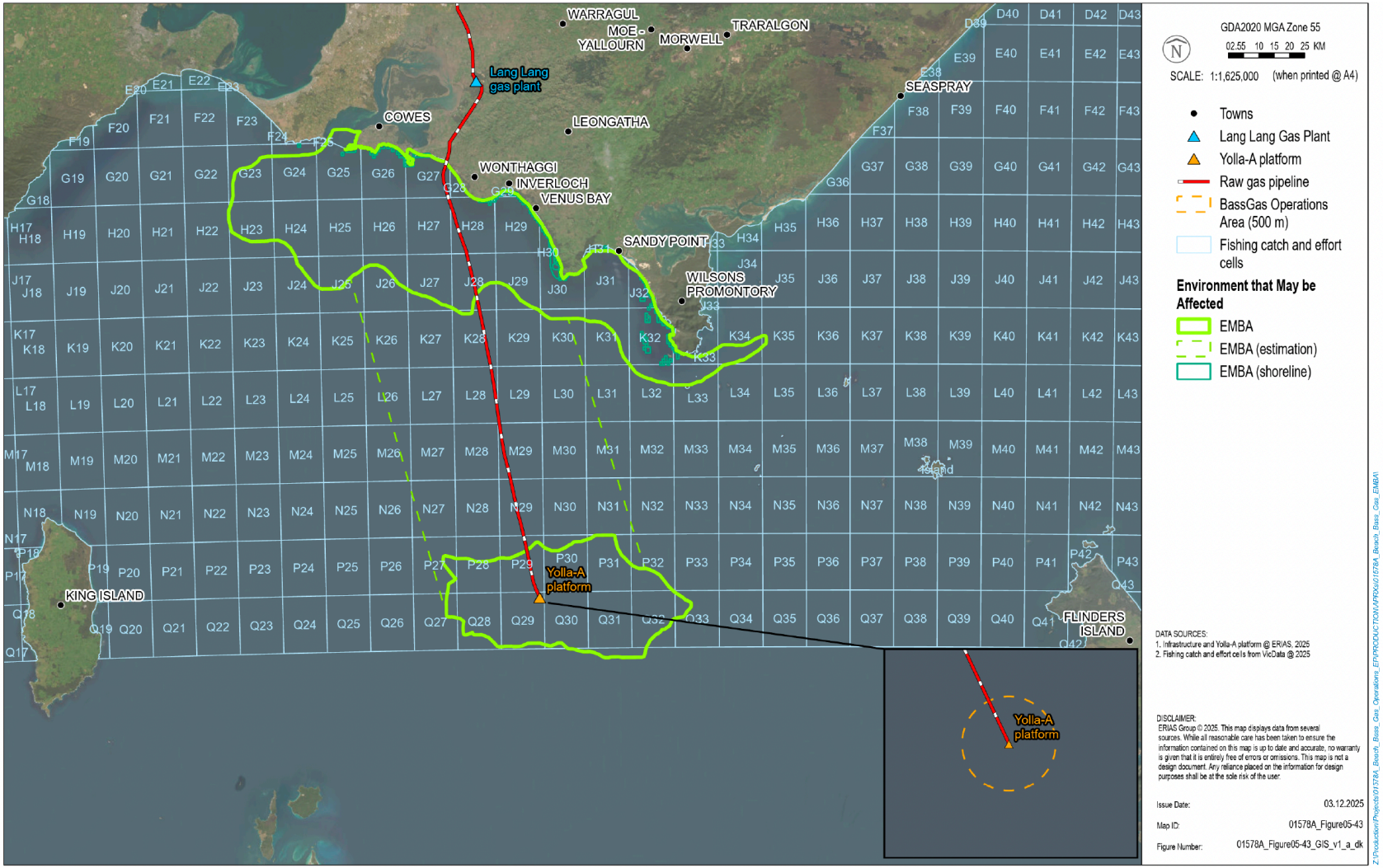


Figure 5.37: VFA fishing catch and effort grid cells overlapped by the BassGas Development and the EMBA

Table 5.18: Victorian-managed commercial fisheries in the operational area and EMBA

Fishery	Target species	Geographic extent of fishery	Does fishing occur in the EMBA?	Fishing season	Fishing methods, vessels and licences	Catch data and other information
Bass Strait Scallop Fishery (Victorian zone) (Figure 5.38)	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. The EMBA intersects 54% of the fishery.	No. Fishing effort is east of Wilsons Promontory. The Tasmanian sector is currently closed.	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 EMBA?	Fishing season	Fishing methods, vessels and licences	Catch data and other information
Abalone Fishery (Figure 5.39)	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.	Yes. EMBA covers the Central zone and is to the immediate east of the gas pipeline near the coastal crossing. 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
Rock Lobster Fishery (Figure 5.40)	Southern rock lobster (*Jasus edwardsii*). Very small bycatch of species including southern rock cod (*Lotella* and *Pseudophycis*	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	Yes. Based on catch data in the San Remo Region and prevalence of rocky reef in the coastal area of the pipeline. Waters around Yolla-A are too	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	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	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

Fishery	Target species	Geographic extent of fishery	Does fishing occur in the EMBA?	Fishing season	Fishing methods, vessels and licences	Catch data and other information
	spp), hermit crab (family Paguroidea), leatherjacket (*Monacanthidae* spp) and octopus (*Octopus* spp).	shelf, which is a high-current area, facilitating dispersal.	deep for this fishery.	moulting period when soft shells increase their vulnerability. Catches generally highest from August to January.	zone. Across the Victorian fishery there is a total of 118 licences.	2019/20 – 37.1 tonnes 2018/19 – 44.7 tonnes
Wrasse Fishery (Figure 5.41)	Blue-throat wrasse (*Notolabrus tetricus*), saddled wrasse (*N. fucicola*), orange-spotted wrasse (*N. parilus*).	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 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	Yes. In recent years, catches have been highest off the central coast (Port Phillip Heads, Western Port and Wilson's Promontory) and the west coast.	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 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.	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 2019/20 – 22 tonnes 2018/19 – 38 tonnes
Pipi fishery (Eastern Zone)	Pipi (*Donax deltoids*)	Covers the entire Victorian coastline, with pipis found in the surf zone of high-energy sandy beaches. The EMBA intersects both the western and eastern zones (being the Victorian shoreline).	Yes. Wherever there are high-energy sandy beaches. Venus Bay is a popular harvesting area.	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 EMBA?	Fishing season	Fishing methods, vessels and licences	Catch data and other information
Giant crab (Western Zone) Fishery	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.	Yes. The extent cover the eastern zone fishery zone.	Closed season from: 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.	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 lobster and giant crabs to escape. The maximum number of licences is 30 and a maximum of 140 pots across the fishery.	Catches of giant crab for the last five seasons were: 2023/24 – 7 tonnes 2022/23 – 7 tonnes 2021/22 – 7.5 tonnes 2020/21 – 8 tonnes 2019/20 – 9.5 tonnes 2018/19 – 9.5 tonnes.

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)

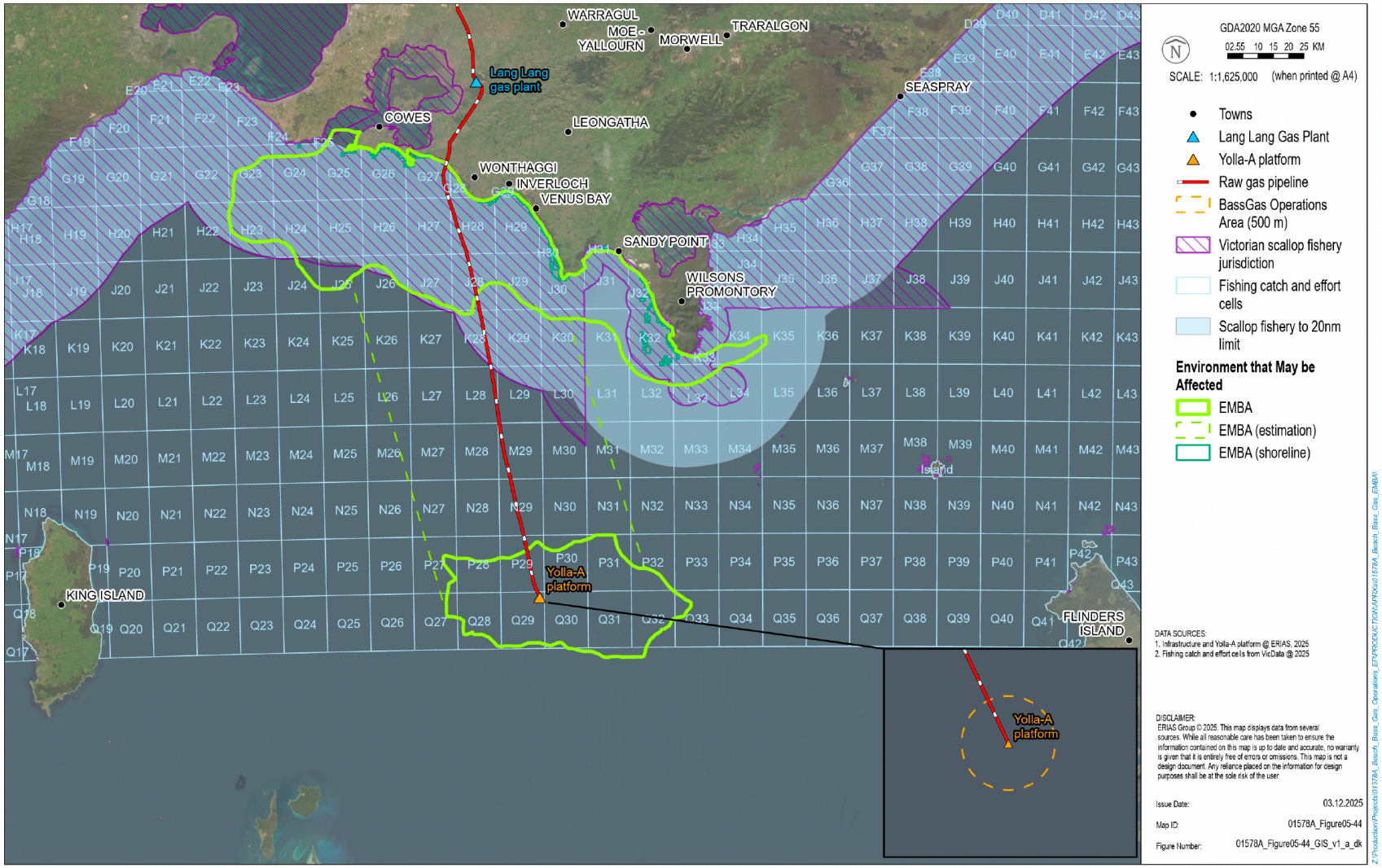


Figure 5.38: Jurisdiction of the Victorian scallop fishery and its intersection with the operational area and spill EMBA

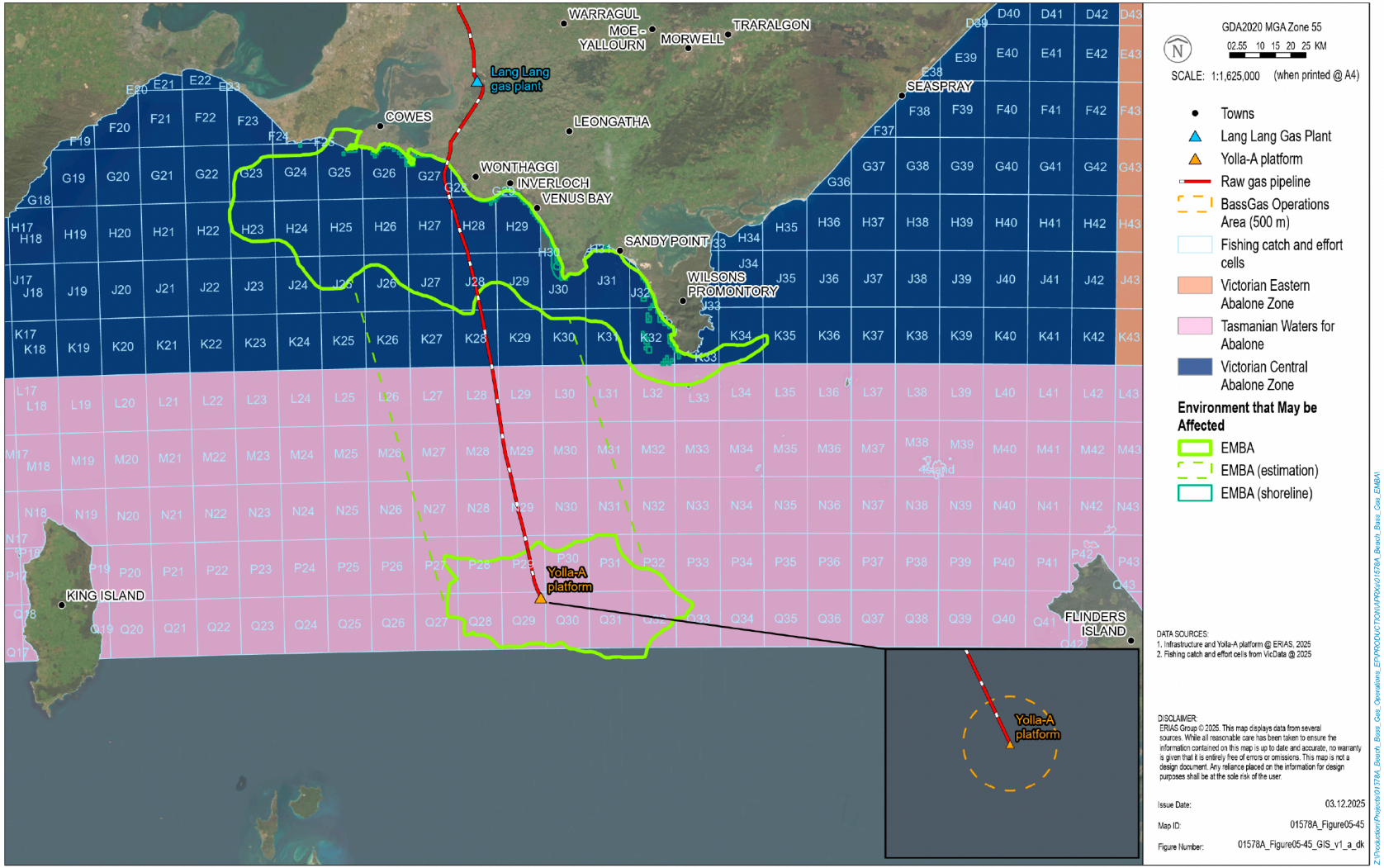


Figure 5.39: Jurisdiction of the Victorian (and Tasmanian) abalone fishery and its intersection with the operational area and EMBA

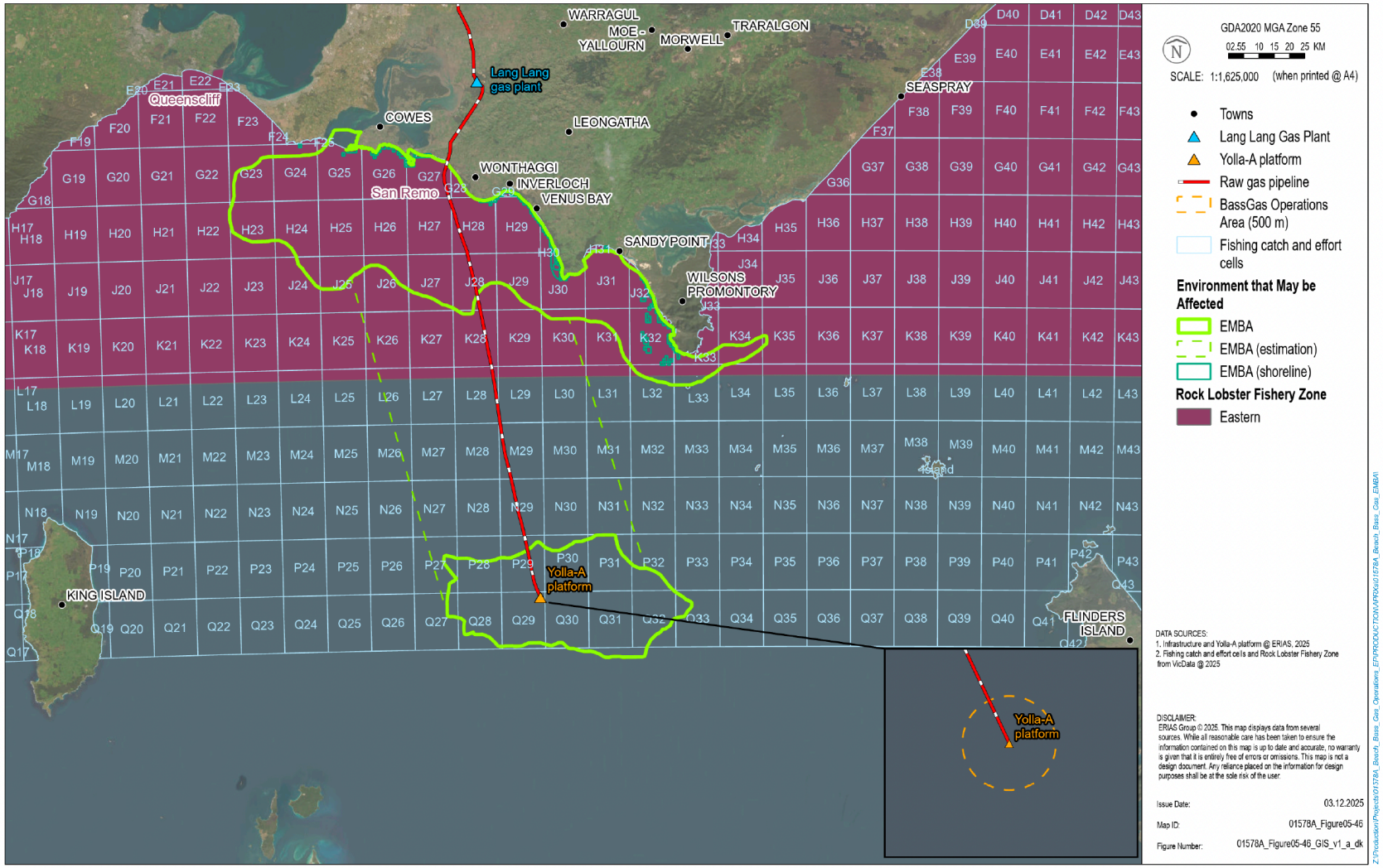


Figure 5.40: Jurisdiction of the Victorian southern rock lobster fishery and its intersection with the operational area and EMBA

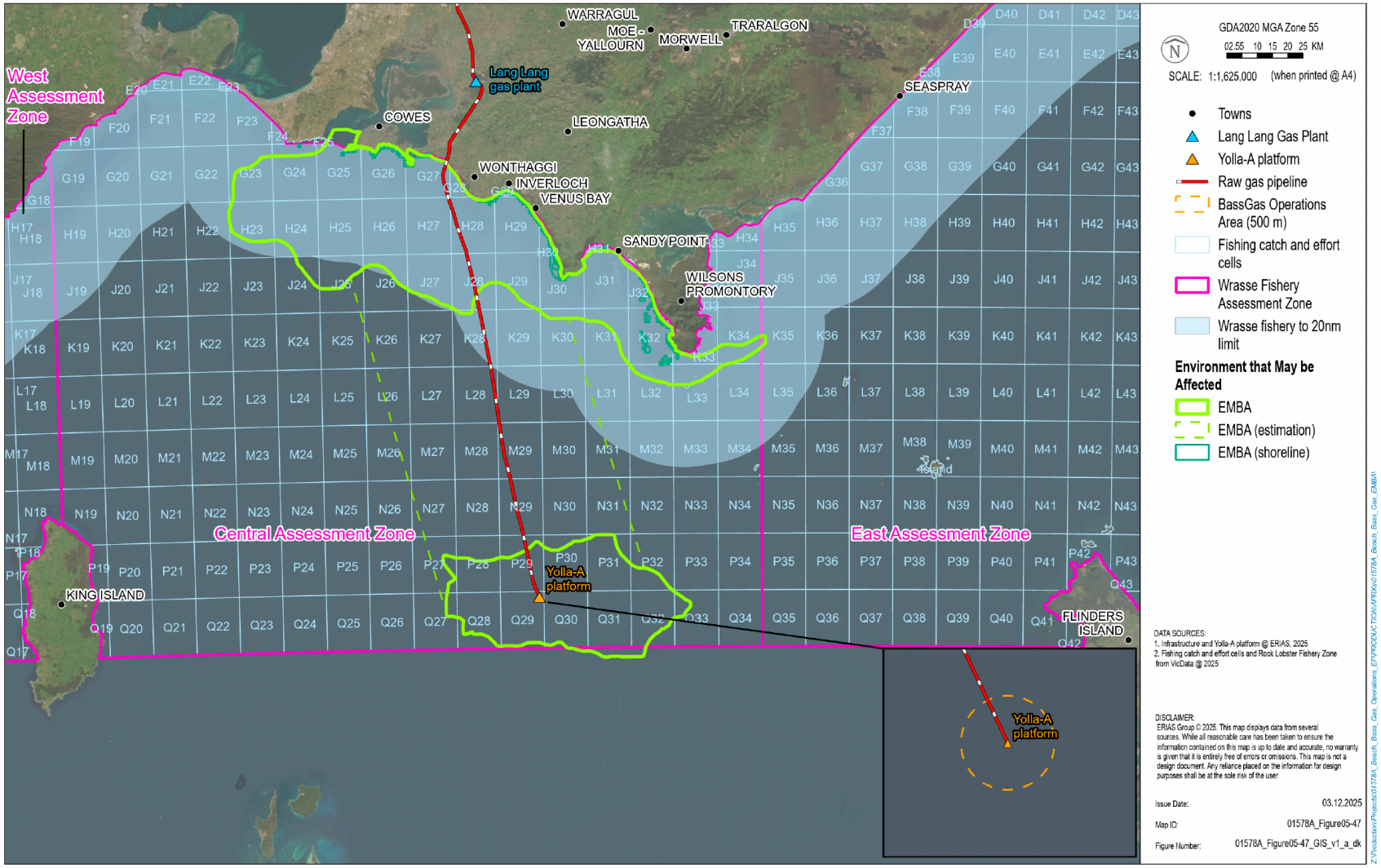


Figure 5.41: Jurisdiction of the Victorian wrasse fishery and its intersection with the operational area and EMBA.

5.8.6 Commercial Shipping

The South-east Marine Region (which includes Bass Strait) is one of the busiest shipping regions in Australia (DCCEEW, 2015a). Shipping consists of international and coastal cargo trade, passenger services and cargo and vehicular ferry services across Bass Strait (DCCEEW, 2015a).

The 'Spirit of Tasmania' ferry service runs between Melbourne and Devonport (northern Tasmania) on a daily basis. Traffic volume data areas clearly illustrate this route (

Figure 5.42), which is located about 40 km southwest of Yolla-A. The route for other maritime traffic that flows between Melbourne and the Australian east coast passes close to Wilsons Promontory and across the BassGas pipeline (see

Figure 5.42).

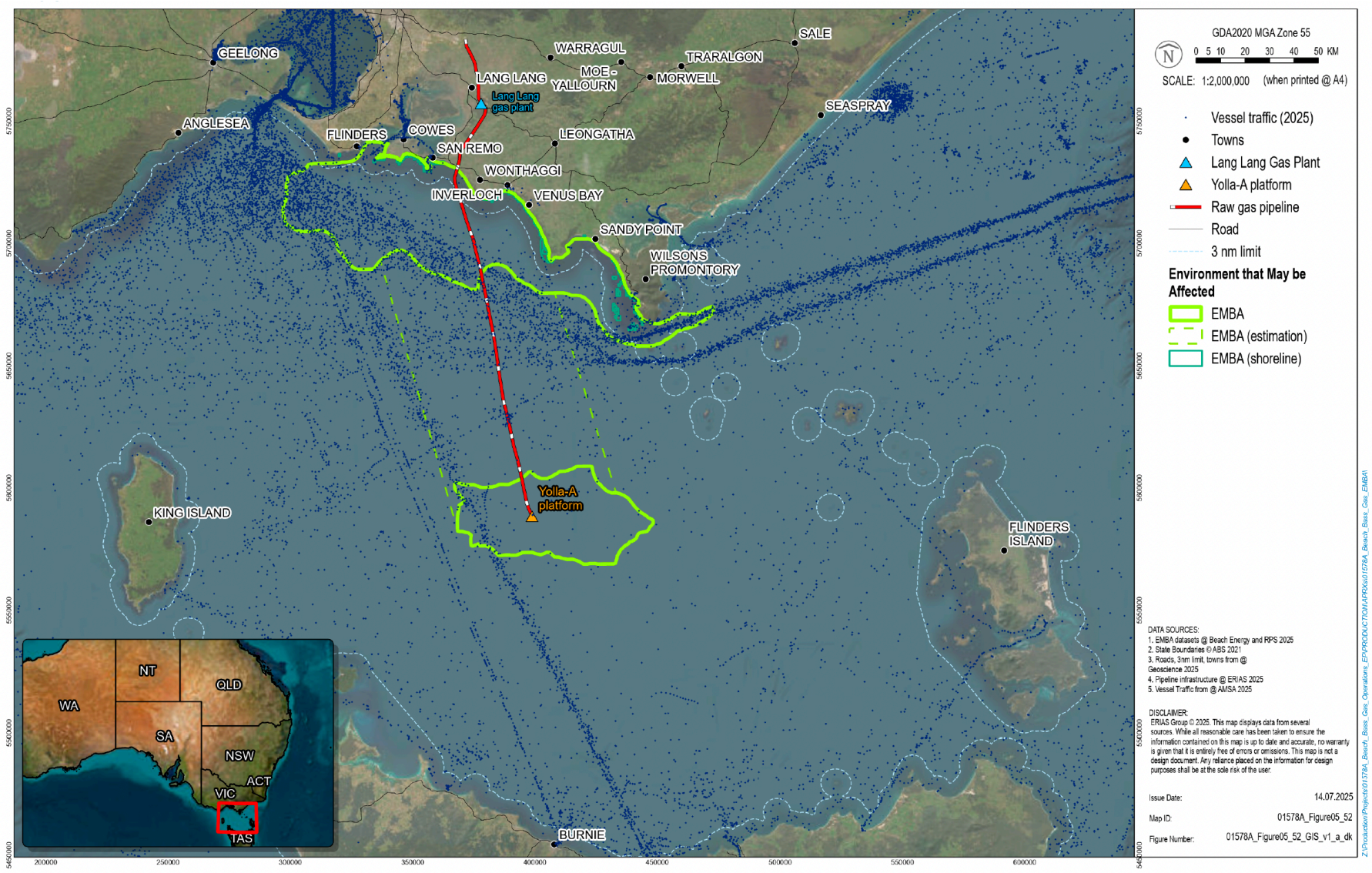


Figure 5.42: Commercial shipping traffic in the EMBA

6 Environmental Impact and Risk Assessment Methodology

6.13 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.

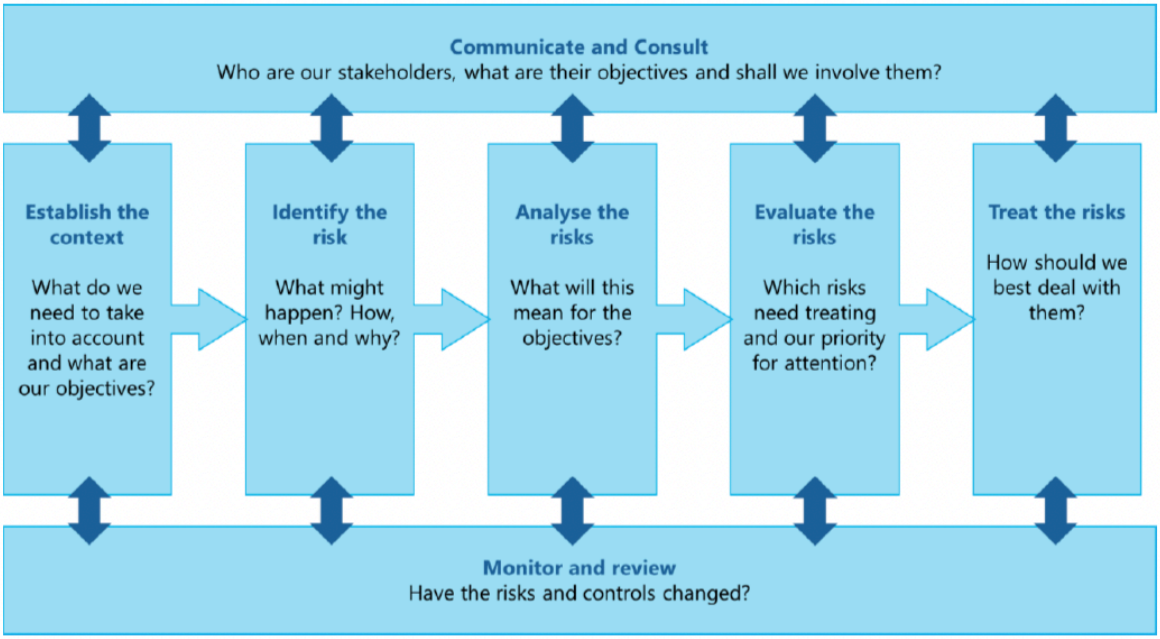


Figure 6.1: Beach risk assessment process

6.13.1 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*
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.

Term	Definition
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).

6.14 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**.

6.15 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 **Section 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 **Section 4**, 'Stakeholder Consultation'.

- Understanding the regulatory framework in which the activity takes place as described in **Section 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 **Section 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.

6.16 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 7-1 details the aspects identified for the activity.

6.17 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.

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).

6.18 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

CDN 14740489 Beach Risk Matrix

Risk Matrix

CONSEQUENCE		CONSEQUENCE CATEGORY					LIKELIHOOD					
		PEOPLE	ENVIRONMENT	REPUTATION	FINANCIAL[1]	LEGAL	A. Remote	B. Highly Unlikely	C. Unlikely	D. Possible	E. Likely	F. Almost Certain
		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.)	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.
CONSEQUENCE	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	>$500m	Prolonged and complex civil and/or regulatory litigation; potential jail terms and/or very high fines and/or damages claim	HIGH	HIGH	VERY HIGH	VERY HIGH	VERY HIGH	VERY HIGH
	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	$100m-$500m	Civil and/or regulatory litigation; potential significant fines and/or damages claim	MEDIUM	MEDIUM	HIGH	HIGH	VERY HIGH	VERY HIGH
	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	$10m-$100m	Civil and/or regulatory litigation; potential major fine and damages claim	MEDIUM	MEDIUM	MEDIUM	HIGH	HIGH	VERY HIGH
	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	$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	HIGH
	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	$100k-$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
	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	≤$100k	Minor potential breach of law; not reportable to a regulator; on the spot fine or technical non-compliance	LOW	LOW	LOW	MEDIUM	MEDIUM	MEDIUM

6.19 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.

6.19.1 Residual Impact and Risk Levels

6.19.1.1 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 2.7.2.1) is sufficient to manage the impact or risk to ALARP.

6.19.1.2 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 6.6.3.

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		

6.19.2 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

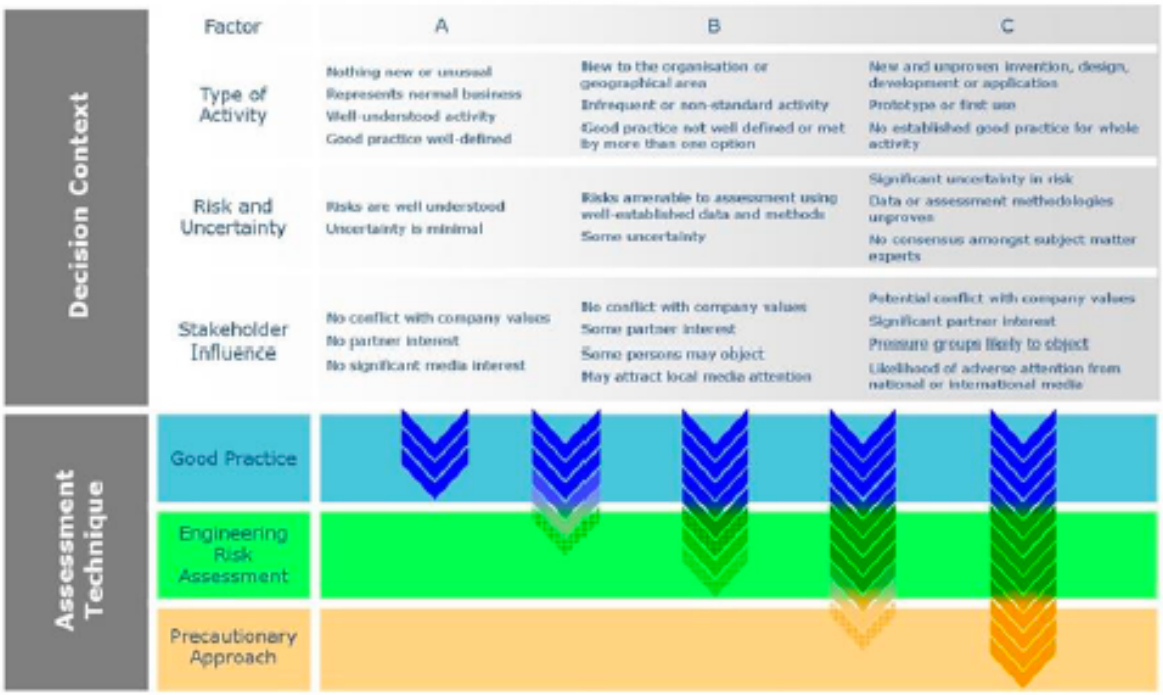


Figure 6.2: Impact and risk 'uncertainty' decision-making framework (OGUK, 2014)

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:

6.19.2.1Good 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.

6.19.2.2 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.

6.19.2.3 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.

6.20 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.

6.20.1 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 6.4

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.

6.20.2 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.

6.20.3 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.

6.20.4 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.

6.21 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.

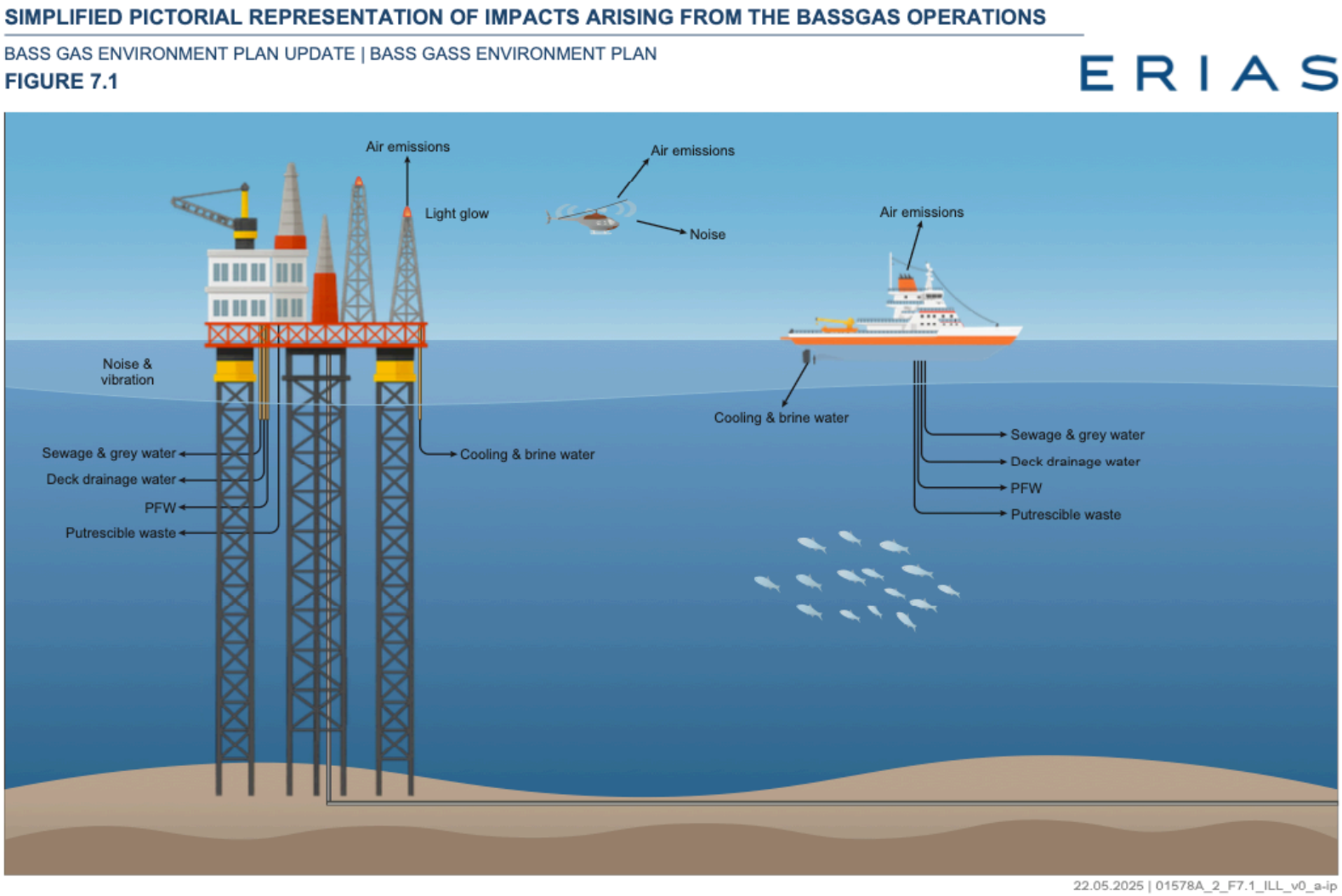
This chapter also presents the EPO, EPS and measurement criteria required to manage the identified impacts and risks. A summary of the impact consequence rankings and risk ranking for each hazard identified and assessed in this chapter is presented in Table 7.1

Table 7.1: BassGas offshore operations environmental impacts and risk summary

No	Hazard	Inherent	Residual
Impact		Consequence Rating	
1	Physical presence of infrastructure and vessels	Minor	Minor
2	Infrastructure inspection and maintenance	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	Medium	Low
2	Vessel collision with megafauna	Medium	Low
3	Introduction of invasive marine species	Medium	Medium
4	LoC (chemicals) – platform	Low	Low
5	LoWC (gas condensate) – wells	Medium	Low
6	LoC (gas condensate) – raw gas pipeline	Medium	Low
7	LoC (MDO) – vessels	Medium	Low
8	Oil spill response activities – excluding well relief drilling	Low	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.

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 inspection and maintenance activities will only occur when they are operating along the RGP, which is infrequent and for short durations.

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.

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.

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) representing the Operational Area (Figure 5.1).Sensitive marine receptors likely to occur within the Operational Areas 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).
- The ecological receptors identified above are values of the following within the EMBA
- Conservation values and sensitivities.
- Traditional Owners with cultural heritage 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 96% of the length of the RGP, exist within Commonwealth waters.	Four percent (4%) of the length of the RGP exists within Victorian waters
Vessels could be working along any part of the RGP	

7.1.5 Potential Level 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 Development is limited to that occupied by the platform and the offshore RGP.

There are no known sensitive seabed features in the EMBA 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 5.9). 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.

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 impact is assessed as **Minor**.

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 5.6.6. 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. This presence of the platform is assessed as **negligible** for an impact to increase in travel time and fuel use for marine users who have to change navigation path to avoid it.

The platform has a fully automatic navigational aid system, as described in Section 3.5.19, 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 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. However, it is unlikely that a collision would be forceful enough to breach a vessel's hull controls, such as high visibility of vessels, the advanced navigation aids employed by large vessels, and stakeholder consultations for inspection routine 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 5.6.5). 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 risk remains low.

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 5.6.56), 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 5.6.5), only the Commonwealth-managed Small Pelagic Fishery is impacted by the PSZ this fishery continues to operate in the area without impacts from the BassGas Development.

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 circumstance may cause vessel master's 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:

10. The party claiming there is a dispute must provide written notification to the other party, detailing the nature of the dispute.

11. 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.

12. If the meeting does not resolve the dispute within seven days, Beach will immediately appoint a mediator.

13. 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.

14. If mediation fails to resolve the dispute, either party may initiate legal proceedings as stated in Clause 6 of the Mediation Code of Practice.

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).

7.1.6 Impact Assessment

Table 7.2: Impact assessment for the physical presence of infrastructure and vessels.

ALARP decision context and justification	ALARP Decision Contact: Type A Impact of the physical presence of the platform, pipeline and vessels are well understood, and there is nothing new or unusual. Good practice is well defined, and uncertainty is minimal. There are no conflicts with company values, partner interests and no significant media interests. No objections or claims were raised by stakeholders in relation to physical presence. During ongoing consultation any concern from stakeholder will be managed to close, for the life of asset. As the impact consequence is rated as Minor (1) applying good industry practice is sufficient to manage the impact to ALARP.
Adopted Control Measures	**Description**
CM01: Marine Assurance Process	Beach Marine Assurance System ensures that vessels meet relevant maritime laws and includes pre-commencement rig and vessel inspections of class certification requirements under the Navigation Act 2012 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.

CM02: Operational procedures	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.
CM03: Third-party marine users.	Beach will undertake consultation for the implementation of the EP which will include at a minimum: • The BassGas offshore infrastructure and PSZ are marked on maritime nautical charts (nautical charts Aus 150, 487 & 801). • Navigational lights are operated on Yolla-A in accordance with Navigation Act 2012 (Cth) (Chapter 6, Part 3, Division 2 – Collisions, Lights and Signals). • Beach regularly liaises with fisheries and navigation agencies to ensure they are aware of planned vessel-based inspection and maintenance activities. • The Australian Hydrographic Office and/or Maritime Safety Victoria will be notified of the vessel-based activity no less than four weeks prior to it commencing to enable the promulgation of Notice to Mariners and AusCoast navigational warnings. • Visual and radar watch is maintained on the bridge of the project vessel at all times. 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 Sea-farers [STCW95], GDMSS proficiency). • The Vessel Master issues warnings (e.g., radio warning, flares, lights/horns) to third-party vessels approaching the vessel in order to prevent a collision.
CM04: Beach Fair Ocean Access Procedure	Upon notification of a claim of interference, Beach will enter the details into the CMO incident management system and follow its Investigations Procedure to investigate the complaint/incident and determine whether compensation is payable to the complainant.

Table 7.3: Demonstration that Impacts will be of an Acceptable Level

Consequence rating	Minor (1)
Likelihood of occurrence	NA (Impact)
Residual risk	NA (Impact)
Acceptability Assessment	
To meet the principles of ESD	Physical presence was assessed as having a Minor (1) consequence which is not considered as having the potential to result in serious or irreversible environmental damage. There is high confidence in the potential level of impact as Beach has significant experience operating in the Bass Basins based on their existing offshore developments and associated activities. The EIA presented throughout this EP demonstrates that ESD principles (a), (b), (c) and (d) are met (noting that principle (e) is not relevant).
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 the physical presence of infrastructure or vessels.
Other requirements	Physical presence will be managed in accordance with the applicable legislative requirements such as the Navigation Act 2012 and associated Marine Orders as detailed in Section 7.5.6.
Environmental MNES	
BIA	Albatross and Giant Petrels – Foraging. Blue whale - Foraging (likely to be present), known foraging area (known to be present) for pygmy blue. Southern right whale – Breeding. Great white shark – Foraging.
Australian Marine Parks	This hazard does not intersect nearby AMPs.
Wetland of International Importance:	This hazard does not intersect any Ramsar wetlands.
Threatened Ecological Communities	This hazard does not intersect any TECs.
Nationally important wetlands	This hazard does not intersect any NIWs.
Nationally threatened and migratory species	As per the impact and risk assessment operational activities will be managed in accordance with and will not compromise the specific objectives or actions of the following plans: • Albatross and Giant Petrels Recovery Plan (DCCEEW, 2022) • National recovery plan for the Dwarf Galaxias (Galaxiella pusilla) (Department of Sustainability and Environment, 2010b) • White shark Recovery Plan (Carcharodon carcharias) (DSEWPaC 2013b). • Recovery Plan for the Grey Nurse Shark (Carcharias taurus) (DoE, 2014b) • Marine turtles as per the Recovery Plan for Marine Turtles in Australia (DoEE, 2017). • Conservation of listed seabirds as per the Wildlife Conservation Plan for Seabirds (CoA, 2020a). • National Recovery Plan for the Orange-bellied Parrot (DELWP 2016). • Conservation Management Plan for the Blue Whale (DoE, 2015). • National Recovery Plan for the Southern Right Whale (DCCEEW, 2024). • Conservation Advice for Fin Whales (TSSC, 2015c) and Conservation Advice for Sei Whales (TSSC, 2015b).
Monitoring and reporting	Monitoring of potential impacts is undertaken via stakeholder consultation as detailed in Section 4. Recording keeping will include: • BassGas stakeholder engagement register. • Vessel PMS records. • Notices to Mariners. • Communications logs. • Incident register/reports. • Stakeholder flyers.

Acceptability outcome	Acceptable
Environmental Performance	EPOs represent the measurable levels of environmental performance Beach is seeking to achieve to ensure impacts are of an acceptable level. EPOs relevant to the effective management of impacts associated with physical presence from the Yolla-a platform, RGP and planned activities are: • EPO1: Undertake the activity in a manner that will not interfere with other marine users to a greater extent than is necessary for the exercise of right conferred by the titles granted. • EPO3: Biologically important behaviours can continue while the activity is being undertaken. Table 7.93 sets out the EPS for the control measures identified above, and the measurement criteria to evaluate the achievement of EPOs and EPS.
Cumulative Impacts	There is potential for cumulative impacts on marine fauna due to overlapping activities of FSVs during operations and routine RGP asset integrity inspection, maintenance and repair of the platform and pipeline. FSVs may be operational simultaneously, along with additional vessels involved in planned activities. Consultation with Marine users will be actioned. .

7.2 IMPACT 2: Infrastructure Inspection and Maintenance

7.2.1 Source of Aspect

Infrastructure Inspection and maintenance 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.

7.2.2 Known and Potential Environmental Impacts

Inspection and maintenance 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) (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 and maintenance activities is limited in spatial extent to no greater than several metres radius from the activity, representing the operational area (Figure 5.1).

Receptors in the EMBA include:

- Pelagic fauna (plankton, fish, marine mammals).
- Benthic habitats (sandy seabed and rocky reef) and associated flora and fauna (invertebrates, fish, algae, seagrass).
- Demersal fauna (fish).
- Commercial and recreational fishing vessels and fishers.
- Commercial shipping.

Local marine users for tourism and recreational purposes.

7.2.4 Jurisdiction of Hazard

The jurisdictions for this hazard are outlined below.

Commonwealth waters	Victorian waters
YES	YES
Inspection and maintenance activities occur on the platform topsides and jacket and the section of the RGP in Commonwealth waters.	Pipeline inspection and maintenance activities occur on the section of the RGP that occurs in Victorian waters

7.2.5 Potential Level 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 impacts on benthic habitat and fauna are expected to be Minor. 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.

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.

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 impacts are considered Minor.

7.2.6 Impact Assessment

Table 7.4: Impact assessment for infrastructure inspection and maintenance activities

ALARP decision context and justification	ALARP Decision Contact: Type A Impact of infrastructure inspections and maintenance activities of the platform and pipeline are limited to the immediate works area as per the activity specific plan, are localised and are temporary activities that are well understood. Good practice is well defined, and uncertainty is minimal. There are no conflicts with company values, partner interests and no significant media interests. No objections or claims were raided by stakeholders in relation to routine inspection and maintenance activities. During ongoing consultation any concern from stakeholder will be managed to close, for the life of asset. As the impact consequence is rated as Minor (1) applying good industry practice is sufficient to manage the impact to ALARP.
Adopted Control Measures	**Description**
CM02: Operational procedures	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.
CM05: Minimal Adverse Seabed Disturbance	• Inspection and maintenance activities are limited to the immediate works area as per the activity specific plan (i.e., no indiscriminate sand or water blasting). • Water blasting is given preference to grit blasting. • Grit blasting on the platform jacket and topsides uses containment and recovery to minimise losses to the ocean. • Grit blasting material selection is undertaken in accordance with the chemical selection procedure (see Section 8.19). • Vessels used to undertake maintenance activities will preferentially use DP; they will only anchor where DP presents unacceptable safety risks.

Additional Control Measures Assessed		
Control	**Cost/Benefit Analysis**	**Control implemented?**
No anchoring, Dynamic	No anchoring of vessels within Operational Areas eliminates seabed disturbance from anchor and drag/ placement.	No

Positioning (DP) systems only.	Use of DP alone for maintaining station is feasible, however, would lead to disproportionately higher continuous noise impacts to sensitive receptors.	
Use less or smaller anchors to reduce seabed disturbance	Minimises contact with seabed and resultant disturbance. The number and size of anchors used will be determined by the vessel contractor, metocean conditions and safety risks as evaluated in the mooring plan. Reducing the recommended number of anchors	No

Table 7.5: Demonstration that Impacts will be of an Acceptable Level

Consequence rating	Minor (1)
Likelihood of occurrence	NA (Impact)
Residual risk	NA (Impact)
Acceptability Assessment	
To meet the principles of ESD	Infrastructure inspection and maintenance activities are assessed as having a Minor (1) consequence, which is not considered to have the potential to result in serious or irreversible environmental damage. There is high confidence in the potential impact, as Beach has significant experience undertaking activities such as these, having operated in the Bass Basins based on its existing offshore developments and associated activities. The EIA presented throughout this EP demonstrates that ESD principles (a), (b), (c) and (d) are met (noting that principle (e) is not relevant).
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 the physical presence of infrastructure or vessels.
Other requirements	Infrastructure inspections and maintenance will be managed in accordance with the applicable legislative requirements such as the Navigation Act 2012 and associated Marine Orders as detailed in Section 7.5.6.
Environmental MNES	
Australian Marine Parks	This hazard does not intersect nearby AMPs.
Wetland of International Importance:	This hazard does not intersect any Ramsar wetlands.
Threatened Ecological Communities	This hazard does not intersect any TECs.
Nationally important wetlands	This hazard does not intersect any NIWs.
Nationally threatened and migratory species	This hazard does not have any impacts on threatened or migratory species.
State marine parks	This hazard does not intersect any state marine parks.

Species Conservation Advice/ Recovery Plans/Threat Abatement Plans	None triggered by this hazard,
Monitoring and reporting	Monitoring of potential impacts is undertaken via stakeholder consultation as detailed in Section 4. Recording keeping will include: • Maintenance Activity Plans. • Maintenance Activity Reports. • BassGas stakeholder engagement register. • Vessel PMS records. • Notices to Mariners. • Communications logs. • Subsea (ROV) footage. • Incident register/reports. • Stakeholder flyers.
Acceptability outcome	**Acceptable**
Environmental Performance	EPOs represent the measurable levels of environmental performance Beach is seeking to achieve to ensure impacts are of an acceptable level. EPOs relevant to the effective management of impacts associated with infrastructure and maintenance from the Yolla-a platform, RGP and planned activities are: • EPO1: Undertake the activity in a manner that will not interfere with other marine users to a greater extent than is necessary for the exercise of right conferred by the titles granted. Table 7.93 sets out the EPS for the control measures identified above, and the measurement criteria to evaluate the achievement of EPOs and EPS.

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 and maintenance activities.

7.3.2 Known and Potential Environmental Impacts

The known and potential impacts of lighting are:

- Light glow may act as an attractant to light-sensitive species (e.g., seabirds, squid, zooplankton), in turn affecting predator-prey dynamics (due to attraction to or disorientation from light).

7.3.3 EMBA

The potential impacts from light emissions from operational activities is limited in spatial extent to no greater than several metres radius from the activity, representing the operational area (Figure 5.1)., from sources such as:

- Platform navigation lights - are designed to be seen from about 10 nm (18.5 km) away, but light glow per se is limited to a few hundred metres 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 – may be seen from many kilometres away, depending on the volume of gas being flared (e.g., process upsets will result in more gas being flared and therefore a larger flame than routine flaring or from the pilot light). Flaring is not a routine event – continuous flow of fuel gas provides flare purge and pilot gas.
- Vessel navigation lights - are designed to be seen from afar, but likely to result in light glow limited to tens of metres 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.

The light-sensitive receptors that may occur within this EMBA, either as residents or migrants, are:

- Zooplankton, invertebrates, and fish.
- Seabirds and migratory shorebirds.

The ecological receptors identified above are values of the following within the light EMBA

- Conservation values and sensitivities.
- Cultural heritage values and sensitivities.

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 inspection and maintenance activities may work alongside the platform or RGP in Commonwealth waters.	Vessels engaged in inspection and maintenance activities may work alongside the RGP in Victorian waters.

7.3.5 Potential Level 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 kilometres of a light source. This 20-kilometer threshold 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 kilometres 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-kilometer distance is adopted as the extent to which light emissions may affect marine turtles, seabirds, and migratory shorebirds due to operational activities.

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 kilometers from the nearest shoreline and 125 kilometers from the nearest town, Venus Bay, which means that the flare is not visible from land. As a result, the light from offshore BassGas operations does not impact the public. Since the 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.

Migrating seabirds may be attracted to the platform's lights, which may draw them off course from their usual migration path (DoEE, 2020). DoEE (2020) reports that petrel species in the Southern Ocean may be unable to take off from a deck. To date, personnel based on Yolla-A have not encountered any unusual bird behaviour, injuries or deaths around light sources.

There are no actions within the National Recovery Plan for Threatened Albatrosses and Giant Petrels 2011-2016 (DSEWPC, 2011a) that are compromised by light emissions associated with BassGas operations.

Due to the absence of bird breeding colonies near the Yolla-A platform (it is 140 km east of little penguin, short- tailed shearwaters and black-faced cormorants on King Island, 95 km northeast of IBAs on islands off the Tasmanian coastline and 80 km southwest of Curtis Island), light glow from small permanent light sources is unlikely to result in impacts at the species population level or ecosystem level. Temporary activities such as vessel operations would similarly have minor impacts.

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. Temporary activities such as vessel operations would similarly have Minor impacts.

Marine mammal

There is no evidence to suggest that artificial light sources adversely affect the migratory, feeding, or breeding behaviours of cetaceans. Cetaceans predominantly utilise acoustic senses to monitor their environment rather than visual sources (Simmonds et al., 2004), so light is not considered to be a significant factor in cetacean behaviour or survival.

7.3.5.2 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.

7.3.6 Impact Assessment

An impact assessment for light emissions is presented below in Table 7.6.

Table 7.6: Impact assessment for light emissions

ALARP decision context and justification	ALARP Decision Contact: Type A Impact of light emissions from the permanent platform operations and during planned routine infrastructure inspection and maintenance (temporary) activities are limited to the immediate works area as per the activity specific plan, are localised and are temporary activities that are well understood. Light glow may act as an attractant to light-sensitive species (e.g., seabirds, fish and zooplankton), in turn affecting predator-prey dynamics (due to attraction to or disorientation from light). The impacts of light glow on marine fauna are well known. Human perceptions of visual amenity are subjective with uncertainty is minimal. There are no conflicts with company values, partner interests and no significant media interests. 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. As the impact consequence is rated as Minor (1) applying good industry practice is sufficient to manage the impact to ALARP.
Adopted Control Measures	**Description**
CM01: Marine Assurance Process	Beach Marine Assurance System ensures that vessels meet relevant maritime laws and includes pre-commencement rig and vessel inspections of class certification requirements under the Navigation Act 2012 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. • Lighting requirements meet the International Rules for Preventing Collisions at Sea (COLREGs) and industry standards. • Workplace lighting is required to support safe working conditions at night in accordance with health and safety requirement.
CM06: Light Management Plan	• The National Light Pollution Guidelines for Wildlife (CoA 2023) provide management options for mitigating the effect of light to marine fauna and specifically seabirds that includes migratory birds. • The Light Management Plan for BassGas operational activities to reduce the impact of artificial light to seabirds turtles and migrating shorebirds, to mitigate potential harm from light exposure, attraction and disorientation, the plans include the following practices and guidance: ◦ Non-essential lights are turned off when not in use. ◦ Lighting is directed onto work areas. ◦ Window screens or blinds are closed at night. ◦ National Light Pollution Guideline for Wildlife, DCCEEW ◦ Crew environmental induction covers handling and reporting requirements for marine fauna include grounded or injured seabirds. ◦ Planned infrastructure inspection and maintenance activity will where possible consider seasonal timing to minimise adverse impact to migratory seabirds and marine fauna. • Beach will contract appropriately qualified lighting practitioners, together with an appropriately qualified marine biologist or ecologist to develop and support the implementation of a Light Management Plan as per the National Light Pollution Guidelines for Wildlife (CoA 2023).

Additional Control Measures Assessed		
Control	**Cost/Benefit Analysis**	**Control implemented?**
Limit or exclude night-time operations	Elimination of work lights associated with routine operations could result in a minor 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 operations would increase the duration of the program and the associated HSE impacts and costs and would be grossly disproportionate the reduction in impact.	No
Seasonal timing	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.	No

Table 7.7: Demonstration that Impacts will be of an Acceptable Level

Consequence rating	Minor
Likelihood of occurrence	NA (Impact)
Residual risk	NA (Impact)
Acceptability Assessment	

To meet the principles of ESD	Light emissions are assessed as having a Minor (1) consequence, which is not considered to have the potential to result in serious or irreversible environmental damage. Light glow may act as an attractant to light-sensitive species (e.g., seabirds, fish and zooplankton), in turn affecting predator-prey dynamics (due to attraction to or disorientation from light). There is high confidence in the potential impact, as Beach has significant experience undertaking activities such as these, having operated the BassGas operations since 2006 and has controls in place for existing offshore developments and associated activities. The EIA presented throughout this EP demonstrates that ESD principles (a), (b), (c) and (d) are met (noting that principle (e) is not relevant).
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 light emissions.
Other requirements	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. • Where there is important habitat for seabirds within 20 km of a project, an EIA should be undertaken. These requirements are met by this impact assessment and the implementation of CM06: Light Management Plan. Light pollution is identified as a threat in the Wildlife Conservation Plan for Seabirds (CoA 2020a) and with the following actions relevant to light: • Manage the effects of anthropogenic disturbance to seabird breeding and roosting areas. • Ensure all areas of important habitat for seabirds are considered appropriately and consistently in the development assessment process. This requirement is met by this impact assessment and the implementation of CM06: Light Management Plan. The light EMBA does not overlap any seabird breeding and roosting areas. Light emissions are identified as a threat in National Recovery Plan for Albatrosses and Petrels 2022 (CoA 2022a) however, no actions are identified. The implementation of vessel Light Management Plans will ensure that lighting is of a level that will not impact on the recovery of threatened albatrosses or petrels. 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. This requirement is met by this impact assessment and the implementation of CM06: Light Management Plan.
Environmental MNES Australian Marine Parks	The South-east Commonwealth Marine Reserves Network Management Plan 2013-23 (DNP, 2013) identifies light pollution associated with offshore mining operations and other offshore activities as a threat to the AMP network.

	The EPS listed in this table aimed at minimising light pollution emitted from the platform and support vessels do not conflict with the strategies outlined in the plan that aim to address this threat.
Wetland of International Importance:	Localised light glow does not have any impacts on Ramsar wetlands.
Threatened Ecological Communities	Localised light glow does not have any impacts on TECs.
Nationally important wetlands	Localised light glow does not have any impacts on NIWs.
Nationally threatened and migratory species	Localised light glow does not have any impacts on threatened or migratory species.
State marine parks	Localised light glow does not have any impacts on state marine parks.
Species Conservation Advice/ Recovery Plans/Threat Abatement Plans	The management actions listed for the National Light Pollution Guidelines for Wildlife, published by DCCEEW (2023) provide management options for mitigating the effect of light to marine fauna and specifically seabirds that includes migratory birds. As per the impact and risk assessment operational activities will be managed in accordance with and will not compromise the specific objectives or actions of the following plans: • Albatross and Giant Petrels Recovery Plan (DCCEEW, 2022) • National recovery plan for the Dwarf Galaxias (Galaxiella pusilla) (Department of Sustainability and Environment, 2010b) • White shark Recovery Plan (Carcharodon carcharias) (DSEWPaC 2013b). • Recovery Plan for the Grey Nurse Shark (Carcharias taurus) (DoE, 2014b) • Marine turtles as per the Recovery Plan for Marine Turtles in Australia (DoEE, 2017). • Conservation of listed seabirds as per the Wildlife Conservation Plan for Seabirds (CoA, 2020a). • National Recovery Plan for the Orange-bellied Parrot (DELWP 2016). • Conservation Management Plan for the Blue Whale (DoE, 2015). • National Recovery Plan for the Southern Right Whale (DCCEEW, 2024). • Conservation Advice for Fin Whales (TSSC, 2015c) and Conservation Advice for Sei Whales (TSSC, 2015b).
Monitoring and reporting	Monitoring of potential impacts will include: • Fauna interactions with lighting during operations at the Planform and during routine inspection and maintenance programs. • Stakeholder consultation will be ongoing, as detailed in Section 4. Recording keeping will include: • Platform lighting assessment/inspection/audit reports. • Vessel PMS records. • Wildlife incident reports. • Engineering technical reports (for flare volumes). • Personnel induction training records. • Incident register/reports.
Acceptability outcome	**Acceptable**

Environmental Performance	EPOs represent the measurable levels of environmental performance Beach is seeking to achieve to ensure impacts are of an acceptable level. EPOs relevant to the effective management of impacts associated with infrastructure and maintenance from the Yolla-a platform, RGP and planned activities are: EPO2: No death or injury to listed threatened or migratory species from the activity. EPO3: Biologically important behaviours can continue while the activity is being undertaken. Table 7.93 sets out the EPS for the control measures identified above, and the measurement criteria to evaluate the achievement of EPOs and EPS.
Cumulative Impacts	There is potential for cumulative impacts on light-sensitive marine fauna due to the overlapping presence of routine platform lighting, vessel navigation and deck lighting, flaring (including pilot light), and temporary underwater lighting associated with ROV operations during inspection and maintenance activities. These light sources may 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. Light-sensitive receptors present are expected to comprise transient individuals or small groups of seabirds, fish and zooplankton moving through the area, with cumulative effects primarily limited to short-term attraction or avoidance behaviours and localised alterations in predator–prey interactions within light halos. 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. Given the offshore location, absence of nearby breeding or roosting habitats, the highly localised spatial extent of light glow, and the application of industry-standard lighting controls and a Light Management Plan, cumulative light emissions are not expected to result in population-level effects or prevent biologically important behaviours from continuing while activities are undertaken. The overall cumulative impact is therefore assessed as Minor, consistent with achieving EPO2 and EPO3.

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.

Air pollutants include sulfur dioxide (SO_2) and particulate matter (PM). Atmospheric emissions also encompass greenhouse gases (GHGs) 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.

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. Mobile sources significantly contribute to air pollution and greenhouse gas emissions.

7.4.1.1 Yolla-A and support vessels

- Combustion of fuel gas in the main power generators, turbine and export compressor.
- Flaring (volumes noted in Section 3.5.11).
- Continuous vent purge of ~0.002 MMscfd of fuel gas to prevent air ingress to the vent and drain system.
- Cold venting of non-combusted hydrocarbon gas (during routine maintenance and intermittently during wireline and workover activities), usually in the order of 100 SCM per routine. These gas discharges include methane, ethane, propane and carbon dioxide (CO_2).
- Combustion of MDO from engines, generators and fixed mobile deck equipment including the crane (and standby generator, lifeboat winches, etc).
- Painting and paint storage, resulting in the release of fugitive Volatile Organic Carbons (VOCs) as vapours.

7.4.1.2 Helicopters

- Combustion of aviation gas (Jet A-1) while in the PSZ.

7.4.1.3 Fugitive emissions

- Volumes of gases or vapours are released from pressure-containing equipment such as valves, piping flanges, pumps, storage tanks, compressors, etc. on the platform and vessels. Volumes are kept to a minimum through upkeep of machinery aboard the rig and vessels, during implementation of the planned maintenance system.

7.4.1.4 BassGas Offshore Operations – Emissions context of value chain

BassGas Operations Offshore activity includes the production and flow of gas and condensate through the Yolla-A platform and wells, then through the subsea pipeline. Once the hydrocarbons enter Lang Lang Gas Plant (LLGP), they are outside the boundary of BassGas Offshore Operations, and in the downstream part of its value chain.

Lang Lang Gas Plant, although outside the boundary of BassGas Offshore Operations, is also under the operational control of Beach for the purposes of NGER reporting. For clarity, the following notation is applied when considering emissions in the value chain (Xodus, 2025):

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.

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 (that is, from LLGP and the associated sales gas pipeline).

Scope 2: Indirect emissions from the generation of purchased electricity, steam, heating, and cooling consumed by the company.

Scope 3: All other indirect emissions not covered in scope 2, which occur in the value chain.

The activities and sources of GHG emissions are described in Table 7.8.

Table 7.8: GHG emissions source categorisation (Source: Xodus, 2025)

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
	Fugitives	Fugitive emissions from: • Platform and RGP • Produced formation water
	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

GHG Scope	Category	Source / Activities
		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.	
3	Product use	Natural gas Condensate Liquefied petroleum gas (LPG) CO_2 Fugitive emissions from third party natural gas transmission
	Support activities	Vessels
		Helicopters
	Purchased goods and services	Purchased diesel
	Waste	Waste

Source: Xodus 2025

Over the five-year duration of the EP revision:

The scope 1 emissions associated with the BassGas Offshore Operations is 224,632 tCO_2e. This represents an annual average emissions of 44,926 tCO_2e/year.

The scope 1* emissions associated with the LLGP is 406,040 tCO_2e. This represents an annual average emissions of 81,208 tCO_2e/year.

The scope 3 emissions associated with the BassGas Offshore Operations over this duration is forecast to be 1,707,270 tCO_2e, or an annual average of 341,454 tCO_2e/year.

This is described in more detail Table 7.9. providing an itemised breakdown of the emissions sources and estimates at 2024, from the BassGas operations including throughout the value chain (ie. Lang Lang Gas Plant (LLGP), Sales Gas pipeline, use of sales product.

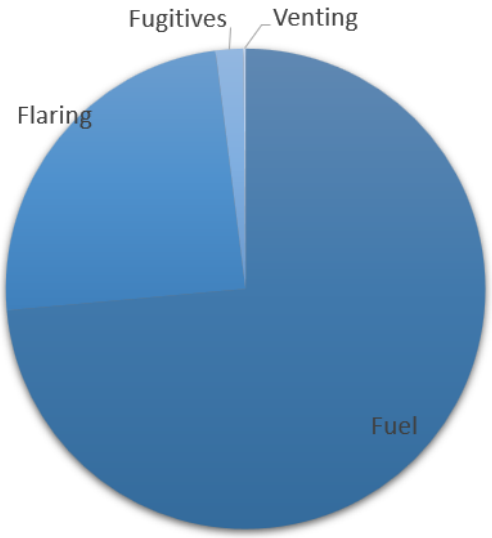
Table 7.9: Emissions estimated from the BassGas Offshore Operations, including the value chain (Source: Xodus, 2025)

Emissions Source (tCO_2e)	Emissions Scope		
	1	1*	3
UPSTREAM	**224,632**		

Emissions Source (tCO_2e)		Emissions Scope	
Flaring	54,855		
Fuel	165,251		
Yolla 2 x GTG (1,400kW)	58,271		
Yolla Diesel driven emergency generator (640 kW)	333		
Yolla GT compressors	106,647		
Fugitives	5,128		
Yolla PFW Fugitives	1,364		
Yolla Platform and RGP Fugitives	2,844		
Venting	318		
Helicopter			9,407
Purchased diesel			574
ONSHORE		**406,040**	
Flaring		791	
Fuel		261,526	
LLGP Fuel Gas (GTGs, GT compressors)		260,402	
LLGP LPG, Deisel Fuel and Lubricants Use		1,125	
Fugitives		7,096	
LLGP Fugitives, including Sales Pipeline		7,096	
Venting		136,627	
SALES PRODUCT			**1,641,996**
Fugitives Transmission of Natural Gas			32,019
Product Use - Condensate			273,839
Product Use - LPG			210,278
Product Use - Natural Gas			915,823
Product Use - CO_2			210,037
VESSELS			**54,823**
Pipeline Inspection (ROV, MBES and/or spud can survey)			571
Platform ROV Inspection			720
Platform supply vessel			47,759
Standby vessels			5,772
WASTE			**470**
TOTALS (by scope)	**224,632**	**406,040**	**1,707,270**
GRAND TOTAL (all scopes)			**2,337,942**

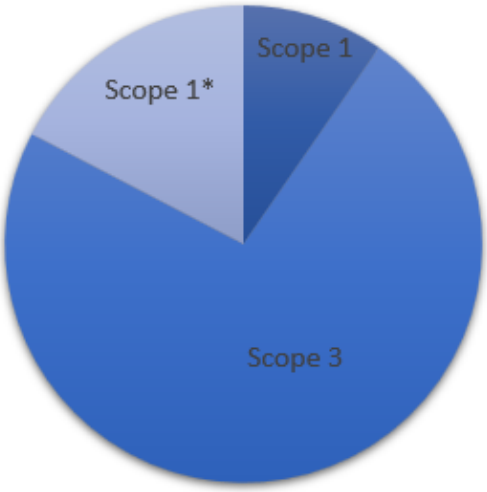
An overview of the relative contribution of each Scope 1 emissions source for BassGas Offshore Operations is provided in Figure 7.2 (Xodus, 2025). Fuel consumed by the compressors and generators is the most significant emissions source.

Figure 7.2: Scope 1 emissions sources within the boundary of BassGas Offshore Operations (Source: Xodus, 2025)



When considering GHG emissions across the BassGas Offshore Operations value chain, the majority (69%) of emissions arise from the use of sold products from the Lang Lang Gas Plant (LLGP), which receives the gas and condensate from BassGas Offshore Operations. These are scope 3 emissions; use of sold products accounts for 94% of scope 3 emissions. Scope 1* emissions, from the operation of LLGP and the sales gas pipeline, account for 17% of emissions. The proportions of scope 1, 1* and 3 emissions in the value chain is shown in Figure 7.3.

Figure 7.3: Scope of value chain emissions for BassGas Offshore Operations (Source: Xodus, 2025)



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

The estimated atmospheric emissions for the local airshed are likely to be hundreds of meters from the support vessels and tens of kilometres from the platform, both horizontally and vertically. This also makes them unlikely to have any impact on cultural values and sensitivities.

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 inspection, maintenance and repair activities.	Vessels undertaking inspections, maintenance and repair along the portion of the RGP within state waters combust fuel that generate atmospheric emissions.

7.4.5 Potential Level of Environmental Impacts

The combustion of gas or diesel in generators and the venting of fuel gas 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 vessel engines, generators, and deck equipment can further degrade air quality and increase GHG emissions.

GHG emissions from the production, transport, and use of hydrocarbon products (Scope 3) during offshore operations further add to atmospheric GHG levels. Together, these activities contribute to localised and temporary declines in air quality and the accumulation of greenhouse gases in the environment.

7.4.5.1 Localised and temporary decrease in air quality

Atmospheric emissions from the platform, vessels, and helicopters will result in a minor deterioration in local air quality. The combustion of MDO fuel 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 the support vessels and platform and has a negligible impact due to the strong winds, which quickly disperse emissions.

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.

7.4.5.2 Greenhouse gas effect

The greenhouse 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

greenhouse gases. 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 production of natural gas and the combustion of MDO, along with gas venting, release GHG emissions such as CO_2, CH_4, and N_2O, which contribute to the greenhouse effect. Although emissions from specific activities may be minor compared to larger sources such as coal-fired power plants or industrial processes, they can still cause local air quality issues and health problems. Furthermore, the cumulative effects of multiple smaller sources can result in significant environmental impacts. Overall consideration in the context of these emissions, as their impact can vary based on numerous factors, including location and scale. However, for the Bass Gas operations, emissions are deemed to have a negligible effect on local environments, resulting in a low overall impact.

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 sulfur oxides and particulate matter (PM), thereby improving air quality. Regarding GHGs, MDO combustion still produces carbon dioxide, as well as trace amounts of methane and nitrous oxide. While there might be a marginal reduction compared to HFO, the primary emission benefit lies in reducing sulfur oxides and PM.

7.4.6 Impact Assessment

An impact assessment for atmospheric emissions is presented below in Table 7.10.

Table 7.10: Impact assessment from atmospheric emissions

ALARP decision context and justification	ALARP Decision Contact: Type A The effects of routine atmospheric and greenhouse gas emissions from the platform, pipelines, vessels, and related activities are well understood, with no unexpected or unusual impacts identified. Good practice is well defined, and uncertainty is minimal. There are no conflicts with company values, partner interests and no significant media interests. No objections or claims were raised by stakeholders in relation to physical presence. During ongoing consultation any concern from stakeholder will be managed to close, for the life of asset. As the impact consequence is rated as Minor (1) applying good industry practice is sufficient to manage the impact to ALARP.
Adopted Control Measures	**Description**
CM01: Marine Assurance Process	Beach Marine Assurance System ensures that vessels meet relevant maritime laws and includes pre-commencement rig and vessel inspections of class certification requirements under the Navigation Act 2012 and associated Marine Orders, including but not limited to: • 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 certificate and an International Energy Efficiency certificate.

	◦ A Ship Energy Efficiency Management Plan to reduce emissions. ◦ Engine NO2 emission levels that comply with Regulation 13 of MARPOL 73/78 Annex VI. ◦ Low-sulphur (<0.5% m/m) diesel usage. • Combustion equipment is maintained by the manufacturer's instructions through the contractor's maintenance systems to ensure it operates efficiently
CM02: Operational procedures	• Combustion equipment is maintained by the manufacturer's instructions through the Beach Energy Planned Maintenance System to ensure it operates efficiently. • Flare auto-ignition, flame-out monitoring and OEM specifications back-up purge protection systems are maintained in accordance with the CMMS to minimise cold venting. • Flaring volumes are monitored so that abnormalities are rapidly detected and addressed. • Only low-sulphur (<0.5% m/m) MDO is used for the crane and diesel generator in order to minimise SOx emissions.
CM10: Air Quality and GHG emissions	Beach Energy, 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 baseline) across its portfolio. Beach Energy has implemented a GHG Management Plan that details the following: • Methodology for recording and 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.

Additional Control Measures Assessed		
Control	**Cost/Benefit Analysis**	**Control implemented?**
Use of low emission vessels	Beach via its Procurement Vetting Process (CM11) assesses suppliers emissions management and via this process would procure low emission vessels if available.	Yes – as per CM11: Procurement Vetting Process
Eliminate platform flaring and venting	Eliminates impacts to air quality from flaring and venting activities. Flaring/venting is required for operability and safety requirements Flaring and venting durations are indicated in **Error! Reference source not found.**. No reasonably practicable alternative methods for reduction or mitigation of vented or fugitive emissions have been identified (vapour recovery system and flare system have been assessed) that would further reduce the impacts. Other measures have grossly disproportionate cost to benefit.	No

Table 7.11: Demonstration that Impacts will be of an Acceptable Level

Consequence rating	Minor (1)
Likelihood of occurrence	NA (Impact)

Residual risk	NA (Impact)
Acceptability Assessment	
To meet the principles of ESD	Atmospheric emissions was assessed as having a Minor (1) consequence which is not considered as having the potential to result in serious or irreversible environmental damage. There is high confidence in the potential level of impact as Beach has significant experience operating in the Bass Basins based on their existing offshore developments and associated activities. The EIA presented throughout this EP demonstrates that ESD principles (a), (b), (c) and (d) are met (noting that principle (e) is not relevant).
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 the physical presence of infrastructure or vessels.
Other requirements	Atmospheric emissions will be managed in accordance with the applicable legislative requirements such as the. • *National Greenhouse and Energy Reporting Act 2007* (NGER Act) • *NGER (Measurement) Determination 2008* (amendments) • Navigation Act 2012 and associated Marine Orders
MNES	The following published material identifies climate change as a threat to the relevant marine environment as per the impact assessment atmospheric emissions (including GHG) will be managed in accordance with and will not compromise the specific objectives or actions of the following plans: • Albatross and Giant Petrels Recovery Plan (DCCEEW, 2022) • National recovery plan for the Dwarf Galaxias (Galaxiella pusilla) (Department of Sustainability and Environment, 2010b) • White shark Recovery Plan (Carcharodon carcharias) (DSEWPaC 2013b). • Recovery Plan for the Grey Nurse Shark (Carcharias taurus) (DoE, 2014b) • Marine turtles as per the Recovery Plan for Marine Turtles in Australia (DoEE, 2017). • Conservation of listed seabirds as per the Wildlife Conservation Plan for Seabirds (CoA, 2020a). • National Recovery Plan for the Orange-bellied Parrot (DELWP 2016). • Conservation Management Plan for the Blue Whale (DoE, 2015). • National Recovery Plan for the Southern Right Whale (DCCEEW, 2024). • Conservation Advice for Fin Whales (TSSC, 2015c) and Conservation Advice for Sei Whales (TSSC, 2015b).
Monitoring and reporting	Stakeholder consultation will be ongoing, as detailed in Section 4. Recording keeping will include: • Maintaining GHG and energy emissions, discharges and consumption estimates for annual reporting and emission reduction strategies. • Contractors' emission estimates for direct and indirect emissions records. Platform and vessel operations assessment/inspection/audit reports. • Vessel PMS records. • Engineering technical reports (for flare volumes).

Acceptability outcome	Acceptable
Environmental Performance	EPOs represent the measurable levels of environmental performance Beach is seeking to achieve to ensure impacts are of an acceptable level. EPOs relevant to the effective management of impacts associated with infrastructure and maintenance from the Yolla-a platform, RGP and planned activities are: • EPO5: No substantial reduction of air quality within local airshed caused by atmospheric emissions produced during the activity. Table 7.93 sets out the EPS for the control measures identified above, and the measurement criteria to evaluate the achievement of EPOs and EPS.
Cumulative Impacts	There is potential for cumulative impacts on the local airshed from overlapping routine atmospheric emissions 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. 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.

7.5 IMPACT 5: Routine Emissions - Noise and Vibration

7.5.1 Source of Aspect

Noise and vibration are generated by the following activities associated with the operation of BassGas infrastructure and vessels:

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.
- 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 raw gas pipeline.
- Wireline activities.
- Inspection and maintenance activities.
    - Geophysical activities (primarily SBP), to locate buried portions of the raw gas pipeline.
    - ROV inspections of the raw gas pipeline.
    - Abrasive blasting to remove paint and marine growth from the platform structure or raw gas pipeline.
- Vessel operations within the PSZ and alongside the raw gas pipeline during inspection, maintenance, and repair 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. 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 the Yolla Platform 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.

These factors indicate that both airborne and underwater noise emissions from the Yolla Platform are unlikely to cause measurable behavioural disruption, hearing damage, or habitat avoidance by marine mammals or seabird populations, resulting in an overall low risk classification.

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, multi-beam echo sounders, side scan sonar, 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 Environment Protection and Biodiversity Conservation (EPBC) Act Policy Statement 2.1, which sets out procedures for managing interactions with whales.

Additional information regarding the frequency ranges associated with different geophysical surveys is outlined below.

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 side scan sonar (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:

15. 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).

16. 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.

17. 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 Energy has amended its support vessel contractual arrangements meaning that in addition to utilising regular operations support vessels (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 Bass Gas Operations. However, Beach Energy has requested that the update to the acoustic modelling consider the use of regular OSV and the larger anchor handling tug supply (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 Anchor Handling Tug Supply Vessel (AHTS). JASCO (2025) outlined that this vessel features two bow tunnel thrusters rated at 1000 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 offshore supply vessel (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 dynamic positioning (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 subsea infrastructure.

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. This suggests that the risk of negative effects on cetaceans and fur seals from helicopter use is likely to be **minor**.

7.5.1 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 7.4.1, 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
    - Temporary threshold shift (TTS) – the temporary loss of hearing sensitivity caused by excessive noise exposure, in which the animal recovers.
    - Permanent threshold shift (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), and
- 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 dynamic positioning (DP) for either 4 or 8 hours. Four scenarios were modelled:

- Scenario 1: Yolla Platform + Anchor Handling Tug Supply (AHTS) vessel under DP for 4 hours.
- Scenario 2: Yolla Platform + AHTS under DP for 8 hours.
- Scenario 3: Yolla Platform + Generic Offshore Supply Vessel (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 for inspection, maintenance, and repair (IMR) activities based on similar water depths, sound sources and seabed characteristics.

Table 7.12 details the criteria and furthest modelled distances to them for each scenario

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Table 7.12: Marine mammal Auditory injury (PTS), TTS and behaviour sound exposure criteria and predicted furthest distances for each modelling scenario.

Sound exposure criteria		Scenario 1: Yolla Platform Operations + AHTS under DP conducting Resupply Ops (4 h)	Scenario 2: Yolla Platform Operations + AHTS under DP conducting Resupply Ops (8 h)	Scenario 3: Yolla Platform Operations + Generic OSV under DP conducting Resupply Ops (4 h)	Scenario 4: Yolla 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

Sound exposure criteria		Scenario 1: Yolla Platform Operations + AHTS under DP conducting Resupply Ops (4 h)	Scenario 2: Yolla Platform Operations + AHTS under DP conducting Resupply Ops (8 h)	Scenario 3: Yolla Platform Operations + Generic OSV under DP conducting Resupply Ops (4 h)	Scenario 4: Yolla Platform Operations + Generic OSV under DP conducting Resupply Ops (8 h)
Fish (12h TTS)	158	0.08	0.08	0.03	0.03
Fish (48h recoverable injury)	170	-	-	-	-

A dash indicates the level was not reached within the limits of the modelled resolution (20 m).

7.5.1.1 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).

7.5.1.2 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 7.13 outlines the criteria for effects of non-impulsive noise exposure for marine mammals, as provided in JASCO (2025).

Table 7.13: 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 $\mu Pa^2 \cdot s$)
Low-frequency (LF) cetaceans	120	177	197
High-frequency (HF) cetaceans		181	201
Very High-frequency (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 7.14outlines 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 7.14).

Table 7.14: 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	(N) Low (I) Low	(N) Low (I) Low	(N) High (I) Moderate	(N) Moderate (I) Moderate

Type of animal	Mortality and potential mortal injury	Impairment			Behaviour
		Recoverable injury	TTS	Masking	
	(F) Low	(F) Low	(F) Low	(F) Low	(F) Low

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 EMBA for sound and vibration varies with the source and atmospheric and underwater conditions. Sound-sensitive receptors that may occur within this EMBA, either as residents or migrants, are primarily pelagic species (fish, cetaceans, pinnipeds). Cetaceans have significant cultural heritage values for Traditional Owners as they are part of cultural stories dating back millenia.

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 inspection, maintenance and repair activities will generate noise and vibration while working alongside the platform or RGP in Commonwealth waters	Vessels engaged in inspection, maintenance and repair activities will generate noise and vibration while working alongside the RGP in Victorian waters.

7.5.4 Evaluation of Environmental Impacts

The environmental effects will have a gradation of severity based mainly on distance from the noise or vibration source and sensitivity of the species.

In assessing the potential impacts on the key marine groups, it is necessary to consider that the level of behavioural response and stress induced by noise may also decrease with habituation. Consequently, some fauna may approach or remain near to a noise source, such as an operating facility, even though the level of noise exceeds that at which the behaviour changes have been observed to occur when there is no corresponding threat associated with it.

Based on the information provided under Section 7.5.2, the evaluation of potential impacts focuses on those activities that are considered to have potential for effects, namely vessel operations. Cetaceans, pinnipeds and fish are considered the receptors more at risk from exposure to noise associated with 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 5.4.5, 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 where 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 consequence for cetaceans.

Cultural Heritage Impacts

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 values associated with cetaceans are anticipated, and cultural connections linked to these species would not be compromised beyond short-term, transient disturbance.

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 sound generated by vessels is therefore considered to be of a minor 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 7.14 , 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 5.3.6.2), it is considered likely that the majority of the fish will be pelagic or demersal species that are not site-attached. As such, the sound generated by operations and inspection and maintenance activities is considered to be of a minor 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).

7.5.5 Impact Assessment

An impact assessment for sound and vibration is presented below in Table 7.15.

Table 7.15:: Impact assessment for sound and vibration

ALARP decision context and justification	ALARP Decision Context: Type B Impacts from sound emissions are relatively well understood though there is the potential for uncertainty in relation to the level of impact based on updated underwater sound exposure thresholds for marine mammals and turtles by NMFS (2024) and Accomando et al. (2024), respectively. Activities are well practised, and there are no conflicts with company values, no partner interests, and no significant media interests. Additional controls may be required to ensure impacts can be managed to an acceptable level.
Adopted Control Measures	**Description**

CM01: Marine Assurance Process	Platform, Rigs (Relief well) and vessels will have a Preventative Maintenance System that provides a status on the maintenance of equipment and detailed manufacturer's specification on maintenance procedures for: • Equipment detailed as a control in this EP will be inspected to ensure effective operation. • Power generation and propulsion systems on vessels will be inspected to ensure efficient operation.
CM08: Whale Management Procedure	The Whale Management Procedure outlines specific measures to minimise anthropogenic noise threats to relevant species, including the implementation of safe operating distances between vessels and whales, pre-activity surveys for specific activities, night-time and low visibility controls and establishment of safe points for operational activities. The procedure assumes that once an activity is underway foraging whales that enter the pre-activity survey zone are not displaced as foraging behaviour has not been disrupted as the whale has commenced or continued foraging and thus aligns with the Conservation Management Plan for the Blue Whale (DoE, 2015b) and DAWE (2021a) definitions. Prior to an activity commencing a pre-activity survey will be undertaken of the activity survey zone for the activity: • Resupply ◦ OSV – 6 km ◦ AHTS – 22 km • Inspection, Maintenance, and Repair ◦ OSV – 6 km ◦ AHTS – 22 km The activity survey zones are based on the distance to the furthest modelled PTS, TTS or behaviour criteria, as detailed in Table 7.12 and have been rounded up to take into account accuracy of estimation of distance at sea. 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.
CM02: Operational procedures	• Selection of opportunistic vessels will be based on a criteria that considers the activity scope and duration (including DP requirements). Where possible, the smallest vessel available will be selected to ensure safe scope delivery. • Vessel speeds within the Operational Area will be restricted to ≤ 10 knots.
CM09: *EPBC Regulations 2000 – Part 8 Division 8.1* Interacting with Cetacean s Requirement	8.1 Vessels and Whales - Vessel operators during vessel operations, well completions and well intervention sub-activities shall adhere to the distances and vessel management practices of EPBC Regulations (Part 8, Division 8.21) and report vessel interactions with whales, specifically: • Do not approach a whale. • Maintain a distance of 300m from a whale.

	• If a whale approaches the vessel try to maintain the separation distances without changing direction or moving into the path of the animal. Vessels and Dolphins - Vessel operators during vessel operations, well suspension and well intervention sub-activities shall adhere to the distances and vessel management practices of EPBC Regulations (Part 8, Division 8.2) and report vessel interactions with dolphins specifically: • Do not approach a dolphin • Maintain a distance of 150m from a dolphin (with the exception of bow riding) • If a dolphin approaches the vessel try to maintain the separation distances without changing direction or moving into the path of the animal. Helicopters and Whales and Dolphins - Helicopters will not fly lower than 1650 ft when within 500 m horizontal distance of a cetacean except when landing or taking off and will not approach a cetacean from head on (EPBC Regulations Part 8, Division 8.2).

Additional Control Measures Assessed

Control	Cost/Benefit Analysis	Control implemented?
Seasonal timing	Avoiding periods of marine fauna sensitivity (i.e. whale migration, foraging), reduces the risk of impacts from sound emissions during environmentally sensitive periods for listed marine fauna. There is a high cost in moving or delaying activity schedule. The risk to all listed marine fauna cannot be reduced due to variability in timing of environmentally sensitive periods and unpredictable presence of some species. 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. The implementation of additional controls above the legislative requirements of the EPBC Regulations 2000 – Part 8 Division 8.1 interacting with cetaceans will be implemented to manage potential impacts to whales undertaking biologically important behaviour.	No
Anchoring of vessels	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.	No
Implementation of the EPBC Act Policy 2.1 Soft start	Soft starts are applied to seismic surveys to slowly ramp up the seismic source allowing fauna to move away from the source. No seismic source will be used for the activity and the geophysical equipment being used for the survey cannot be slowly ramped up.	No
Dedicated monitoring vessel	An additional dedicated vessel is not required as monitoring activities can be effectively conducted from the geophysical vessel. Cost is disproportionate to marginal environmental benefit.	No
Aerial surveillance	Aerial surveillance from aircraft or drones is not required as monitoring activities can be effectively conducted from the geophysical vessel. Cost is disproportionate to marginal environmental benefit.	No

Table 7.16: Demonstration that Impacts will be of an Acceptable Level

Consequence rating	Minor
Likelihood of occurrence	NA (Impact)
Residual risk	NA (Impact)
Acceptability Assessment	
To meet the principles of ESD	Noise and vibration emissions are assessed as having a Minor (1) consequence, which is not considered to have the potential to result in serious or irreversible environmental damage. Updated modelling from JASCO was provided in December 2025 which modelled a revision of scenarios within a previously completed modelling study of underwater sound levels associated with Beach Energy operated Yolla Platform and associated vessels. The report concluded that sound did not reach the threshold associated with recoverable injury for fish with a swim bladder for any scenario. The maximum distance from the source where the marine mammal behavioural response threshold may be met was 21.9 km (for AHTS), compared to 5.94 km (for the OSV vessel) (JASCO 2025). The footprint is localised around the platform or adjacent to the RGP, and therefore far offshore and away from coastal areas where 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. The proposed control measures will ensure certainty in preventing auditory injury and TTS and meet the acceptable level of impact. There is high confidence in the potential impact, as Beach has significant experience undertaking activities such as these, having operated the BassGas operations since 2006 and has controls in place for existing offshore developments and associated activities. The EIA presented throughout this EP demonstrates that ESD principles (a), (b), (c) and (d) are met (noting that principle (e) is not relevant).
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 emissions.
Other requirements	Underwater sound will be managed in accordance with legislative requirements. EPBC Regulations 2000 – Part 8 Division 8.1 interacting with cetaceans requirements are implemented as per CM08: Whale Management Procedure.
Environmental MNES	
Australian Marine Parks	As per the impact and risk assessment vessel movements will not intersect nearby AMPs.
Wetland of International Importance:	As per the impact and risk assessment vessel movements will not intersect nearby Ramsar wetlands.
Threatened Ecological Communities	As per the impact and risk assessment vessel movements will not intersect nearby TECs.

Nationally important wetlands	As per the impact and risk assessment vessel movements will not intersect nearby NIWs.
Nationally threatened and migratory species	As per the impact and risk assessment vessel movements will not intersect or have any impacts on threated or migratory species.
State marine parks	As per the impact and risk assessment vessel movements will not intersect or have any impacts on the management aims of state marine parks.
Species Conservation Advice/ Recovery Plans/Threat Abatement Plans	As per the impact and risk assessment vessel selection and movements will be managed in accordance with and will not compromise the specific objectives or actions of the following plans: • Albatross and Giant Petrels Recovery Plan (DCCEEW, 2022) • National recovery plan for the Dwarf Galaxias (*Galaxiella pusilla*) (Department of Sustainability and Environment, 2010b) • White shark Recovery Plan (*Carcharodon carcharias*) (DSEWPaC 2013b). • Recovery Plan for the Grey Nurse Shark (*Carcharias taurus*) (DoE, 2014b) • Marine turtles as per the Recovery Plan for Marine Turtles in Australia (DoEE, 2017). • Conservation of listed seabirds as per the Wildlife Conservation Plan for Seabirds (CoA, 2020a). • National Recovery Plan for the Orange-bellied Parrot (DELWP 2016). • Conservation Management Plan for the Blue Whale (DoE, 2015). • National Recovery Plan for the Southern Right Whale (DCCEEW, 2024). • Conservation Advice for Fin Whales (TSSC, 2015c) and Conservation Advice for Sei Whales (TSSC, 2015b).
Monitoring and reporting	Monitoring of potential impacts will include: • Fauna interactions to noise during operations at the Planform and during routine inspection and maintenance programs. • Stakeholder consultation will be ongoing, as detailed in Section 4. Recording keeping will include: • Platform operations assessment/inspection/audit reports. • Vessel PMS records. • Wildlife incident reports. • Engineering technical reports (for flare volumes). • Personnel induction training records. • Incident register/reports.
Acceptability outcome	**Acceptable**
	EPOs represent the measurable levels of environmental performance Beach is seeking to achieve to ensure impacts are of an acceptable level. EPOs relevant to the effective management of impacts associated with infrastructure and maintenance from the Yolla-a platform, RGP and planned activities are: • EPO2: No death or injury to listed threatened or migratory species from the activity. • EPO3: Biologically important behaviours can continue while the activity is being undertaken. • EPO4: Anthropogenic noise in biologically important areas and habitat critical to the survival of a species will be managed such that:

	◦ Any blue whale continues to utilise biologically important areas without injury and is not displaced from a foraging area. ◦ It does not prevent any southern right whale from utilising biologically important areas or habitat critical to the survival of a species or cause auditory impairment (TTS and PTS). ◦ Fauna use the waters around the BassGas Development without displacement or injury due to noise and vibration from offshore operations. Table 7.93 sets out the EPS for the control measures identified above, and the measurement criteria to evaluate the achievement of EPOs and EPS.
Cumulative Impacts	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 use may 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. When considered cumulatively, the additional contribution of BassGas noise and vibration is not expected to result in hearing injury, mortality, or sustained behavioural disruption to marine fauna. With the implementation of existing operational controls and whale management procedures, cumulative noise exposures will remain below levels that would cause death or injury to listed threatened or migratory species (EPO2), and will not prevent the continuation of biologically important behaviours such as migration, foraging or resting (EPO3). Noise and vibration emissions do not interact with the seabed in a manner that would cause substantial or unrecoverable changes to seabed quality (EPO6).

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 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).

For the preparation of this revised EP, Beach has contracted RPS and AECOM to update the PFW dispersion modelling (RPS 2025) and mixing zone (AECOM 2025a) reports. Further, Beach contracted AECOM to undertake an ALARP review of the effects of the PFW containing GLDA on the receiving environment (AECOM, 2025b). The outcomes of these assessments are discussed below.

7.6.1.1 Methodology for Determining the Mixing Zone

The method to 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.

A comparison of characterisation results of PFW sample concentrations and PFW-GLDA sample concentrations has been undertaken as part of the Site Specific Dilution Factor and Mixing Zone report prepared by AECOM (AECOM 2025). The assessment utilised 21 PFW samples collected between December 2017 and February 2023 and one PFW-GLDA sample collected in November 2024. Of the 21 PFW samples, 11 were submitted for WET testing, additional to the PFW-GLDA sample collected in November 2024. The PFW sample characterisation results are summarised in Table 7.17, with the full report available in Appendix 12.

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 2025x) (refer Appendix 13).

Table 7.17: Chemical analytes of the samples used for WET testing. Concentrations are in mg/L unless otherwise specified

Analyte/Parameter	Range	Mean[1]	Standard Deviation[1]	GLDA-PFW Concentrations (mg/L unless otherwise specified)
Physicochemical properties and inorganics				
Conductivity (at 25°, µS/cm)	17,000 – 31,000	25,000	3,710	25,000
pH (at 25°, pH unit)	6.1 – 7.1	6.7	0.33	6.5
Potassium	33 – 74	55	10	56
Total Phosphate	0.01 – 0.5	0.09	0.13	0.14
Total Nitrogen	21 – 52	33	9.6	1,600
Total Suspended Solids	2 – 29	7.7	6.0	5.8

Analyte/Parameter	Range	Mean[1]	Standard Deviation[1]	GLDA-PFW Concentrations (mg/L unless otherwise specified)
Metals/metalloids				
Arsenic	0.001 – 0.014	0.006	0.004	<0.01
Cadmium	0.0002 – 0.002	0.001	0.001	<0.002
Chromium	0.001 – 0.019	0.006	0.006	1.7
Copper	0.001 – 0.012	0.006	0.006	<0.01
Lead	0.001 – 0.02	0.005	0.005	0.27
Mercury	0.001 – 0.05	0.01	0.01	0.0023
Nickel	0.001 – 0.1	0.01	0.01	0.65
Zinc	0.006 – 0.071	0.03	0.03	0.84
TRH				
$C_6 – C_{10}$	4 – 130	70	29	85
$C_{10} – C_{16}$	0.33 – 100	44	26	15
$C_{16} – C_{34}$	0.1 – 120	6.9	27	<1
$C_{34} – C_{40}$	0.1 – 1	0.31	0.38	<1
$C_{10} – C_{36}$ (total)	0.33 – 232.8	56	48	30
BTEXN				
Benzene	0.8 – 36	14	6.9	11
Toluene	0.27 – 30	19	8.9	21
Ethylbenzene	0.27 – 9.5	1.9	2.7	0.8
M&p xylene	1.4 – 16	8.0	3.5	8.9
O-xylene	0.5 – 27	3.6	5.6	2.2
Naphthalene	0.002 – 0.86	0.45	0.29	0.73
Glycols				
Di-Ethylene glycol	20 – 120	26	24	<20
Ethylene glycol	20	20	0	<20
Propylene glycol	20	20	0	<20
Triethylene glycol	20 – 98	25	19	<20
PAH				
Total PAH	0.002 – 0.86	0.45	0.29	0.43
Phenols				
Total halogenated phenols	0.01 - 1	0.06	0.22	<0.01
Total non-halogenated phenols	0.459 - 177	72	51	52

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

7.6.1.2 PFW Characterisation

The most recent characterisation of physical and chemical constituents of Yolla PFW discharge from 2021 to 2025 are presented in Table 7.3 with a comparison to the 2020 data. This data is from samples of PFW not sampled during a GLDA injection period for which data is shown in Table 7.18 above.

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 7.18: Composition of the Yolla PFW (2020 - 2025), concentrations are in mg/L unless otherwise specified

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	-
Vanadium	26 (2025 only)	0.005 – 1.6	0.27	0.41	-

Analyte/Parameter	Number of Samples	Range[1]	Mean[1]	Standard Deviation[1]	Range (2014 – 2019)
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					
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	-

Analyte/Parameter	Number of Samples	Range[1]	Mean[1]	Standard Deviation[1]	Range (2014 – 2019)
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

Since October 2019 the target for 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). With the new online analysers fully commissioned, the trend is predicted to be around 100 mg/L and below during normal operations. Note that TPH has been skewed with higher numbers of PFW samples during GLDA injections at their peak concentrations. November 2025 sampling results best reflect the predicted PFW TPH concentration for the next 5 years.

7.6.1.3 PFW Volume

The original design PFW flow rate was nominated as 100 m^3/day, however, an increase in flow rates was anticipated, and has occurred. 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 align with decreased production rates in late 2023 and 2024 as shown in Figure 7.4. In 2025, daily flow rates increased sightly with increased production associated with the descaling of the wells and averaged approximately 92 m^3/day.

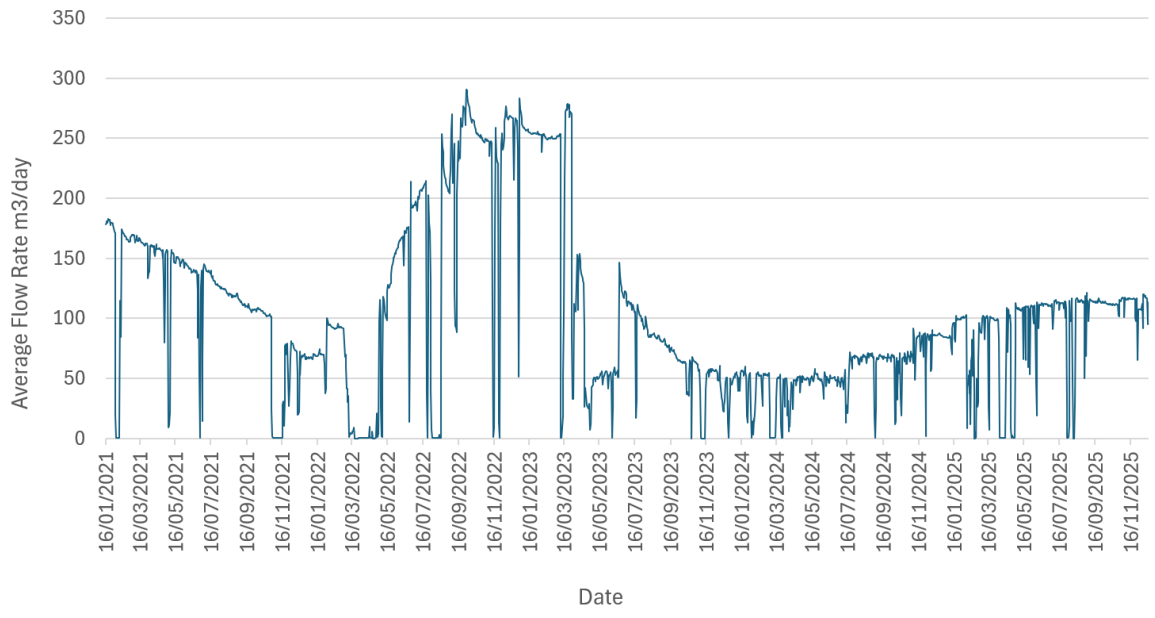


Figure 7.4: PFW discharge flow rates 2021-2025

7.6.1.4 PFW Toxicity

A WET testing program was undertaken on PFW and PFW-GLDA samples to identify changes to water quality. This informs understanding around how the use of GLDA may influence the toxicity of PFW discharges, as this may impact the mixing zone boundary by way of altering the Site Specific Dilution Factor. The results of the WET testing program and incorporation into Site Specific Dilution Factor derivation have been summarised in the following section with the full reports available as Appendix 12 and 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:

- WET testing between 2019 – 2022.
- SSDF derived in 2023 (protective of 99% of species in the marine receiving environment).
- Furter WET testing 2023 – 2024, including during 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 (2024).
- Chemical analysis and WET testing on PFW sample collected immediately after descaling event (November 2024).

The results of these studies were incorporated in a number of studies including the updated SSDF and Mixing Zone Boundary (AECOM, 2025a), ALARP report (AECOM, 2025b), and PFW Dispersion Modelling (RPS, 2025a).

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. Of the WET tests, Aecom classified five tests as chronic and five tests as acute, with the former preferred for use when deriving water quality guidelines (or SSDF).

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. These lowest toxicity values are summarised in Table 7.19. Toxicity data used to generate the SSD curves for PFW and GLDA-PFW.for both PFW and PFW-GLDA samples, with more information provided regarding derivation of results, including limitations, provided in Appendix 12.

Table 7.19. Toxicity data used to generate the SSD curves for PFW and GLDA-PFW.

Test Species	Toxicity Data Type	PFW – EC/IC10 (Conc %)	GLDA-PFW – EC/IC10/NOEC (Conc %)
Allorchestes compressa (amphipod)	Converted Chronic	0.927	0.030

Test Species	Toxicity Data Type	PFW – EC/IC10 (Conc %)	GLDA-PFW – EC/IC10/NOEC (Conc %)
Heliocidaris tuberculata (sea urchin)	Chronic	3.482	0.100
Hormosira banksii (macroalgae seaweed)	Chronic	9.475	0.300
Lates calcarifer (fish, Barramundi)	Converted Chronic	0.336	0.020
Macquaria novemaculeata (fish, Australian Bass) ^	Converted Chronic	0.293	-
Mytilus galloprovincialis (mussel)	Chronic	3.432	0.100
Nitzschia closterium (marine microalgae)	Chronic	5.653	0.300

The combined toxicity concentration thresholds were statistically analysed to determine 99% and 95% species protection levels with the results presented in Table 7.20below, which shows that 99% species protection for PFW is obtained by a 1:1,961 dilution, and similarly for GLDA-PFW a 1:19,608 dilution. 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 7.20: SSDFs for PFW and GLDA-PFW – 99% spp. and 95% spp.

Species Protection Level (%)	PFW	GLDA-PFW
99% Species Protection Level		
Concentration (%)	0.051	0.0051
Lower 95% Confidence Interval	0.017 – 0.87	0.0017 – 0.053
Site-Specific Dilution Factor	1:1,961	1:19,608
95% Species Protection Level		
Concentration (%)	0.19	0.014
Lower 95% Confidence Interval	0.067 – 1.6	0.0062 – 0.089
Site-Specific Dilution Factor	1:526	1:7,143

Based on the assessments undertaken on PFW toxicity changes from descaling activities, and in comparison to existing management frameworks, Aecom (2025b) considered it likely that existing control measures will be appropriate to manage risks to the receiving marine environment from the presence of residual GLDA and well cleaning byproducts within the PFW discharge to a level that is ALARP (AECOM, 2025b).

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 in 2025 to include the WET testing data corresponding to the introduction of GLDA. The following description of the plume modelling methodology was extracted from the RPS updated stochastic plume modelling, which included a far-field assessment and the up to date 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

Under strong currents, the distance where the lower dilution threshold of 526 was reached ranged from 55 m to 62 m across the different seasons and flow rates, while the higher dilution threshold (19,608) was reached within 850 m to 1,230 m.

Under moderate currents, the distance where the lower dilution threshold of 526 was reached ranged from 27 m to 30 m across the different seasons and flow rates, while the higher dilution threshold (19,608) was reached within 475 m to 1,400 m.

Under low currents, the distance where the lower dilution threshold of 526 was reached ranged from 11 m to 12 m across the different seasons and flow rates, while the higher dilution threshold (19,608) was reached within 580 m to 1,600 m.

Far-Field Modelling

The lower dilution threshold (526) was observed within approximately 10 m and 12 m for the Base Case and Future Case, respectively.

The dilution threshold of 1,961 was observed within approximately 29 m and 37 m for the Base Case and Future Case, respectively.

The dilution threshold of 7,143 was observed within approximately 41 m and 61 m for the Base Case and Future Case, respectively.

The upper dilution threshold (19,608) was observed within approximately 163 m and 247 m for the Base Case and Future Case, respectively.

Therefore, using the worst case extent of the PFW plume the standard PFW discharge mixing zone boundary is 37 m and the intermittent PFW plume from GLDA well injections has a worst case mixing zone boundary of 247 m. The mixing zone boundaries are shown in Figure 7.3 below.

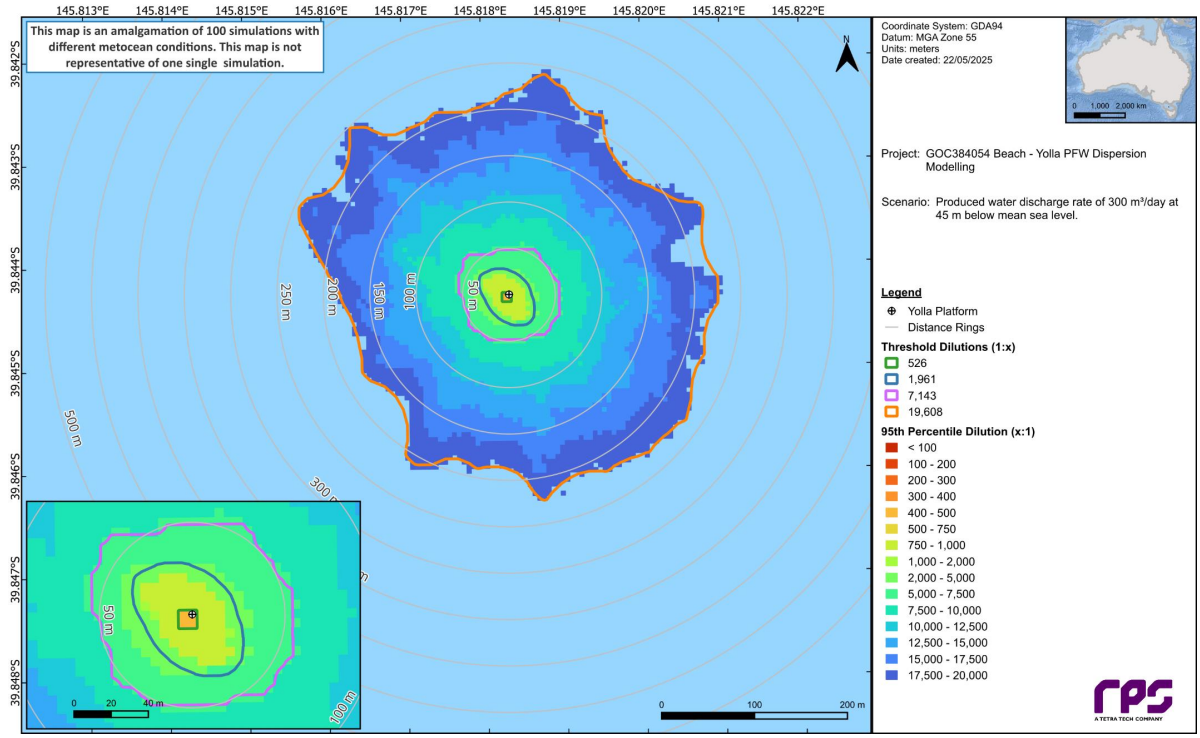


Figure 7.5: 95th percentile dilution for a PFW discharge at 300 m^3/d (results refer to annual conditions)

Field Monitoring of Modelled Dispersion Factors

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 (study report Appendix X). 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 1:1,961 with a mixing zone boundary of 37 m, the estimated dilution distance required for PFW constituents to reach ANZG (2018) DGVs was calculated with the results presented in Table 7.6. The method for calculation included incorporating the average value of constituents for the November 2025 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 7.21: 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 (37 m)
Metals/metalloids					
Aluminium	3.25	0.009	361	6.8	Yes
Cadmium	0.002	0.0007	2.86	0.054	Yes
Chromium	4.33	0.00014[4]	30,940	583	No
Cobalt	0.048	0.000005	9,600[1]	181.1[1]	No[1]
Copper	0.01	0.0002	50	0.94	Yes
Manganese	6.27	0.08	78.4	1.48	Yes
Mercury	0.0092	0.0001	91.6	1.73	Yes
Nickel	3.33	0.007	475.2	8.96	Yes
Silver	0.05	0.0008	62.5	1.18	Yes
Vanadium	0.296	0.05	5.92	0.11	Yes
BTEXN					
Benzene	13.37	0.5	26.75	0.50	Yes
Toluene	18.62	0.11	169.32	3.2	Yes
Ethylbenzene	0.466	0.05	9.32	0.176	Yes
Xylene (total)	5.57	0.05[2]	111.5	2.1	Yes
Naphthalene	0.48	0.05	9.62	0.182	Yes
PAH					
Phenanthrene	0.00175	0.0006	2.92	0.055	Yes
Phenols					
Pentachlorophenol	0.01	0.011	0.91	0.017	Yes
Phenol	13.25	0.27	49.1	0.926	Yes

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 extremely 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

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 (or mixing zone) for this impact is modelled to be 37 m for the standard PFW discharge and 247 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 Victoria waters.	

7.6.5 Potential Level 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 are potentially to be observed for fauna within the mixing zone and 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 show that at the mixing zone boundaries there are no effects.

There is no predicted harm to cultural values and sensitivities from this impact.

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 ^{o}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 1,961 worst case dilution at the mixing zone boundary means conductivity at the mixing zone boundary will equalise with the ocean baseline.
- pH (at 25^{o}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 1,961 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 1,961 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.

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.

7.6.5.3 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 - 2025 have ranged from below 10 to above 90 mg/L, with an average of during this time with no apparent trend in concentrations. The ANZG (2018) DGVs for marine waters for BTEX constituents are presented in Table 7.6. Using the 1,961 worst case dilution factor, and average BTEX concentrations for the November 2025 sampling period, BTEX concentrations are estimated to reach DGVs within the 37 m mixing zone boundary.

7.6.5.4 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.

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/L. Using the 1,961 worst case dilution factor

7.6.5.5 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 (Appendix 13) 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 7.20 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 7.22 below 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 19,608 dilution factor for PFW-GLDA.

Table 7.22: 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 (247 m)
Metals/metalloids					
Cadmium	0.0020	0.0007	2.86	0.036	Yes
Chromium	1.7000	0.00014[4]	12,143	152.96	Yes
Copper	0.0100	0.0002	50	0.63	Yes
Nickel	0.6500	0.007	92.86	1.17	Yes
Mercury	0.0023	0.0001	23	0.29	Yes
BTEXN					
Benzene	11	0.5	22	0.28	Yes
Toluene	21	0.11	190.9	2.4	Yes
Ethylbenzene	0.8	0.05	16	0.21	Yes
Xylene (total)	11.1	0.05	224	2.82	Yes
Naphthalene	0.73	0.05	14.6	0.18	Yes

The 19,608 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 247 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 (see later discussion). Sediment sampling will be repeated in 2026.

7.6.5.6 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.

7.6.5.7 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 5.5.7 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 5.7.6 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** consequence.

7.6.5.8 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).

7.6.5.9 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. Photo 3.4 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** consequence.

7.6.5.10 Potential toxicity to plankton

Section 5.5.2 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 consequence.

7.6.5.11 Potential toxicity to seals

As noted in Section 5.5.6, 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 not a credible 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 5.4.6). 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 5.4.6 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).

7.6.5.12 Potential toxicity to cetaceans

As noted in Section 5.5.5, 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.

7.6.5.13 Impacts to Seabed Sediment Quality

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 Figure 5.12 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).

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 following section) 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.

7.6.5.14 Sediment sampling study

Sediment sampling was undertaken in February 2021 within the PFW mixing zone (Figure 7.6 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 (Appendix 10, Yolla Sediment Quality Assessment - Results Report, Aecom, 22-May-2023). A summary of results and key findings is shown in Table 7.8. Sediment sampling will be repeated in 2026.

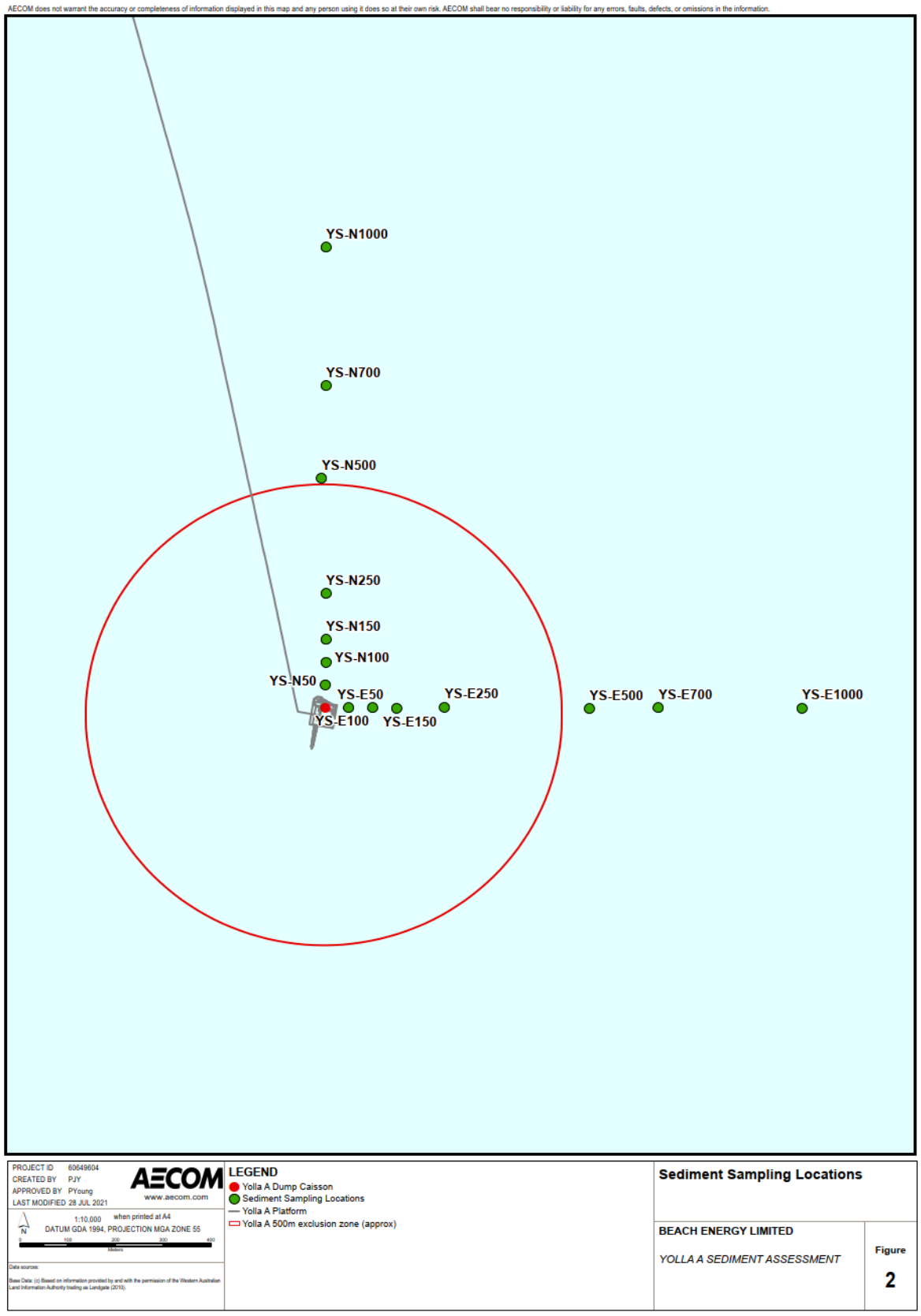


Figure 7.6: Sediment sampling locations in the vicinity of Yolla platform

Table 7.23: 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.

7.6.5.15 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 7.24provides 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 7.24:: Comparison between the Beach and EARPL 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	Soft sediments	

7.6.5.16Water 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, thus ensuring the protection of 80% of species.

7.6.5.17 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 levels and TPH levels below ANZG 2018 thresholds (Section Sediment sampling study).

Adaptive Management Framework (AMF)

The PFW AMF comprises routine monitoring and non-routine monitoring 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 7.7: PFW monitoring – decision frameworkdemonstrates what actions are taken if any of the routine monitoring limits are exceeded and who has monitoring responsibilities.

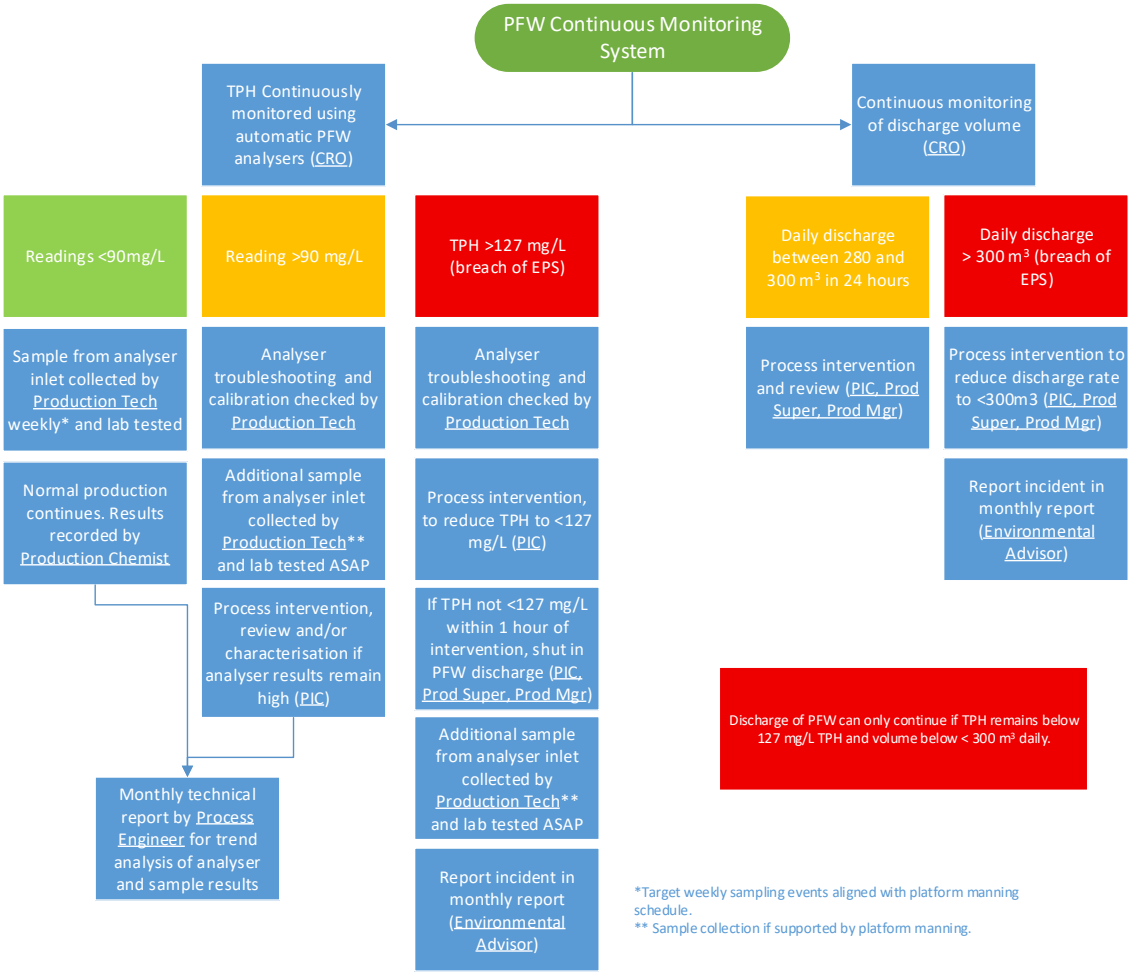


Figure 7.7: PFW monitoring – decision framework

Threshold Definition

A threshold limit concentration of 127 mg/L.

- 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 sine then to now (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 7.4) 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 shown in Table 7.25 describe the routine and non-routine monitoring program that is in place as part of the AMF that ensure the limits are not breached.

7.6.5.18 Training and Competency

All new crew joining Yolla-A are assessed as competent to perform their role through the Beach training and competency framework 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 8.6.1, 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 7.25:: 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

Program element	Explanation	Frequency	Responsibilities
Total PFW volume discharge monitoring	Total discharge rate monitored and alarmed not to exceed 300 m3/day. PFW shut in if a volume of 300 m3/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 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	6-monthly (note that sampling frequency will increase in 2026 with 6 monthly characterisation for both regular and GLDA PFW streams) and to be reduced	• Sampling & freight – Production Technician • Review of results - SEA, Production Chemist • Specialist consultants contracted as required

Program element	Explanation	Frequency	Responsibilities
	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 the constituent exceeding a trigger is resulting in an increase to toxicity of the PFW stream.	thereafter based on results)	
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	• Scoping, contracting, logistics and report review - SEA • PFW sampling, preservation and laboratory management – Production Technician

Program element	Explanation	Frequency	Responsibilities
		frequent than annually)	
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.

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?	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.	Continue investigation until completed with causes known (as per 'detailed steps' column).

TPH limit (90 mg/L) triggered	Detailed steps	By who	Result	Consequence*
	• 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. • 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.		TPH readings continue to be between 90 and 127 mg/L.	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 m3/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. WET testing will be triggered (see below).

TPH limit (90 mg/L) triggered	Detailed steps	By who	Result	Consequence*
WET testing and/or characteris-ation 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.	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.
	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: • Stage 1 - Baseline assessment; and • Stage 2 - Triggered assessment.		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.
	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		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

TPH limit (90 mg/L) triggered	Detailed steps	By who	Result	Consequence*
	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: 10. 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: 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. 11. 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.			reduced TPH levels.

*Colour coding follows the 'traffic light' system (green = proceed as normal, amber = caution/take action, red = stop/take action).

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 continuously 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 (less than the 693 m extent of the 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*
Undertake seabed sediment sampling utilising suitably qualified environmental science consultancy: Scoping, contracting, logistics and report review – SEA. Program design and implementation - specialist consultant. Results to be compared to ANZG (2018) DGVs and NAGD Screening Levels	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.

Steps	By who	Result	Consequence*
Undertake an attributability assessment considering any unplanned releases and/or in-field operations that have the potential to affect sediment quality. Sediment sampling points will be based on PFW plume modelling.		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	• 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.

Trigger	Indicative verification monitoring
concentration in PFW stream discharge	• 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.

7.6.6 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 and justification	ALARP Decision Context: Type B There is a reduction in water quality and toxicity impacts to fauna within the mixing zone close to the discharge point at 45 m water depth. There are two mixing zones determined by WET testing and stochastic dispersion modeling – a standard 37 m PFW mixing zone and a PFW containing GLDA (a gold standard oilfield descaling chemical formulation) mixing zone, an intermittent event with a 247 m mixing zone. These are worst case mixing zones based on 300 m^3/day PFW discharge. The PFW will be discharged on an ongoing basis within this 5-year EP period. Impacts of PFW discharges are well studied and understood. Studies on the North West Shelf and studies in the Gippsland Basin, together with WET testing and plume modelling undertaken for Yolla-A contribute to this level of certainty. Yolla PFW discharge is a single PFW discharge with a low volume rate compared to other oil project PFW discharges in Commonwealth waters. Additional controls may be required to ensure impacts can be managed to ALARP depending on the level of added chemical use.
Adopted Control Measures	**Description**
CM07: Produced formation water monitoring program	• Two X-One analysers continuously monitor discharged 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.

	• Weekly third-party laboratory samples sampled, analysed and results added to the LIMS spreadsheet to validate X-One TPH data.
	• Calibration and routine maintenance of analysers in accordance with the manufacturers specifications and CMMS.
	• Total discharge rate monitored and alarmed not to exceed 300 m^3/day. PFW shut-in if it exceeds 300 m^3/day.
	• Monthly Technical Monitoring Report includes review of the past month's test results against online monitoring output. The review assesses the trends in BTEX, TPH and total PFW discharge rate. 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 analyser TP H correlation.
	• Routine 6-monthly 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.
	• Whole Effluent Toxicity testing is triggered through the Adaptive Management Framework. In 2026 two WET testing events will be tested for standard PFW discharge and PFW-GLDA discharge.
	• Plume Verification Study undertaken in 2023 to validate stochastic plume modelling results and undertaken five- yearly (or as otherwise triggered via the AMF).
	• 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.

Additional Control Measures Assessed		
Control	**Cost/Benefit Analysis**	**Control implemented?**
More frequent WET testing	Benefits have grown from GLDA star-up in understanding the intermittent pulse of increased toxicity. Two WET tests programmed for 2026. Further tests not justified on a cost basis.	No.

Table 7.31: Demonstration that Impacts will be of an Acceptable Level

Consequence rating	Minor
Likelihood of occurrence	NA (Impact)
Residual risk	NA (Impact)
Acceptability Assessment	
To meet the principles of ESD	PFW discharges are assessed as having a Minor (1) consequence, which is not considered to have the potential to result in serious or irreversible environmental damage. The control measures listed above outline the underlying monitoring program that is in place to maintain the quality of the discharge and the integrity of the real time online monitoring system. The response to production non-compliance events is an automatic alarm and shut-down

	process. The trend surveillance process leads to the monthly Technical Monitoring Report and additional WET testing, dispersion modelling, and dispersion modelling field verification when needed. The location of Yolla platform is distant from BIAs and commercial fishing grounds.
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 PFW discharges including commercial fishers.
Other requirements	Industry standards worldwide have influenced the Yolla PFW discharge compliance and risk assessment approach.
Monitoring and reporting	Beach Energy has introduced a strong scientific monitoring program to continue to understand PFW discharge risk and maintain compliance.
Environmental MNES	
BIA	Albatross and Giant Petrels – Foraging. Blue whale - Foraging (likely to be present), known foraging area (known to be present) for pygmy blue. Southern right whale – Breeding. Great white shark – Foraging.
Australian Marine Parks	As per the impact and risk assessment operational activities will not intersect nearby AMPs.
Wetland of International Importance:	As per the impact and risk assessment operational activities will not intersect nearby nearby Ramsar wetlands.
Threatened Ecological Communities	As per the impact and risk assessment operational activities will not intersect nearby TECs.
Nationally important wetlands	As per the impact and risk assessment operational activities will not intersect nearby NIW
Nationally threatened and migratory species	As per the impact and risk assessment operational activities will not have any impact or risk to threated or migratory species.
State marine parks	As per the impact and risk assessment this hazard will not intersect nearby SMPs.
Species Conservation Advice/ Recovery Plans/Threat Abatement Plans	As per the impact and risk assessment operational activities will be managed in accordance with and will not compromise the specific objectives or actions of the following plans: • Albatross and Giant Petrels Recovery Plan (DCCEEW, 2022) • National recovery plan for the Dwarf Galaxias (*Galaxiella pusilla*) (Department of Sustainability and Environment, 2010b) • White shark Recovery Plan (*Carcharodon carcharias*) (DSEWPaC 2013b). • Recovery Plan for the Grey Nurse Shark (*Carcharias taurus*) (DoE, 2014b) • Marine turtles as per the Recovery Plan for Marine Turtles in Australia (DoEE, 2017). • Conservation of listed seabirds as per the Wildlife Conservation Plan for Seabirds (CoA, 2020a).

	• National Recovery Plan for the Orange-bellied Parrot (DELWP 2016). • Conservation Management Plan for the Blue Whale (DoE, 2015). • National Recovery Plan for the Southern Right Whale (DCCEEW, 2024). • Conservation Advice for Fin Whales (TSSC, 2015c) and Conservation Advice for Sei Whales (TSSC, 2015b).
Acceptability outcome	**Acceptable**
Environmental Performance	EPOs represent the measurable levels of environmental performance Beach is seeking to achieve to ensure impacts are of an acceptable level. EPOs relevant to the effective management of impacts associated with PFW from the Yolla-a platform, are: • EPO13: Achieve a 99% species protection level at the edge of the mixing zone: 37 m for regular operations and 247 m for descaling events, through the implementation of a comprehensive monitoring program. This program will include real-time TPH discharge monitoring, monthly trend analysis, and adaptive measures in the event of potential non-compliance, with marine toxicity assessed using the WET testing regime. Table 7.93 sets out the EPS for the control measures identified above, and the measurement criteria to evaluate the achievement of EPOs and EPS.
Cumulative Impacts	Cumulative discharges of PFW from Yolla-A are expected to be intermittent due to rapid dilution into the surrounding waters. PFW will meet ANZG (2018) DGVs for 99% species protection level for PFW constituents at the mixing zone boundary with some exceptions. As a result, temporary, localised reductions in marine water quality may occur, but these are expected to rapidly return to ambient conditions upon mixing. With controls in place, cumulative discharges are not expected to result in death or injury to listed threated or migratory species. Water quality impacts are expected to remain within 37 m of the discharge point for routine PFW discharge and 247 m for descaling events involving the use of GLDA., with no unplanned releases of additional materials, chemicals or hydrocarbons.

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. The platform will primarily be staffed intermittently.

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 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. Impact to cultural values and sensitivities are not expected.

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 maintenance activities working alongside the platform or RGP in Commonwealth waters may also discharge putrescible waste.	Vessels engaged in maintenance activities along the RGP are not permitted to discharge putrescible waste in Victorian waters.

7.7.5 Potential Level of Environmental Impacts

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.

7.7.6 Impact Assessment

An impact assessment for putrescible waste discharges is presented below in Table 7.32.

Table 7.32: Impact assessment for putrescible waste discharges

ALARP decision context and justification	ALARP Decision Contact: Type A Indirect impacts from putrescible waste management are well understood and there is nothing new or unusual. Good practice is defined, and uncertainty is minimal. There are no conflicts with company values, no partner interests, and no significant media interests. As the impact consequence is rated as Minor (1) applying good industry practice is sufficient to manage the impact to ALARP.
Adopted Control Measures	**Description**

CM01: Marine Assurance Process	Beach Marine Assurance System ensures that vessels meet relevant maritime laws including to ensure discharges are in accordance with MARPOL Annex V and associated Marine Orders, including but not limited to: • Marine Order 95 Marine pollution prevention - garbage (giving effect to MARPOL Annex V), to ensure that appropriate garbage management plans and garbage record books are in place for the rig and each vessel. ◦ Vessels comply with the *Protection of the Sea (Prevention of Pollution from Ships) Act 1983*, which gives effect to MARPOL Annex IV relating to the discharge of noxious liquid substances, sewage, and putrescible waste. ◦ Macerated putrescible waste (≤25 mm) is only discharged overboard when the vessel is >3 nm from the shoreline. ◦ Un-macerated putrescible waste is only discharged overboard when the vessel is >12 nm from the shoreline and outside Yolla-A's PSZ. ◦ For vessels without a macerator and for non-putrescible galley waste, waste is returned to shore for disposal.
CM02: Operational procedures	Waste will be managed in accordance with regulatory requirements and Beach's Waste Management Plan – Otway and Bass Strait Offshore (S4000AD719914) which requires 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.
CM11: Procurement Vetting Process	Beach via its Procurement Vetting Process will ensure the appropriately licenced waste handling contractor and appropriately licenced waste facility contracted to Beach , Beach's Waste Management Plan – Otway and Bass Strait Offshore (S4000AD719914). and relevant regulatory requirements.

Additional Control Measures Assessed		
Control	**Cost/Benefit Analysis**	**Control implemented?**
N/A	None	N/A

Table 7.33: Demonstration that Impacts will be of an Acceptable Level

Consequence rating	Minor (1)
Likelihood of occurrence	NA (Impact)
Residual risk	NA (Impact)
Acceptability Assessment	
To meet the principles of ESD	Putrescible wastes are assessed as having a Minor (1) consequence, which is not considered to have the potential to result in serious or irreversible environmental damage. There is high confidence in the potential impact, as Beach has significant experience undertaking activities such as these, having operated the BassGas operations since 2006 and has controls in place for existing offshore developments and associated activities. The EIA presented throughout this EP demonstrates that ESD principles (a), (b), (c) and (d) are met (noting that principle (e) is not relevant).
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.
Other requirements	Onshore treatment and disposal of wastes is to be undertaken in accordance with the respective legislation of the States or Territory. • Environment Protection Act (Vic)
Environmental MNES	
Australian Marine Parks	This hazard does not intersect nearby AMPs.
Wetland of International Importance:	This hazard does not intersect any Ramsar wetlands.
Threatened Ecological Communities	This hazard does not intersect any TECs.
Nationally important wetlands	This hazard does not intersect any NIWs.
Nationally threatened and migratory species	This hazard does not have any impacts on threatened or migratory species.
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 may compromise the specific objectives or actions (regarding marine pollution) of the Albatross and Giant Petrels Recovery Plan (DCCEEW, 2022), specifically threats including the attraction of birds to food sources and ingestion of waste.
Monitoring and reporting	Monitoring of potential impacts is undertaken via stakeholder consultation as detailed in Section 8.5.1. Recording keeping will include: • Volume/weight of non-macerated waste sent ashore(platform and vessels). • Training matrix. • Induction records. • BassGas stakeholder engagement register. • Vessel PMS records. • Notices to Mariners. • Communications logs. • Incident register/reports. Loss of materials or waste overboard is required to be reported as per Section 8.3.1. Audits and inspections of waste management as part of operational activities will be conducted in accordance with Section 8.3.3.
Acceptability outcome	**Acceptable**
Environmental Performance	EPOs represent the measurable levels of environmental performance Beach is seeking to achieve to ensure impacts are of an acceptable level. EPOs relevant to the effective management of impacts associated with Putrescible wastes from the Yolla-a platform and planned activities are: • EPO2: No death or injury to listed threatened or migratory species from the activity.

	• EPO3: Biologically important behaviours can continue while the activity is being undertaken. • EPO8: No impact to water quality at a distance > 500 m from the vessel or rig from planned marine discharges. • EPO10: No unplanned discharge of materials or waste to the marine environment. • EPO11: Waste generated will be segregated and disposed of onshore in accordance with relevant legislation. Table 7.93 sets out the EPS for the control measures identified above, and the measurement criteria to evaluate the achievement of EPOs and EPS.
Cumulative Impacts	Routine discharges of macerated putrescible waste from the Yolla-A platform and associated vessels will occur intermittently over the life of the asset and in combination with other routine marine discharges and maritime activities in Bass Strait. When considered cumulatively, these discharges may result in repeated, short-term and localised increases in organic material and scavenger attraction within the immediate vicinity of the discharge point. However, discharge volumes are small, highly biodegradable, and rapidly dispersed in open offshore waters, limiting the potential for accumulation or broader water quality effects. With the application of MARPOL-compliant waste management controls, maceration requirements and operational procedures, cumulative discharges are not expected to result in death or injury to listed threatened or migratory species (EPO2), nor to disrupt biologically important behaviours beyond transient, localised attraction responses (EPO3). Water quality impacts are not expected to extend beyond 500 m from the vessel or platform (EPO8), and no unplanned discharges are anticipated (EPO10), with waste segregation and onshore disposal implemented where required (EPO11).

7.8 IMPACT 8: Routine Discharges - Sewage and Grey Water

7.8.1 Source of Aspect

On the platform and vessels, the use of ablution facilities results in the discharge of treated sewage and the use of laundries, showers, kitchens and hand basins results in the discharge of 'grey water' to the ocean. 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.

Yolla-A usually accommodates between five to eight (5-8) POB, and both grey water and sewage are managed through a sewage treatment plant (STP) sized for a maximum of 44 POB. On Yolla-A, sewage and grey water is discharged via the sewage caisson 7 m below sea level.

7.8.2 Known and Potential Environmental Impacts

The known and potential environmental impact of treated sewage and grey water discharges is from the platform and support vessels during operational activities. These discharges will be spatially localised, limited to a short duration (i.e., scheduled activities at the platform and RGP) and will 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 potentially felt in the surrounding area up to 50 m horizontally and 10 m vertically and likely to be limited to within 1 km from the discharge point carried by the variable currents present within Bass Strait, hence the magnitude of the impact is considered to be minor.

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. 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 the quality of the receiving waters, receptors that may occur within this EMBA, either as residents or migrants, are:

- Pelagic fauna; plankton, fish, cetaceans and pinnipeds
- Seabirds.
- Traditional Owners with cultural heritage connections to these waters.

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 maintenance 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 Potential Level of Environmental Impacts

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.

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.

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 consequences 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.

7.8.6 Impact Assessment

An impact assessment for putrescible waste discharges is presented below in Table 7.34

Table 7.34: Impact assessment for the discharge of treated sewage and grey water

ALARP decision context and justification	ALARP Decision Contact: Type A Indirect impacts from sewage and grey water waste management are well understood and there is nothing new or unusual. Good practice is defined, and uncertainty is minimal.

	There are no conflicts with company values, no partner interests, and no significant media interests. As the impact consequence is rated as Minor (1) applying good industry practice is sufficient to manage the impact to ALARP.
Adopted Control Measures	**Description**
CM01: Marine Assurance Process	Beach Marine Assurance System ensures that vessels meet relevant maritime laws including to ensure discharges are in accordance with *POWBONS Act 1986 (Vic),* MARPOL and associated Marine Orders, including but not limited to: • Marine Order 96 Marine pollution prevention - sewage (giving effect to MARPOL Annex IV), to ensure the discharge of noxious liquid substances, sewage, appropriate management plans and record books are in place for the platform and vessel/s. • Sewage will be macerated to fragments less than 25 mm and treated in a marine sanitary treatment unit in compliance with MARPOL requirements and the *Marine Pollution (Ships and Installation) Act 2013*. • Un-macerated waste is only discharged overboard when the vessel is >12 nm from the shoreline and outside Yolla-A's PSZ. • For vessels without a macerator and for non-putrescible galley waste, waste is returned to shore for disposal.
CM02: Operational procedures	Waste will be managed in accordance with regulatory requirements and and Beach's Waste Management Plan – Otway and Bass Strait Offshore (S4000AD719914) which requires 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.
CM11: Procurement Vetting Process	Beach via its Procurement Vetting Process will ensure the appropriately licenced waste handling contractor and appropriately licenced waste facility contracted to Beach, Beach's Waste Management Plan – Otway and Bass Strait Offshore (S4000AD719914) and relevant regulatory requirements.

Additional Control Measures Assessed		
Control	**Cost/Benefit Analysis**	**Control implemented?**
N/A	None	N/A

Table 7.35: Demonstration that Impacts will be of an Acceptable Level

Consequence rating	Minor (1)
Likelihood of occurrence	NA (Impact)
Residual risk	NA (Impact)
Acceptability Assessment	
To meet the principles of ESD	Sewage and greywater wastes are assessed as having a Minor (1) consequence, which is not considered to have the potential to result in serious or irreversible environmental damage. There is high confidence in the potential impact, as Beach has significant experience undertaking activities such as these, having operated the BassGas operations since 2006 and has controls in place for existing offshore developments and associated activities.

	The EIA presented throughout this EP demonstrates that ESD principles (a), (b), (c) and (d) are met (noting that principle (e) is not relevant).
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.
Other requirements	Onshore treatment and disposal of wastes is to be undertaken in accordance with the respective legislation of the States or Territory. • Environment Protection Act (Vic)
Environmental MNES	
BIA	Albatross and Giant Petrels – Foraging. Blue whale - Foraging (likely to be present), known foraging area (known to be present) for pygmy blue. Southern right whale – Breeding. Great white shark – Foraging.
Australian Marine Parks	This hazard does not intersect nearby AMPs.
Wetland of International Importance:	This hazard does not intersect any Ramsar wetlands.
Threatened Ecological Communities	This hazard does not intersect any TECs.
Nationally important wetlands	This hazard does not intersect any NIWs.
Nationally threatened and migratory species	This hazard does not have any impacts on threatened or migratory species.
State marine parks	As per the impact and risk assessment this hazard will not intersect nearby SMPs.
Species Conservation Advice/ Recovery Plans/Threat Abatement Plans	As per the impact and risk assessment operational activities will be managed in accordance with and will not compromise the specific objectives or actions of the following plans: • Albatross and Giant Petrels Recovery Plan (DCCEEW, 2022) • National recovery plan for the Dwarf Galaxias (*Galaxiella pusilla*) (Department of Sustainability and Environment, 2010b) • White shark Recovery Plan (*Carcharodon carcharias*) (DSEWPaC 2013b). • Recovery Plan for the Grey Nurse Shark (*Carcharias taurus*) (DoE, 2014b) • Marine turtles as per the Recovery Plan for Marine Turtles in Australia (DoEE, 2017). • Conservation of listed seabirds as per the Wildlife Conservation Plan for Seabirds (CoA, 2020a). • National Recovery Plan for the Orange-bellied Parrot (DELWP 2016). • Conservation Management Plan for the Blue Whale (DoE, 2015). • National Recovery Plan for the Southern Right Whale (DCCEEW, 2024). • Conservation Advice for Fin Whales (TSSC, 2015c) and Conservation Advice for Sei Whales (TSSC, 2015b).

Monitoring and reporting	Monitoring of potential impacts is undertaken via stakeholder consultation as detailed in Section 4. Recording keeping will include: • Volume/weight of non-macerated waste sent ashore (platform and vessels). • Training matrix. • Induction records. • BassGas stakeholder engagement register. • Vessel PMS records. • Notices to Mariners. • Communications logs. • Incident register/reports. Loss of materials or waste overboard is required to be reported as per Section 8.3.1. Audits and inspections of waste management as part of operational activities will be conducted in accordance with Section 8.3.3.
Acceptability outcome	**Acceptable**
Environmental Performance	EPOs represent the measurable levels of environmental performance Beach is seeking to achieve to ensure impacts are of an acceptable level. EPOs relevant to the effective management of impacts associated with Putrescible wastes from the Yolla-a platform and planned activities are: • EPO2: No death or injury to listed threatened or migratory species from the activity. • EPO3: Biologically important behaviours can continue while the activity is being undertaken. • EPO8: No impact to water quality at a distance > 500 m from the vessel or rig from planned marine discharges. • EPO10: No unplanned discharge of materials or waste to the marine environment. • EPO11: Waste generated will be segregated and disposed of onshore in accordance with relevant legislation. Table 7.93 sets out the EPS for the control measures identified above, and the measurement criteria to evaluate the achievement of EPOs and EPS.
Cumulative Impacts	Cumulative discharges of treated sewage and grey water from Yolla-A and associated vessels are expected to be intermittent and highly localised, with rapid dilution and dispersal in the open waters of Bass Strait. When considered alongside other routine marine discharges, these activities may cause minor, short-term nutrient increases in surface waters and transient, localised attraction of scavenging fauna. However, treatment through the STP, small discharge volumes, and open-water currents ensure that impacts remain confined to the immediate discharge area. With controls in place, cumulative discharges are not expected to result in death or injury to listed threatened or migratory species (EPO2) or disrupt biologically important behaviours (EPO3). Water quality impacts are not predicted to extend beyond 500 m from the platform or vessels (EPO8), and no unplanned discharges are anticipated (EPO10), with any waste properly treated, segregated, and disposed of onshore (EPO11).

7.9 IMPACT 9: Routine Discharges - Cooling and Brine Water

7.9.1 Source of Aspect

Seawater serves as a heat exchange medium for cooling machinery engines on Yolla-A and various vessels. Potable water, primarily for accommodation and associated domestic areas, may be generated on vessels using a reverse osmosis (RO) plant. This process will produce brine, which is diluted and discharged at the sea surface. 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 cooling and 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.

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 and cooling 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. 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 the quality of the receiving waters, receptors that may occur within this EMBA, either as residents or migrants, are:

- Pelagic fauna; plankton, fish, cetaceans and pinnipeds

- Avifauna.
- Traditional Owners with cultural heritage connections to these waters.

7.9.4 Jurisdiction of Hazard

The jurisdictions for this hazard are outlined below.

Commonwealth waters	Victorian waters
YES	YES
The platform discharges cooling and brine water.	Vessels will discharge cooling and brine water while undertaking inspections and maintenance along the portion of the RGP within state waters.

7.9.5 Potential Level of Environmental Impacts

Temporary and localised increase in 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.

Temporary and localised increase in 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.

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 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.

7.9.6 Impact Assessment

An impact assessment for the discharge of cooling and brine water is presented below in Table Table 7.36.

Table 7.36: Impact assessment for the discharge of cooling and brine water

ALARP decision context and justification	ALARP Decision Contact: Type A Indirect impacts from brine and cooling water waste management are well understood and there is nothing new or unusual. Good practice is defined, and uncertainty is minimal. Chemicals will be selected with the lowest practicable environmental impacts and risks subject to technical constraints to minimise the impacts of sea surface temperature and salinity increases on marine fauna. There are no conflicts with company values, no partner interests, and no significant media interests. As the impact consequence is rated as Minor (1) applying good industry practice is sufficient to manage the impact to ALARP.
Adopted Control Measures	**Description**
CM05: Chemical Management Procedure	All chemicals that will or could be discharged to the marine environment must be assessed prior to use to ensure the lowest toxicity, most biodegradable and least accumulative chemicals are selected which meet the technical requirements of the application as per the Beach Chemical Management Procedure. • 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.
CM02: Operational procedures	Waste will be managed in accordance with regulatory requirements and Beach's Waste Management Plan – Otway and Bass Strait Offshore (S4000AD719914) which requires 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.
CM11: Procurement Vetting Process	Beach via its Procurement Vetting Process will ensure the appropriately licenced waste handling contractor and appropriately licenced waste facility contracted to Beach, Beach's Waste Management Plan – Otway and Bass Strait Offshore (S4000AD719914) and relevant regulatory requirements.
Additional Control Measures Assessed	

Control	Cost/Benefit Analysis	Control implemented?
N/A	None	N/A

Table 7.37: Demonstration that Impacts will be of an Acceptable Level

Consequence rating	Minor (1)
Likelihood of occurrence	NA (Impact)
Residual risk	NA (Impact)
Acceptability Assessment	
To meet the principles of ESD	Brine and cooling water discharges are assessed as having a Minor (1) consequence, which is not considered to have the potential to result in serious or irreversible environmental damage. There is high confidence in the potential impact, as Beach has significant experience undertaking activities such as these, having operated the BassGas operations since 2006 and has controls in place for existing offshore developments and associated activities. The EIA presented throughout this EP demonstrates that ESD principles (a), (b), (c) and (d) are met (noting that principle (e) is not relevant).
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.
Other requirements	Onshore treatment and disposal of wastes is to be undertaken in accordance with the respective legislation of the States or Territory. • Environment Protection Act (Vic)
Environmental MNES	
Australian Marine Parks	This hazard does not intersect nearby AMPs.
Wetland of International Importance:	This hazard does not intersect any Ramsar wetlands.
Threatened Ecological Communities	This hazard does not intersect any TECs.
Nationally important wetlands	This hazard does not intersect any NIWs.
Nationally threatened and migratory species	This hazard does not have any impacts on threatened or migratory species.
State marine parks	This hazard does not have any impacts on the management aims of state marine parks.
Species Conservation Advice/ Recovery Plans/Threat Abatement Plans	This hazard does not intersect any Advice, Recovery Plan and TAPs
Monitoring and reporting	Monitoring of potential impacts is undertaken via stakeholder consultation as detailed in Section 4.

	Recording keeping will include: • Vessel Preventative Management System records. • Yolla-A Maintenance Management System • Chemical inventories. • Incident register/reports. Loss of materials or waste overboard is required to be reported as per Section 8.3.1. Audits and inspections of waste management as part of operational activities will be conducted in accordance with Section 8.3.3.
Acceptability outcome	**Acceptable**
Environmental Performance	EPOs represent the measurable levels of environmental performance Beach is seeking to achieve to ensure impacts are of an acceptable level. EPOs relevant to the effective management of impacts associated with brine and cooling water discharge from the Yolla-a platform and planned activities are: • EPO2: No death or injury to listed threatened or migratory species from the activity. • EPO3: Biologically important behaviours can continue while the activity is being undertaken. • EPO8: No impact to water quality at a distance > 500 m from the vessel or rig from planned marine discharges. • EPO10: No unplanned discharge of materials or waste to the marine environment. • EPO11: Waste generated will be segregated and disposed of onshore in accordance with relevant legislation. • EPO12: No spills of chemicals or hydrocarbons to the marine environment. Table 7.93 sets out the EPS for the control measures identified above, and the measurement criteria to evaluate the achievement of EPOs and EPS.
Cumulative Impacts	Cumulative discharges of cooling and brine water from Yolla-A and associated vessels are expected to be intermittent, highly localised, and rapidly diluted in the open waters of Bass Strait. Minor, short-term increases in sea surface temperature and salinity may occur within the immediate vicinity of the discharge, but these are expected to dissipate quickly due to mixing and dispersal by currents. Residual concentrations of biocides and scale inhibitors are low, rapidly degraded, and unlikely to pose any meaningful risk to marine fauna. With controls in place, cumulative discharges are not expected to result in death or injury to listed threatened or migratory species (EPO2) or disrupt biologically important behaviours (EPO3). Water quality impacts are not predicted to extend beyond 500 m from the discharge point (EPO8), and no unplanned discharges of chemicals or waste are anticipated (EPO10, EPO12), with all materials managed, segregated, and disposed of onshore as required (EPO11).

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-hazardous areas direct water overboard without treatment (see Section 3.5.9). If contaminants are present, there is a risk of these being washed overboard during rain or when the deck is washed.

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 the quality of the receiving waters, receptors that may occur within this EMBA, either as residents or migrants, such as:

- Pelagic fauna: Plankton, Fish, Cetaceans, Pinnipeds, Turtles.
- Avifauna.

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 will discharge bilge water and deck drainage while undertaking inspections and maintenance while in the platform PSZ or along the portion of the RGP within Commonwealth waters.	Vessels will discharge bilge water and deck drainage while undertaking inspections and maintenance along the portion of the RGP within state waters.

7.10.5 Potential Level of Environmental Impacts

Temporary and localised reduction of surface 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).

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 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.

7.10.6 Impact Assessment

An impact assessment for the discharge of bilge water and deck drainage is presented below in Table 7.38.

Table 7.38: Impact assessment for the discharge of bilge water and deck drainage

ALARP decision context and justification	ALARP Decision Contact: Type A Indirect impacts from bilge water (and deck drainage) waste management are well understood and impacts of oily water discharges to the ocean are well known and the extent of impact is localised up to 100 m horizontally and 10 m vertically from the discharge point. Good practice is defined, and uncertainty is minimal. There are no conflicts with company values, no partner interests, and no significant media interests. As the impact consequence is rated as Minor (1) applying good industry practice is sufficient to manage the impact to ALARP.
Adopted Control Measures	**Description**

CM01: Marine Assurance Process	Beach Marine Assurance System ensures that vessels meet relevant maritime laws including to ensure discharges are in accordance with MARPOL and associated Marine Orders, including but not limited to: • Marine Order 91 Marine Prevention of Pollution by Oil – bilge water (giving effect to MARPOL Annex I), ensuring effluent discharged into the sea contains less than 15 parts per million (ppm) of oil, for the platform and vessel/s.
CM02: Operational procedures	Waste will be managed in accordance with regulatory requirements and Beach's Waste Management Plan – Otway and Bass Strait Offshore (S4000AD719914) which requires 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.
CM05: Chemical Management Procedure	All chemicals that will or could be discharged to the marine environment must be assessed prior to use to ensure the lowest toxicity, most biodegradable and least accumulative chemicals are selected which meet the technical requirements of the application as per the Beach Chemical Management Procedure.
CM11: Procurement Vetting Process	Beach via its Procurement Vetting Process will ensure the appropriately licenced waste handling contractor and appropriately licenced waste facility contracted to Beach, Beach's Waste Management Plan – Otway and Bass Strait Offshore (S4000AD719914) and relevant regulatory requirements.

Additional Control Measures Assessed		
Control	**Cost/Benefit Analysis**	**Control implemented?**
N/A	None	N/A

Table 7.39: Demonstration that Impacts will be of an Acceptable Level

Consequence rating	Minor
Likelihood of occurrence	NA (Impact)
Residual risk	NA (Impact)
Acceptability Assessment	
To meet the principles of ESD	Bilge water (and deck drainage) are assessed as having a Minor (1) consequence, which is not considered to have the potential to result in serious or irreversible environmental damage. There is high confidence in the potential impact, as Beach has significant experience undertaking activities such as these, having operated the BassGas operations since 2006 and has controls in place for existing offshore developments and associated activities. The EIA presented throughout this EP demonstrates that ESD principles (a), (b), (c) and (d) are met (noting that principle (e) is not relevant).
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.
Other requirements	Onshore treatment and disposal of bilge water (and deck drainage) is to be undertaken in accordance with the respective legislation of the States or Territory. • Environment Protection Act (Vic)
Environmental MNES	
Australian Marine Parks	This hazard does not intersect nearby AMPs.
Wetland of International Importance:	This hazard does not intersect any Ramsar wetlands.
Threatened Ecological Communities	This hazard does not intersect any TECs.
Nationally important wetlands	This hazard does not intersect any NIWs.
Nationally threatened and migratory species	This hazard does not have any impacts on threatened or migratory species.
State marine parks	This hazard does not have any impact on the management aims of state marine parks.
Species Conservation Advice/ Recovery Plans/Threat Abatement Plans	This hazard does not intersect any Advice, Recovery Plan and TAPs
Monitoring and reporting	Monitoring of potential impacts is undertaken via stakeholder consultation as detailed in Section 4. Recording keeping will include: • Volume bilge water (and deck drainage). • Training matrix and Induction records. • BassGas stakeholder engagement register. • Vessel PMS records. • Notices to Mariners. • Communications logs. • Incident register/reports. Audits and inspections of waste management as part of operational activities will be conducted in accordance with Section 8.3.3.
Acceptability outcome	**Acceptable**
Environmental Performance	EPOs represent the measurable levels of environmental performance Beach is seeking to achieve to ensure impacts are of an acceptable level. EPOs relevant to the effective management of impacts associated with Putrescible wastes from the Yolla-a platform and planned activities are: • EPO2: No death or injury to listed threatened or migratory species from the activity. • EPO3: Biologically important behaviours can continue while the activity is being undertaken. • EPO8: No impact to water quality at a distance > 500 m from the vessel or rig from planned marine discharges. • EPO10: No unplanned discharge of materials or waste to the marine environment. • EPO12: No spills of chemicals or hydrocarbons to the marine environment.

	Table 7.93 sets out the EPS for the control measures identified above, and the measurement criteria to evaluate the achievement of EPOs and EPS.
Cumulative Impacts	Cumulative discharges of bilge water and deck drainage from Yolla-A and associated vessels are expected to be intermittent, low in volume, and rapidly diluted in the surrounding waters. Treated bilge water will meet MARPOL standards (<15 ppm oil-in-water), while any minor deck drainage containing trace contaminants will be dispersed quickly. As a result, temporary, localised reductions in surface water quality may occur, but these are not expected to extend beyond 100 m from the discharge point and will rapidly return to ambient conditions. With controls in place, cumulative discharges are not expected to result in death or injury to listed threatened or migratory species (EPO2) or interfere with biologically important behaviours (EPO3). Water quality impacts are expected to remain within 500 m of the discharge point (EPO8), with no unplanned releases of materials, chemicals, or hydrocarbons (EPO10, EPO12).

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.

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 EMBA for the accidental disposal of hazardous and non-hazardous materials and waste is likely to extend for kilometres from the release site (as buoyant waste may float long distances with ocean currents and winds) or localised for non-buoyant items that sink to the seabed.

7.11.3.1 Ecological receptors

These ecological receptors are values of the following within the Operational Area:

- Conservation values and sensitivities
- Cultural values and sensitivities

Receptors susceptible to waste that may occur within this EMBA, either as residents or migrants, are:

- Benthic fauna.
- Benthic habitat (sand and reef substrates).
- Pelagic fish.
- Cetaceans.
- Pinnipeds.
- Avifauna.
- Traditional Owners with cultural heritage connections to these waters.

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. You can find the full list of these species in the referenced document.

The marine fauna listed above are connected to places associated with songlines or connected to individuals through ceremony (Section 5.4). 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).

7.11.3.2 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.

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 maintenance activities.	Accidental discharges could occur from vessels while undertaking inspections and maintenance along/on the portion of the RGP within state waters.

7.11.5 Potential level 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.

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.

7.11.6 Risk Assessment

A risk assessment for the accidental disposal of hazardous and non-hazardous materials and waste is presented below in Table 7.40.

Table 7.40: Risk assessment for the unplanned discharge of solid or hazardous waste to the marine environment.

ALARP decision context and justification	ALARP Decision Contact: Type A Indirect impacts from accidental discharge of materials or waste management are localised reduction in water quality well understood and there is nothing new or unusual. Good practice is defined, and uncertainty is minimal. There are no conflicts with company values, no partner interests, and no significant media interests. As the risk consequence is rated as Moderate applying good industry practice is sufficient to manage the impact to ALARP.
Adopted Control Measures	**Description**
CM01: Marine Assurance Process	Beach Marine Assurance System ensures that vessels meet relevant maritime laws including to ensure discharges are in accordance with MARPOL and associated Marine Orders, including but not limited to: • Marine Order 95 Marine pollution prevention - garbage (giving effect to MARPOL Annex V), to ensure that appropriate garbage management plans and garbage record books are in place for the rig and each vessel. • Vessels comply with the *Protection of the Sea (Prevention of Pollution from Ships) Act 1983*, which gives effect to MARPOL Annex IV relating to the discharge of noxious liquid substances, sewage, and putrescible waste. • Marine Order 42 Carriage, stowage and securing or cargoes and containers, vessels comply to *Navigation Act 2021* where relevant, to ensure cargo is packed, loaded, stowed, and secured throughout each voyage. • *Pollution of waters by oil and noxious substances Act 1986 (Vic)*
CM02: Operational procedures	Waste will be managed in accordance with regulatory requirements and Beach's Waste Management Plan – Otway and Bass Strait Offshore (S4000AD719914) which requires 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. Waste is stored, handled and disposed of in accordance with vessel GMsP. This includes measures including: • No discharge of general operational or maintenance wastes or plastics or plastic products of any kind. • Waste containers are covered with secure lids to prevent solid wastes from blowing overboard. • All solid wastes are stored in designated areas before being sent ashore for recycling, disposal or treatment. • Any liquid waste storage on deck must have at least one barrier to minimise the risk of spills to deck entering the ocean. This can include containment lips on deck (primary bunding) and/or secondary containment measures (bunding, containment pallet, transport packs, absorbent pad barriers) in place.

	• Correct segregation of solid and hazardous wastes. Solid waste that is accidentally discharged overboard is recovered if reasonably practicable.
CM04: Beach Fair Ocean Access Procedure	Upon notification of a claim of interference, Beach will enter the details into the CMO incident management system and follow its Investigations Procedure to investigate the complaint/incident and determine whether compensation is payable to the complainant.
CM05: Chemical Management Procedure	All chemicals that will or could be discharged to the marine environment must be assessed prior to use to ensure the lowest toxicity, most biodegradable and least accumulative chemicals are selected which meet the technical requirements of the application as per the Beach Chemical Management Procedure.
CM11: Procurement Vetting Process	Beach via its Procurement Vetting Process will ensure the appropriately licenced waste handling contractor and appropriately licenced waste facility contracted to Beach, Beach's Waste Management Plan – Otway and Bass Strait Offshore (S4000AD719914) and relevant regulatory requirements.

Additional Control Measures Assessed		
Control	**Cost/Benefit Analysis**	**Control implemented?**
N/A	None	N/A

Table 7.41: Demonstration that Risks will be of an Acceptable Level

Consequence rating	Moderate
Likelihood of occurrence	Highly unlikely
Residual risk	Low
Acceptability Assessment	
To meet the principles of ESD	Unplanned accidental waste discharges are assessed as having a Low risk and a Minor consequence, which is not considered to have the potential to result in serious or irreversible environmental damage. There is high confidence in the potential impact, as Beach has significant experience undertaking activities such as these, having operated the BassGas operations since 2006 and has controls in place for existing offshore developments and associated activities. The EIA presented throughout this EP demonstrates that ESD principles (a), (b), (c) and (d) are met (noting that principle (e) is not relevant).
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.
Other requirements	Onshore treatment and disposal of wastes is to be undertaken in accordance with the respective legislation of the States or Territory. • Environment Protection Act (Vic)

Environmental MNES	
Australian Marine Parks	The unplanned discharge of solid or hazardous waste is highly unlikely to intersect nearby AMPs. The South-east Marine Parks Network Management Plan 2025 (DCCEEW, 2025) identifies marine debris as a threat to the AMP network. The EPS listed in this table aim to minimise the generation of marine debris and are aligned with the strategies outlined in the plan.
Wetland of International Importance:	The unplanned discharge of solid or hazardous waste is highly unlikely to intersect nearby Ramsar wetlands.
Threatened Ecological Communities	The unplanned discharge of solid or hazardous waste is highly unlikely to intersect nearby TECs.
Nationally important wetlands	The unplanned discharge of solid or hazardous waste is highly unlikely to intersect nearby NIWs.
Nationally threatened and migratory species	The unplanned discharge of solid or hazardous waste is highly unlikely to have any impacts on threated or migratory species.
State marine parks	The unplanned discharge of solid or hazardous waste is highly unlikely to have any on the management aims of state marine parks.
Species Conservation Advice/ Recovery Plans/Threat Abatement Plans	The discharge of waste to the marine environment will be managed in accordance with and will not compromise the specific objectives or actions (regarding marine pollution) of the following plan, specifically threats including the attraction of marine fauna to food sources, ingestion of waste and entanglement by waste and impact to habitat. • Albatross and Giant Petrels Recovery Plan (DCCEEW, 2022) • National recovery plan for the Dwarf Galaxias (*Galaxiella pusilla*) (Department of Sustainability and Environment, 2010b) • White shark Recovery Plan (*Carcharodon carcharias*) (DSEWPaC 2013b). • Recovery Plan for the Grey Nurse Shark (*Carcharias taurus*) (DoE, 2014b) • Marine turtles as per the Recovery Plan for Marine Turtles in Australia (DoEE, 2017). • Conservation of listed seabirds as per the Wildlife Conservation Plan for Seabirds (CoA, 2020a). • National Recovery Plan for the Orange-bellied Parrot (DELWP 2016). • Conservation Management Plan for the Blue Whale (DoE, 2015). • National Recovery Plan for the Southern Right Whale (DCCEEW, 2024). • Conservation Advice for Fin Whales (TSSC, 2015c) and Conservation Advice for Sei Whales (TSSC, 2015b).
Monitoring and reporting	Monitoring of potential impacts is undertaken via stakeholder consultation as detailed in Section 4. Recording keeping will include: • Garbage Record Book. • Shore-based waste contract. • Induction records. • Inspection records/checklists. • BassGas stakeholder engagement register. • Incident register/reports.

	Loss of materials or waste overboard is required to be reported as per Section 8.3.1. Audits and inspections of waste management as part of operational activities will be conducted in accordance with Section 8.3.3.
Acceptability outcome	**Acceptable**
Environmental Performance	EPOs represent the measurable levels of environmental performance Beach is seeking to achieve to ensure impacts are of an acceptable level. EPOs relevant to the effective management of impacts associated with Putrescible wastes from the Yolla-a platform and planned activities are: • EPO2: No death or injury to listed threatened or migratory species from the activity. • EPO6: No substantial or unrecoverable change in seabed quality which may adversely impact on biodiversity, ecological integrity, social amenity, cultural values or human health. • EPO7: No impact to submerged cultural heritage. • EPO10: No unplanned discharge of materials or waste to the marine environment. • EPO11: Waste generated will be segregated and disposed of onshore in accordance with relevant legislation. • EPO12: No spills of chemicals or hydrocarbons to the marine environment. Table 7.93 sets out the EPS for the control measures identified above, and the measurement criteria to evaluate the achievement of EPOs and EPS.
Cumulative Impacts	Accidental discharges of hazardous and non-hazardous waste from Yolla-A and associated vessels are considered highly unlikely due to rigorous waste management controls, marine assurance processes, and adherence to MARPOL and relevant environmental legislation. In the unlikely event of a release, 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. Cumulative risks to marine species, including EPBC-listed turtles, cetaceans, pinnipeds, and seabirds, are mitigated through careful handling, storage, and retrieval practices, and the implementation of waste containment procedures, ensuring no death or injury to listed threatened or migratory species (EPO2). Impacts to seabed quality are expected to be minimal and highly localised, with no unrecoverable loss of benthic habitat or ecological function (EPO6), and submerged cultural heritage will not be affected (EPO7). Cumulative impacts on the physical, biological, cultural, and socio-economic environment are considered low, with no unplanned discharge of waste or chemicals (EPO10, EPO12), and all waste is segregated and disposed of onshore in accordance with legislation (EPO11).

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.

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 heritage connections to these waters.

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 inspections and maintenance along the portion of the RGP within Commonwealth waters.	Collisions with megafauna may occur while vessels are undertaking inspections and maintenance along the portion of the RGP within state waters.

7.12.5 Potential Level of Environmental Risks

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.).

- 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.).

- 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.

Cetaceans are culturally significant to Traditional Owners, featuring in stories, songlines and ongoing knowledge systems that link marine species, place and cultural identity; disturbance or harm to cetaceans can therefore represent a disruption to these living cultural narratives, even in the absence of physical damage to heritage sites. However, based on the information above, the risk of collision or injury to cetaceans from this project is assessed as low, with impacts expected to be localised and temporary, and established vessel, helicopter and noise-management controls in place to ensure biologically important behaviours can continue and cultural values are not compromised.

7.12.6 Risk Assessment

A risk assessment for vessel collision with megafauna is presented below in Table 7.42.

Table 7.42: Risk assessment for vessel collision with megafauna

ALARP decision context and justification	ALARP Decision Context: Type A The risk of fauna interaction and potential vessel collision is well understood and there is nothing new or unusual. Good practice is defined, and uncertainty is minimal. There are no conflicts with company values, no partner interests, and no significant media interests. On the basis of the risk and impact assessment completed, Beach considers the control measures identified are appropriate to manage the risk associated with fauna interaction to ALARP.
Adopted Control Measures	**Description**
CM01: Marine Assurance Process	The Yolla-A Platform and vessels will meet relevant maritime laws and includes pre-commencement rig and vessel inspections of class certification requirements under the Navigation Act 2012 and associated Marine Orders, including but not limited to • Marine Order 30 - Prevention of Collisions which details the requirements for navigation equipment, watchkeeping, radar and lighting requirements. • Marine Order 57: Helicopter Operations ensures the obstacles on the helideck including birds are clear before approach and landing.
CM02: Operational procedures	Through constant bridge watch, vessels comply with the Australian National Guidelines for Whale and Dolphin Watching for Vessels (DoEE, 2017) when working within the operational area. This means: • 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. Vessel speeds within the Operational Areas will be restricted to ≤ 10 knots.
CM06: Light Management Plan	• The National Light Pollution Guidelines for Wildlife (CoA 2023) provide management options for mitigating the effect of light to marine fauna and specifically seabirds that includes migratory birds. • The Light Management Plan for BassGas operational activities to reduce the impact of artificial light to seabirds turtles and migrating shorebirds,

	to mitigate potential harm from light exposure, attraction and disorientation, the plans include the following practices and guidance: ◦ Non-essential lights are turned off when not in use. ◦ Lighting is directed onto work areas. ◦ Window screens or blinds are closed at night. ◦ National Light Pollution Guideline for Wildlife, DCCEEW ◦ Crew environmental induction covers handling and reporting requirements for marine fauna include grounded or injured seabirds. ◦ Planned infrastructure inspection and maintenance activity will where possible consider seasonal timing to minimise adverse impact to migratory seabirds and marine fauna. • Beach will contract appropriately qualified lighting practitioners, together with an appropriately qualified marine biologist or ecologist to develop and support the implementation of a Light Management Plan as per the National Light Pollution Guidelines for Wildlife (CoA 2023).
CM08: Whale Management Procedure	The Whale Management Procedure outlines specific measures to minimise anthropogenic noise threats to relevant species, including the implementation of safe operating distances between vessels and whales, pre-activity surveys for specific activities, night-time and low visibility controls and establishment of safe points for operational activities. The procedure assumes that once an activity is underway foraging whales that enter the pre-activity survey zone are not displaced as foraging behaviour has not been disrupted as the whale has commenced or continued foraging and thus aligns with the Conservation Management Plan for the Blue Whale (DoE, 2015b) and DAWE (2021a) definitions. The activity survey zones are based on the distance to the furthest modelled PTS, TTS, or behaviour criteria (Section 7.5), and have been rounded up to account for the accuracy of distance estimation at sea. 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.

Additional Control Measures Assessed		
Control	**Cost/Benefit Analysis**	**Control implemented?**
N/A	None	N/A

Table 7.43: Demonstration that Risks will be of an Acceptable Level

Consequence rating	Serious
Likelihood of occurrence	Remote

Residual risk	Low
Acceptability Assessment	
To meet the principles of ESD	The risk of fauna interaction (vessel collision) was assessed as Low, which is not considered as having the potential to result in irreversible environmental damage. There is high confidence in the potential risk level, as Beach has significant experience undertaking activities such as these, having operated the BassGas operations since 2006 and has controls in place for existing offshore developments and associated activities. The EIA presented throughout this EP demonstrates that ESD principles (a), (b), (c) and (d) are met (noting that principle (e) is not relevant).
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 fauna interactions.
Other requirements	Fauna interactions will be managed in accordance with legislative requirements. EPBC Regulations 2000 – Part 8 Division 8.1 interacting with cetaceans requirements are implemented as per CM08: Whale Management Procedure.
Environmental MNES	
BIA	Albatross and Giant Petrels – Foraging. Blue whale - Foraging (likely to be present), known foraging area (known to be present) for pygmy blue. Southern right whale – Breeding. Great white shark – Foraging.
Australian Marine Parks	As per the impact and risk assessment vessel movements will not intersect nearby AMPs. The South-east Marine Parks Network Management Plan 2025 (DCCEEW, 2025) identifies marine debris as a threat to the AMP network. The EPS listed in this table aim to minimise the generation of marine debris and are aligned with the strategies outlined in the plan.
Wetland of International Importance:	As per the impact and risk assessment vessel movements will not intersect nearby Ramsar wetlands.
Threatened Ecological Communities	As per the impact and risk assessment vessel movements will not intersect nearby TECs.
Nationally important wetlands	As per the impact and risk assessment vessel movements will not intersect nearby NIWs.
Nationally threatened and migratory species	As per the impact and risk assessment vessel movements will not intersect or have any impacts on threated or migratory species.
State marine parks	As per the impact and risk assessment vessel movements will not intersect nearby SMPs.

Species Conservation Advice/ Recovery Plans/Threat Abatement Plans	As per the impact and risk assessment vessel movements will be managed in accordance with and will not compromise the specific objectives or actions of the following plans: • Albatross and Giant Petrels Recovery Plan (DCCEEW, 2022) • National recovery plan for the Dwarf Galaxias (*Galaxiella pusilla*) (Department of Sustainability and Environment, 2010b) • White shark Recovery Plan (*Carcharodon carcharias*) (DSEWPaC 2013b). • Recovery Plan for the Grey Nurse Shark (*Carcharias taurus*) (DoE, 2014b) • Marine turtles as per the Recovery Plan for Marine Turtles in Australia (DoEE, 2017). • Conservation of listed seabirds as per the Wildlife Conservation Plan for Seabirds (CoA, 2020a). • National Recovery Plan for the Orange-bellied Parrot (DELWP 2016). • Conservation Management Plan for the Blue Whale (DoE, 2015). • National Recovery Plan for the Southern Right Whale (DCCEEW, 2024). • Conservation Advice for Fin Whales (TSSC, 2015c) and Conservation Advice for Sei Whales (TSSC, 2015b).
Monitoring and reporting	• Opportunistic megafauna sightings by vessel crew. • Vessel crew induction presentation and attendance records. • Megafauna sighting records • Incident reports.
Acceptability outcome	Acceptable
Environmental Performance	EPOs represent the measurable levels of environmental performance Beach is seeking to achieve to ensure impacts are of an acceptable level. EPOs relevant to the effective management of impacts associated with infrastructure and maintenance from the Yolla-a platform, RGP and planned activities are: • EPO2: No death or injury to listed threatened or migratory species from the activity. • EPO3: Biologically important behaviours can continue while the activity is being undertaken. • EPO6: No substantial or unrecoverable change in seabed quality which may adversely impact on biodiversity, ecological integrity, social amenity, cultural values or human health. Table 7.93 sets out the EPS for the control measures identified above, and the measurement criteria to evaluate the achievement of EPOs and EPS.
Cumulative Impacts	Vessel movements associated with the Yolla-A platform and RGP operations present a low, but not negligible, risk of collision with megafauna, including cetaceans and pinnipeds, due to their presence near the water surface and natural curiosity around slow-moving vessels. The risk of serious injury or mortality is mitigated through operational controls including speed restrictions to ≤10 knots, pre-commencement surveys, vessel and lighting management, and adherence to the Whale Management Procedure, ensuring safe distances and avoidance of anthropogenic noise or light disturbance. Cumulative impacts on marine fauna are considered low, as these controls minimise the likelihood of vessel strikes and allow biologically important behaviours—such as foraging, migration, and social interactions—to continue (EPO3). No substantial or unrecoverable change to seabed quality

	is expected, as vessel activity does not alter benthic habitats (EPO6). Furthermore, the risk of death or injury to listed threatened or migratory species is considered highly unlikely under the implemented mitigation measures (EPO2).

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 and maintenance 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.

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 heritage 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 inspections and maintenance along the portion of the RGP within Commonwealth waters.	Vessels undertaking inspections and maintenance along the portion of the RGP within state waters.

7.13.5 Potential Level of Environmental Risks

Successful IMS invasion requires the following three steps:

18. Colonisation and establishment of the marine pest on a vector (e.g., vessel hull) in a donor region (e.g., home port).
19. Survival of the settled marine species on the vector during the voyage from the donor to the recipient region (e.g., activity area).
20. 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 7.53 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.

7.13.6 Risk Assessment

A risk assessment for the introduction of invasive marine species is presented below in Table 7.44.

Table 7.44: Risk assessment for the introduction of IMS

ALARP decision context and justification	ALARP Decision Context: Type B The risk of IMS is well understood and there is nothing new or unusual. Good practice is defined, and uncertainty is minimal. There are no conflicts with company values, no partner interests, and no significant media interests. Additional controls may be required to ensure risks can be managed to an acceptable level.
Adopted Control Measures	**Description**

CM14: Beach Domestic IMS Biofouling Risk Assessment Process	Vessels, Rigs and support vessels mobilised from domestic waters to undertake activities within the Operational Areas will complete the Beach Domestic IMS Biofouling Risk Assessment Process as detailed in the Beach Introduced Marine Species Management Plan (S400AH719916) prior to the initial mobilisation into the Operational Areas. The Beach Domestic IMS Biofouling Risk Assessment Process: • Validates compliance with regulatory requirements (Commonwealth and State) in relation to biosecurity prior to engaging in activities within the Operational Areas. • Identifies the potential IMS risk profile of vessels and submersible equipment prior to deployment within the Operational Areas. • Identifies potentially deficiency of IMS controls prior to entering the Operational Areas. • 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 Areas).
CM11: Procurement Vetting Process	Beach undertakes a pre-qualification of all contractors to ensure contractor legal obligations are met including vessel operators must comply with the most recent version of the Australian Ballast Water Management Requirements.

Additional Control Measures Assessed		
Control	**Cost/Benefit Analysis**	**Control implemented?**
Only use rigs/vessels that are based in Victoria to reduce	Specialised drill rig (relief well) and support vessels are required to undertake the activity. Using rigs and vessels that are based in Victoria (if available) may reduce the likelihood of introducing an IMS, but this would depend on the IMS risk level of the port where the vessel is based. The control measures that are to be implemented are required to be undertaken for vessels from any port in Victoria or Australia. Thus, there is limited environmental benefit associated with implementing this response.	No

Table 7.45: Demonstration that Risks will be of an Acceptable Level

Consequence rating	Major
Likelihood of occurrence	Highly unlikely
Residual risk	Medium
Acceptability Assessment	
To meet the principles of ESD	The risk of the establishment of IMS was assessed as Medium and the consequence was assessed as Major which has the potential to result in serious or irreversible environmental damage. However, this is assessed as acceptable based on: • There is little uncertainty associated with this aspect as the activities are well known, the cause pathways are well known, and activities are well regulated and managed. • The implementation of controls make it a Highly unlikely likelihood that IMS will be introduced from the activity resulting in a Medium residual risk.

	• It is not considered that there is significant scientific uncertainty associated with this aspect. Therefore, the precautionary principle has not been applied. There is high confidence in the predicted level of risk as Beach has significant experience operating in the Otway and Bass Basins based on their existing offshore developments and associated activities.
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	There have been no stakeholder objections or claims regarding the introduction or establishment of IMS in relation to the activity.
Other requirements	The impact will be managed in accordance with legislation requirements and guidance, including: • Offshore Installations - Biosecurity Guide (DAFF 2023a) • National Biofouling Management Guidance for the Petroleum Production and Exploration Industry (MPSC 2018) • Australian Ballast Water Management Requirements (CoA 2020) and Australian Biofouling Management Requirements (DAWE 2022) gives effect to the Biosecurity Act 2015 and associated regulations; International Convention for the Control and Management of Ships' Ballast Water and Sediments (Ballast Water Convention) and relevant guidelines or procedures adopted by the Marine Environment Protection Committee of the International Maritime Organization (IMO) • IMO Biofouling Guidelines
Environmental MNES	
Australian Marine Parks	The South-east Commonwealth Marine Reserves Network Management Plan 2013-23 (DNP, 2013) identifies light pollution associated with offshore mining operations and other offshore activities as a threat to the AMP network. The EPS listed in this table aimed at minimising light pollution emitted from the platform and support vessels do not conflict with the strategies outlined in the plan that aim to address this threat.
Wetland of International Importance:	As per the impact and risk assessment IMS will not impact Ramsar wetlands.
Threatened Ecological Communities	As per the impact and risk assessment IMS will not impact TECs.
Nationally important wetlands	As per the impact and risk assessment IMS will not impact NIWs.
Nationally threatened and migratory species	As per the impact and risk assessment IMS will not impact threatened or migratory species.
State marine parks	As per the impact and risk assessment IMS will not intersect nearby SMPs..
Species Conservation Advice/ Recovery Plans/Threat Abatement Plans	As per the impact and risk assessment IMS will not impact plans.
	As per the impact and risk assessment IMS will not impact plans.
Monitoring and reporting	Impacts as a result of the introduction of IMS will be reported in accordance with the Section 8.3.1.

Acceptability outcome	Acceptable
Environmental Performance	Environmental Performance Outcomes (EPOs) represent the measurable levels of environmental performance Beach is seeking to achieve to ensure impacts are of an acceptable level. EPOs relevant to the effective management of impacts associated with establishment of invasive marine species from the drilling and P&A activities are: • EPO9: No introduction of a known or potential invasive marine species. Table 7.93 sets out the EPS for the control measures identified above, and the measurement criteria to evaluate the achievement of EPOs and EPS.
Cumulative Impacts	The introduction and establishment of invasive marine species (IMS) within the Operational Area is considered a low-risk event due to the extensive controls in place on PSV and support vessel operations. Potential vectors for IMS include ballast water, biofouling on hulls and submerged equipment, and specialist vessels operating intermittently within the Operational Area. The EMBA for IMS encompasses the Operational Area and potentially extends across Bass Strait if colonisation occurs. Operational controls (including the Beach Domestic IMS Biofouling Risk Assessment Process, pre-qualification of vessels, compliance with National Biofouling Management Guidance and IMO Biofouling Guidelines, and adherence to Australian Ballast Water Management Requirements) significantly reduce the likelihood of introduction. These measures ensure that vessels are either locally based or adequately cleaned and inspected prior to deployment, minimising the translocation of non-indigenous species. Cumulative impacts from IMS introduction are expected to be minimal. While the potential consequence of IMS establishment could be major—affecting native biodiversity, commercial fisheries, and cultural values—such outcomes are considered highly unlikely due to the rigorous preventative measures implemented. Residual risk is therefore assessed as medium, with high confidence in effectiveness of control measures. No impacts on Ramsar wetlands, threatened ecological communities, nationally important wetlands, threatened or migratory species, or state marine parks are expected. Overall, the cumulative impact of IMS introduction and establishment is considered acceptable under EPO9, ensuring no known or potential invasive species are introduced through operational activities.

7.14 RISK 4: LoC of Bulk Chemicals and Hydrocarbons

7.14.1 Source of Aspect

The following activities have the potential to result in accidental overboard discharges of chemicals and hydrocarbons:

Routine operations at the platform and vessels includes handling, use and transfer of hydrocarbons and chemicals with the following were identified as potentially leading to a loss of containment event:

- Use, handling and transfer of hydrocarbons and chemicals on board vessels and 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 fail from ROV, deck washdowns and bund overfills.

Specifically, spills overboard may be caused by, but not limited to:

- Failure to align valves correctly during transfer to tanks.
- Overfilling of tanks on platform or vessel.
- Dropped objects from crane transfers.
- Accidental or emergency disconnection of hoses.

Products that may be accidentally discharged overboard includes:

- Bulk chemicals (e.g., methanol, corrosion inhibitor and hydraulic fluid, generally in 1 m^3 IBCs), and
- 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.

7.14.2 Known and Potential Environmental Risks

The known and potential risks of the LoC of bulk chemicals and hydrocarbons are:

- Temporary and localised reduction of water quality.
- Acute toxicity to marine fauna through ingestion or absorption.

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:

- Plankton.
- Pelagic fish.
- Cetaceans
- Pinnipeds.
- Traditional Owners with cultural heritage connections to these waters.

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 inspections and maintenance along the portion of the RGP within Commonwealth waters.	Vessels undertaking inspections and maintenance along the portion of the RGP within state waters.

7.14.5 Potential Level 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 / mortality to fauna.
- Change in fauna behaviour.
- Change in ecosystem dynamics.
- Changes to the conservation, socio-economic and cultural values and sensitivities.

The 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. In the quantities inferred here (in the order of several cubic metres at most), the risks to water quality and marine fauna will remain low.

7.14.6 Risk Assessment

A risk assessment for the LoC of bulk chemicals and hydrocarbons. is presented below in Table 7.46.

Table 7.46: Risk assessment for the LoC of bulk chemicals and hydrocarbons

ALARP decision context and justification	ALARP Decision Contact: Type A Indirect impacts from unplanned chemical and hydrocarbon releases are well understood and impacts of oily water discharges to the ocean are well known and the extent of impact is localised up to 100 m horizontally and 10 m vertically from the discharge point. Good practice is defined, and uncertainty is minimal. There are no conflicts with company values, no partner interests, and no significant media interests. As the impact consequence is rated as Minor (1) applying good industry practice is sufficient to manage the impact to ALARP.
Adopted Control Measures	**Description**
CM01: Marine Assurance Process	Beach Marine Assurance System ensures that vessels meet relevant maritime laws including to ensure discharges are in accordance with MARPOL and associated Marine Orders, including but not limited to: • Marine Order 91 Marine Prevention of Pollution by Oil (giving effect to MARPOL Annex I), ensuring effluent discharged into the sea contains less than 15 parts per million (ppm) of oil, for the platform and vessel/s.
CM02: Operational procedures	• Bulk solids transferred in accordance with bulk transfer procedures to reduce the risk of an unintentional release bulk product (powder) to sea during tank venting. The procedures include standards for: • Certified equipment with confirmed integrity (e.g. hose and valves). • Transfer process (e.g. safety, communication, monitoring, inventory, emergency shut down procedures, procedural documents, and spill incident details). • Bunkering and bulk liquids will be transferred in accordance with bulk transfer procedures to reduce the risk of an unintentional release to sea during transfer. The procedures include standards for: • Certified equipment with confirmed integrity (e.g. hose and valves). • Transfer process (e.g. safety, communication, monitoring, inventory, emergency shut down procedures, procedural documents, and spill incident details) • Vessel speeds within the Operational Areas will be restricted to ≤10 knots. • AMSA JRCC and other marine users will be notified in the event of loss of materials with potential to affect safe navigation. • Waste will be managed in accordance with regulatory requirements and Beach's Waste Management Plan – Otway and Bass Strait Offshore (S4000AD719914) which requires 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.
CM05: Chemical Management Procedure	• All chemicals that will or could be discharged to the marine environment must be assessed prior to use to ensure the lowest toxicity, most biodegradable and least accumulative chemicals are selected which meet

	the technical requirements of the application as per the Beach Chemical Management Procedure.
CM12: Beach Offshore Oil Pollution Emergency Plan	• Emergency spill response capability is maintained in accordance with the NOPSEMA accepted OPEP. • Implement spill response in accordance with relevant EPOs and EPSs in the accepted OPEP.
CM13: Beach Offshore Operational and Scientific Monitoring Plan	• Operational and scientific monitoring capability is maintained in accordance with the NOPSEMA accepted OSMP.

Additional Control Measures Assessed		
Control	**Cost/Benefit Analysis**	**Control implemented?**
N/A	None	N/A

Table 7.47: Demonstration that Risks will be of an Acceptable Level

Consequence rating	Minor
Likelihood of occurrence	Highly unlikely
Residual risk	Low
Acceptability Assessment	
To meet the principles of ESD	The unplanned release of chemicals and hydrocarbons are assessed as having a Minor (1) consequence, which is not considered to have the potential to result in serious or irreversible environmental damage. The risk is assessed as a short-term, localised reduction of surface water quality around the discharge point and acute toxicity to marine fauna through ingestion/absorption of contaminated water. There is high confidence in the potential risk, as Beach has significant experience undertaking activities such as these, having operated the BassGas operations since 2006 and has controls in place for existing offshore developments and associated activities. The EIA presented throughout this EP demonstrates that ESD principles (a), (b), (c) and (d) are met (noting that principle (e) is not relevant).
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 chemicals and hydrocarbons.
Other requirements	Operational activities undertaken at the platform and during planned activities will adhere to relevant legislative requirements as detailed in the controls section.
Environmental MNES	
BIA	Albatross and Giant Petrels – Foraging. Blue whale - Foraging (likely to be present), known foraging area (known to be present) for pygmy blue.

	Southern right whale – Breeding. Great white shark – Foraging.
Australian Marine Parks	As per the impact and risk assessment operational activities will not intersect nearby AMPs.
Wetland of International Importance:	As per the impact and risk assessment operational activities will not intersect nearby nearby Ramsar wetlands.
Threatened Ecological Communities	As per the impact and risk assessment operational activities will not intersect nearby TECs.
Nationally important wetlands	As per the impact and risk assessment operational activities will not intersect nearby NIW
Nationally threatened and migratory species	As per the impact and risk assessment operational activities will not have any impact or risk to threated or migratory species.
State marine parks	As per the impact and risk assessment this hazard will not intersect nearby SMPs..
Species Conservation Advice/ Recovery Plans/Threat Abatement Plans	As per the impact and risk assessment operational activities will be managed in accordance with and will not compromise the specific objectives or actions of the following plans: • Albatross and Giant Petrels Recovery Plan (DCCEEW, 2022) • National recovery plan for the Dwarf Galaxias (*Galaxiella pusilla*) (Department of Sustainability and Environment, 2010b) • White shark Recovery Plan (*Carcharodon carcharias*) (DSEWPaC 2013b). • Recovery Plan for the Grey Nurse Shark (*Carcharias taurus*) (DoE, 2014b) • Marine turtles as per the Recovery Plan for Marine Turtles in Australia (DoEE, 2017). • Conservation of listed seabirds as per the Wildlife Conservation Plan for Seabirds (CoA, 2020a). • National Recovery Plan for the Orange-bellied Parrot (DELWP 2016). • Conservation Management Plan for the Blue Whale (DoE, 2015). • National Recovery Plan for the Southern Right Whale (DCCEEW, 2024). • Conservation Advice for Fin Whales (TSSC, 2015c) and Conservation Advice for Sei Whales (TSSC, 2015b).
Monitoring and reporting	Unplanned release of chemical and hydrocarbons resulting in a spill to the marine environment is required to be reported as per Section 8.3.1. Impacts as a result of a loss of containment resulting in a hydrocarbon spill will be monitored and reported in accordance with the OSMP.
Acceptability outcome	Acceptable
Environmental Performance	EPOs represent the measurable levels of environmental performance Beach is seeking to achieve to ensure impacts are of an acceptable level. EPOs relevant to the effective management of impacts associated with infrastructure and maintenance from the Yolla-a platform, RGP and planned activities are: • EPO2: No death or injury to listed threatened or migratory species from the activity. • EPO3: Biologically important behaviours can continue while the activity is being undertaken.

	• EPO6: No substantial or unrecoverable change in seabed quality which may adversely impact on biodiversity, ecological integrity, social amenity, cultural values or human health. Table 7.93 sets out the EPS for the control measures identified above, and the measurement criteria to evaluate the achievement of EPOs and EPS.
Cumulative Impacts	The potential for accidental overboard discharges of bulk chemicals and hydrocarbons from platform and vessel operations represents a localised environmental risk. Potential sources include handling, transfer, and storage of chemicals and hydrocarbons during routine platform and support vessel operations, including crane transfers, bunkering, deck washdowns, and ROV operations. The EMBA for such events is generally limited to tens to hundreds of metres from the source, with receptors most at risk including plankton, pelagic fish, cetaceans, and pinnipeds. Control measures implemented (such as the Beach Marine Assurance Process, Chemical Management Procedure, bulk transfer procedures, operational speed restrictions, and the Offshore Oil Pollution Emergency Plan) ensure that the likelihood of an unplanned release is highly unlikely and that any release is contained and minimised in volume and environmental effect. Operational and scientific monitoring, in accordance with the Offshore Operational and Scientific Monitoring Plan, provides further assurance that any minor impact to water quality or fauna can be rapidly detected and managed. Cumulative impacts from loss of containment events are expected to be minimal and localised. While minor, transient reductions in water quality and acute exposure to marine fauna could occur, these effects are short-term and reversible. No impacts on Ramsar wetlands, TECs, nationally important wetlands, threatened or migratory species, or state marine parks are expected. Residual risk is low, and high confidence exists in the effectiveness of adopted controls. Overall, the cumulative impact of LoC events is considered acceptable, ensuring the protection of biologically important behaviours, the integrity of the seabed, and the conservation of marine biodiversity under EPO2, EPO3, and EPO6.

7.15 Potential Impact of an Uncontrolled Release of Hydrocarbon

The potential surface release is condensate during offshore operations from a LoWC, rupture of the RCP, and a 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 oil spill modelling (OSM).

To understand the risks posed by a LOWC, Beach commissioned RPS to undertake Oil Spill Trajectory Modelling (OSTM) for a revised LoWC scenario based on current production rates (RPS, 2025).

The sea surface OSTM conducted analysed three hypothetical spill scenarios:

- Subsea Loss of Well Control (LOWC) at Yolla Platform (i.e. this Section).
- Subsea Pipeline Rupture 3 nm from Shore (Section 7.16).
- Surface Release of Marine Diesel Oil (MDO) 3 nm from Shore (Section 7.17).

Each scenario was assessed for both the summer (November through to March) and winter season (April to October). This evaluation considered the indicative timing of operational activities and adopted a conservative approach, recognising that the dispersion of a hydrocarbon release would likely be more extensive during winter seasonal conditions.

7.15.1 Yolla Condensate

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 7.48outlines the key characteristics of Yolla condensate.

Table 7.48: Yolla condensate Characteristics

Yolla condensate Characteristics	
API Gravity:	52.5
Density:	770.6 kg/m³ at 15°C.
Viscosity:	0.14 cP at 25°C.
Pour Point:	-3°C.
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.

Yolla condensate Characteristics	
	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 Oil Spill Modelling

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 7.49 (RPS, 2025).

Table 7.49: 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. 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.

Level		Exposure	Description
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).

7.16 RISK 5:Loss of Well Control

7.16.1 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.

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 loss of well control (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.

7.16.1.1Oil Spill Trajectory Modelling

The Subsea Loss of Well Control (LOWC) at Yolla Platform 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 at the Yolla well head 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 contracting 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)(CM15).

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 7.8 and Figure 7.9 show that evaporation is the key weathering mechanism.

The OSTM results for sea surface contact are presented in Figure 7.10, entrained hydrocarbons in Figure 7.11and dissolved hydrocarbons in Figure 7.12.

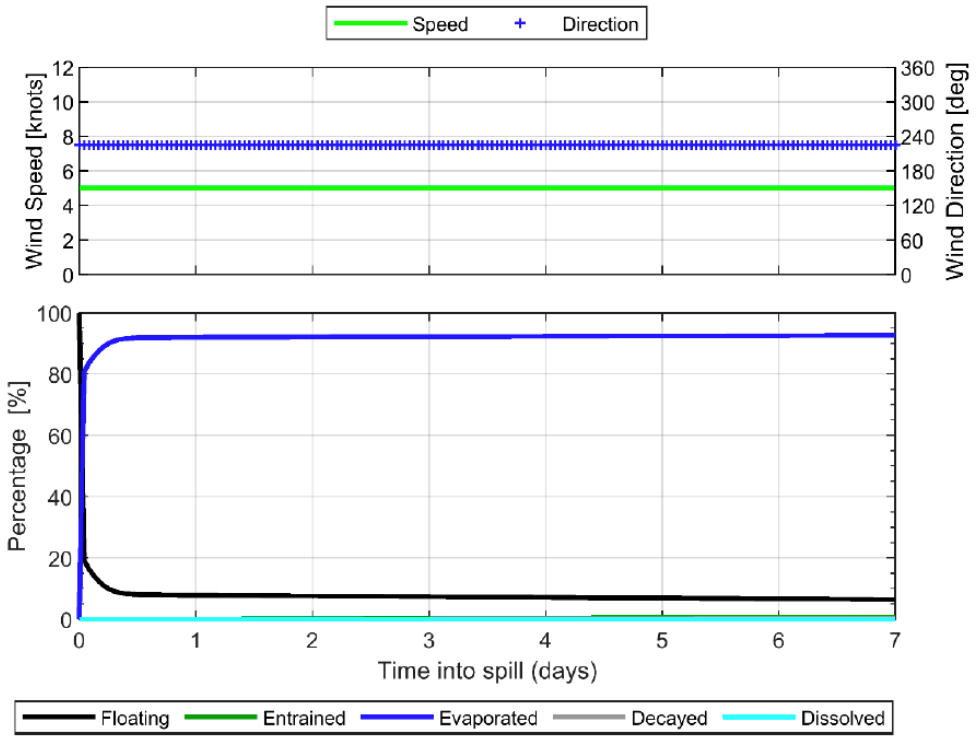


Figure 7.8: Proportional mass balance plot representing the weathering of Yolla condensate spilled onto the water surface over 1 hour and subject to a constant 5 knots (2.6 m/s) wind speed at 15°C water temperature.

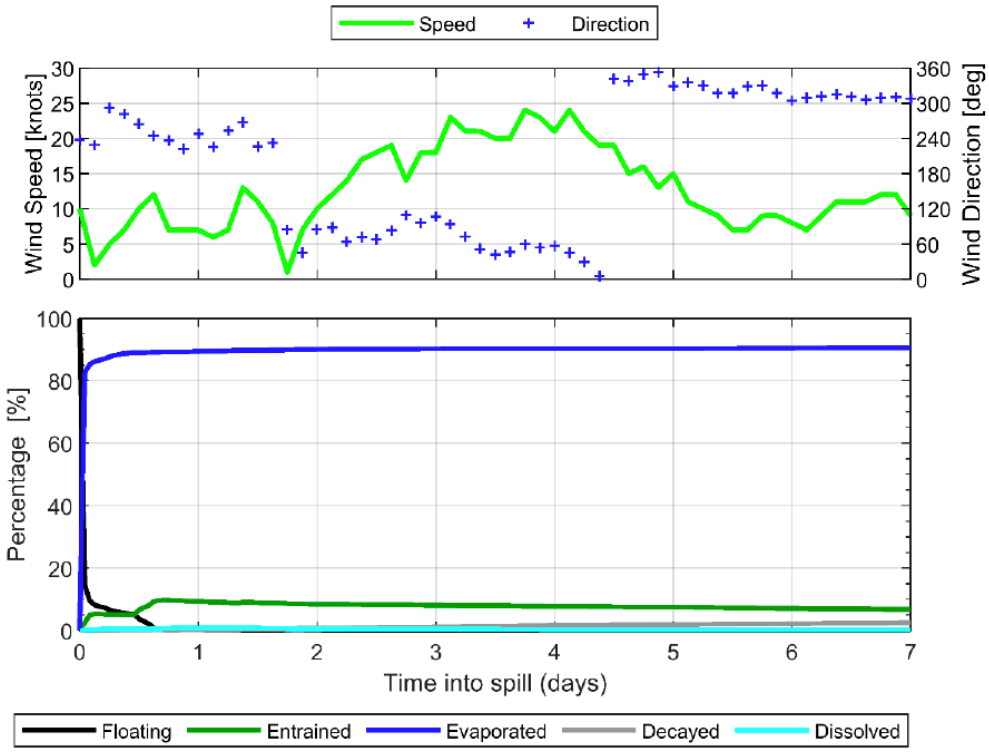


Figure 7.9: Proportional mass balance plot representing the weathering of Yolla condensate spilled onto the water over 1 hour and subject to variable wind speeds (1-12 knots or 1.9-23 m/s) at 15°C water temperature.

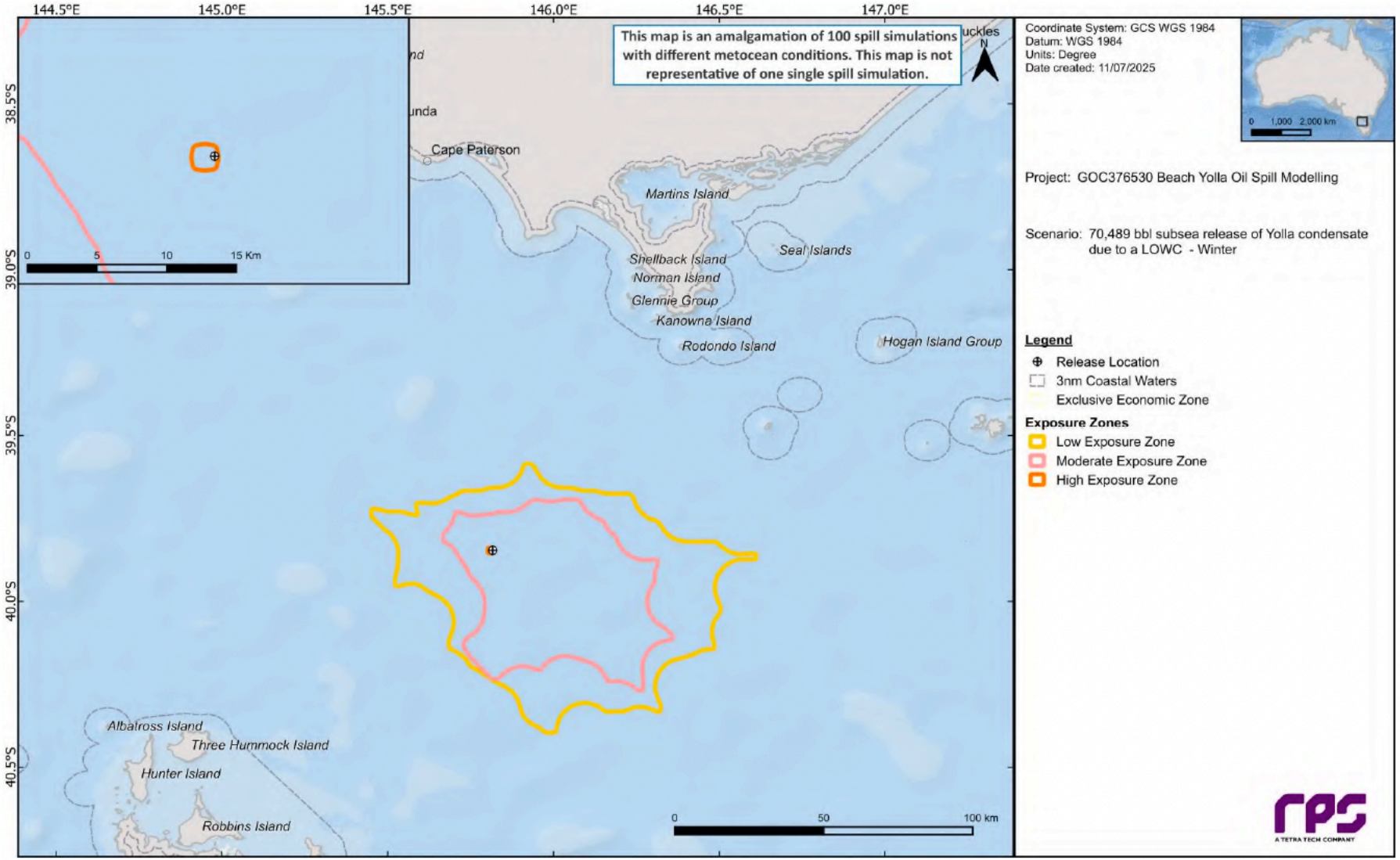


Figure 7.10: Predicted Area of Exposure for Low, Medium and High Thresholds from 70,489 bbl subsea release of condensate over 86 days from LOWC at the Well Head during winter conditions.

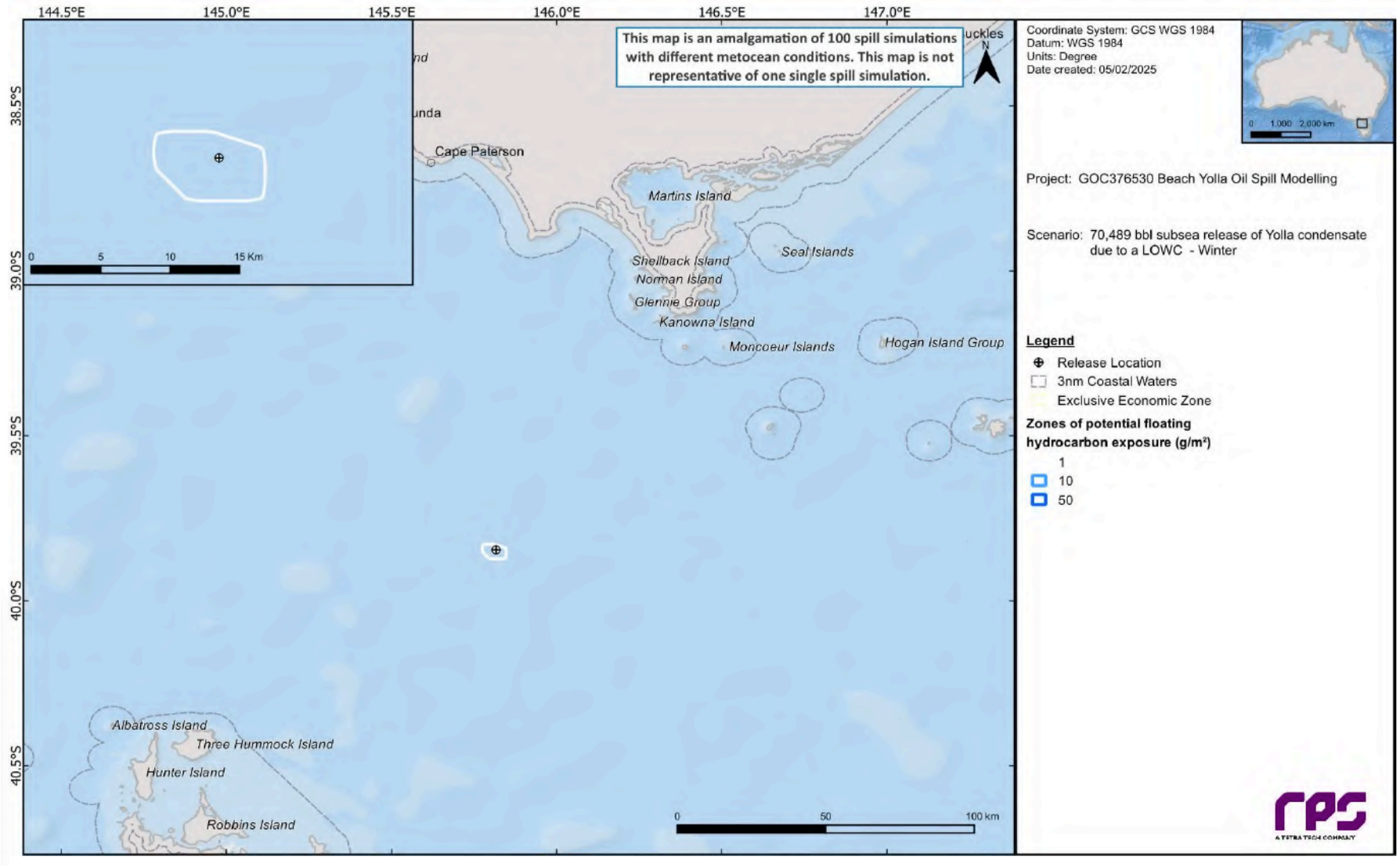


Figure 7.11: Zone of potential Floating Oil Exposure in the event of a 70,489 bbl subsea release of condensate over 86 days from LOWC at the Well Head during winter conditions.

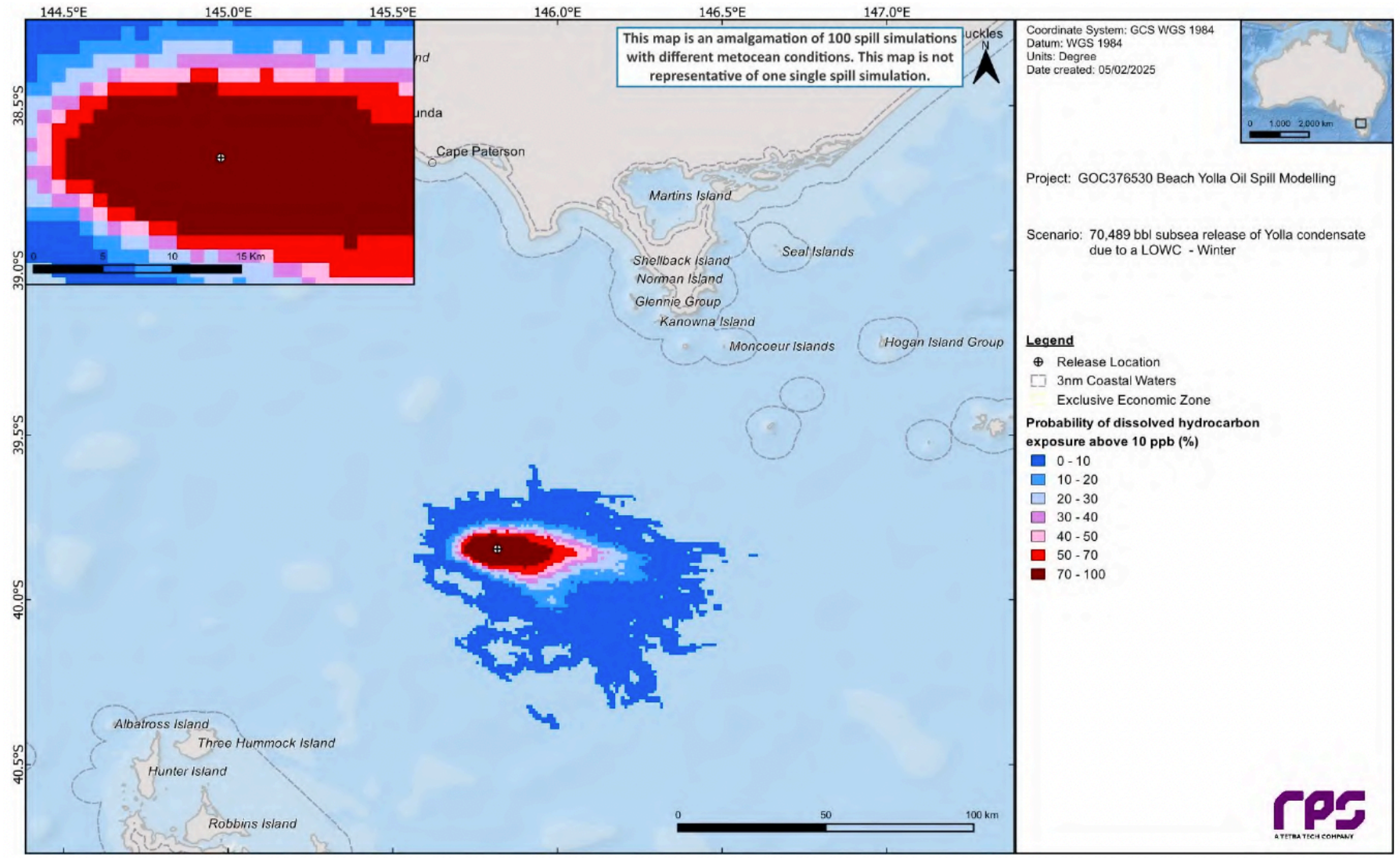


Figure 7.12: Probability of Dissolved Hydrocarbon Exposure above 10 ppb, at 0-10 m below the sea surface in the event of a 70,489 bbl subsea release of condensate over 86 days from LOWC at the Well Head during winter conditions

7.16.2 Known and Potential Environmental Risks

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).

7.16.3 EMBA

The receptors most at risk for a Loss of Well Control (LOWC) exposure and the marine Biologically Important Areas (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)

- Traditional Owners with cultural heritage connections to these waters and species, particularly cetaceans which are strongly linked to cultural stories and values.

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.

7.16.3.1Conservation, socio-economic and cultural values and sensitivities

- 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 heritage and values (both tangible and intangible)..

7.16.4 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

7.16.5 Potential Level of Environmental Risks

Table 7.50provides the criteria used to determine the sensitivity of receptors within the EMBA. The evaluation of environmental risks to these receptors (including fauna, marine parks and fisheries) resulting from the LoWC is presented in Table 7.51 to Table 7.60.

Table 7.50: 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.

Table 7.51: 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 5.5.1

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).

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

General sensitivity to oiling – benthic fauna			
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 7.52: 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 5.4.6.1

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	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	
hydrocarbons at the sea surface.	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 7.53: 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 5.5.2

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.

General sensitivity to oiling – plankton			
Potential risk form LOWC			
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 7.54: 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 5.5.7
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:	

General sensitivity to oiling – pelagic fish

- 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
- 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

General sensitivity to oiling – pelagic fish

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 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

General sensitivity to oiling – pelagic fish		
Because the majority of fish tend to remain in the mid-pelagic zone, they are not likely to come into 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.	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). 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 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.
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 7.55: 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 5.5.5
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	

General sensitivity to oiling – cetaceans

- 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.
- 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).

General sensitivity to oiling – cetaceans

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
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 7.56: Potential risk of LoWC on pinnipeds

General sensitivity to oiling – pinnipeds	
Sensitivity rating of pinnipeds	High
A description of pinnipeds in the EMBA is provided in:	Section 5.5.6

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.

General sensitivity to oiling – pinnipeds
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). 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.	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	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	There is no shoreline contact from LOWC.

General sensitivity to oiling – pinnipeds		
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 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. 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**.	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 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. 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**.	surface. Assessment of the risk to pinnipeds population is **low.**

Table 7.57: 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 5.5.8
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:	

General sensitivity to oiling – marine reptiles
12. Internally – eating or swallowing oil, consuming prey containing oil-based chemicals, or inhaling of volatile oil related compounds; and 13. 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. 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 7.58: 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 5.5.4

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

General sensitivity to oiling – seabirds and shorebirds			
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, 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**.	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 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.**	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 seabird, given their mobility is **low.**	There is no shoreline contact from LOWC.

Table 7.59: 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-economicl)	Low
A description of marine sandy beaches is in the EMBA is provided in:	Section 5.3.7

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 7.60: Potential risk of LoWC on commercial fishing

General sensitivity to oiling – commercial fishing	
Sensitivity rating of marine commercial fishing (socio-economicl)	Low
A description of marine commercial fishing is in the EMBA is provided in:	Section 5.7.5

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 occur within the EMBA for this scenario.

Commonwealth fisheries that occur within the LOWC EMBA include:

General sensitivity to oiling – commercial fishing
• Bass Strait Central Zone Scallop Fishery. • Eastern Tuna and Billfish Fishery. • Southern Squid Jig Fishery. • Small Pelagic Fishery. • Shark (SESS) Fishery, incorporating Gillnet and Shark Hook sector. • Southern and Eastern Scalefish and Shark Fishery. • Commonwealth Trawl Sector

7.16.6 Risk Assessment

A risk assessment for the LoWC is presented below in Table 7.61

Table 7.61: Risk assessment for the LoWC

ALARP decision context and justification	ALARP Decision Contact: Type B – new to the organisation or geographical area, infrequent or non-standard activity, some uncertainty, some partner interest, may attract media attention. Indirect impacts from unplanned LOWC are well understood and impacts to the ocean are well known and the extent of impact is predicted by modelled scenarios from the Yolla Well Head. Good practice is defined, and uncertainty is minimal. There are no conflicts with company values, no partner interests, and no significant media interests. As the impact consequence is rated as Minor (1) applying good industry practice is sufficient to manage the impact to ALARP.
Adopted Control Measures	**Description**
CM01: Marine Assurance Process	The rig (relief well) and vessels will meet relevant maritime laws and includes pre-commencement rig and vessel inspections of class certification requirements under the Navigation Act 2012 and associated Marine Orders, including but not limited to: • Marine Order 21: Safety and emergency arrangements gives effect to SOLAS regulations. • Marine Order 27: Safety of navigation and radio equipment gives effect to SOLAS • Marine Order 31: SOLAS and non-SOLAS certification details survey, maintenance, and certification requirements for vessel class. • Marine Order 91 Marine Pollution Prevention (MARPOL Annex I) – oil
CM03: Third-party marine users.	Beach will undertake consultation relating to or in the event of a LOC or LOWC, actions as outline in the OPEP will be implemented.
CM04: Beach Fair Ocean Access Procedure	Upon notification of a claim of interference, Beach will enter the details into the CMO incident management system and follow its Investigations Procedure to investigate the complaint/incident and determine whether compensation is payable to the complainant.
CM08: Whale Management Procedure	The Whale Management Procedure outlines specific measures to minimise anthropogenic noise threats to relevant species, including the implementation of safe operating distances between vessels and whales, pre-activity surveys for specific activities, night-time and low visibility controls and establishment of safe points for operational activities. The procedure assumes that once an activity is underway foraging whales that enter the pre-activity survey zone are not displaced as foraging behaviour has not been disrupted as the whale has commenced or continued foraging and thus aligns with the Conservation Management Plan for the Blue Whale (DoE, 2015b) and DAWE (2021a) definitions. Prior to an activity commencing a pre-activity survey will be undertaken of the activity survey zone for the activity: • Resupply, Inspection, Maintenance, and Repair ◦ OSV – 6 km ◦ AHTS – 22 km • Inspection, Maintenance, and Repair

	◦ OSV – 6 km ◦ AHTS – 22 km The activity survey zones are based on the distance to the furthest modelled PTS, TTS, or behaviour criteria (Section 7.5), and have been rounded up to account for the accuracy of distance estimation at sea. 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.
CM09: *EPBC Regulations 2000 – Part 8 Division 8.1* Interacting with Cetaceans Requirement	Vessels and Whales - Vessel operators during vessel operations, well completions and well intervention sub-activities shall adhere to the distances and vessel management practices of EPBC Regulations (Part 8, Division 8.1) and report vessel interactions with whales, specifically: • Do not approach a whale. • Maintain a distance of 300m from a whale. • If a whale approaches the vessel try to maintain the separation distances without changing direction or moving into the path of the animal. Vessels and Dolphins - Vessel operators during vessel operations, well suspension and well intervention sub-activities shall adhere to the distances and vessel management practices of EPBC Regulations (Part 8, Division 8.2) and report vessel interactions with dolphins specifically: • Do not approach a dolphin • Maintain a distance of 150m from a dolphin (with the exception of bow riding) • If a dolphin approaches the vessel try to maintain the separation distances without changing direction or moving into the path of the animal. Helicopters and Whales and Dolphins - Helicopters will not fly lower than 1650 ft when within 500 m horizontal distance of a cetacean except when landing or taking off and will not approach a cetacean from head on)EPBC Regulations (Part 8, Division 8.3).
CM11: Procurement Vetting Process	Beach via its Procurement Vetting Process will ensure the appropriately licenced waste handling contractor and appropriately licenced waste facility contracted to Beach, Beach's Waste Management Plan – Otway and Bass Strait Offshore (S4000AD719914) and relevant regulatory requirements. Beach via its Procurement Vetting Process (assesses suppliers emissions management and via this process would procure low emission vessels if available. Beach undertakes a pre-qualification of all contractors to ensure contractor legal obligations are met including vessel operators must comply with the most recent version of the Australian Ballast Water Management Requirements.
CM12: Beach Offshore Oil Pollution Emergency Plan	If a LOC or LOWC occurs, the OPEP will be implemented.

	The Offshore OPEP is developed to support all Beach activities offshore Victoria and includes response arrangements for a worst-case LOC / LOWC scenario from the activity. ◦ The OPEP includes Tactical Response Plans (TRPs) for identified protection priority areas within the region. ◦ Emergency spill response capability is maintained in accordance with the NOPSEMA accepted OPEP. ◦ Implement spill response in accordance with relevant EPOs and EPSs in the accepted OPEP.
CM13: Beach Offshore Operational and Scientific Monitoring Plan	• Operational and scientific monitoring capability is maintained in accordance with the NOPSEMA accepted OSMP. • Implementation strategies provide for monitoring of an oil pollution emergency. The OSMP details operational monitoring to inform response planning and scientific monitoring to inform the extent of impacts from hydrocarbon exposure and potential remediation requirements.
CM15: Source Control Contingency Plan (SCCP), inclusive of Relief Well Plan	• The SCCP will be consistent with the International Oil and Gas Producers (IOGP) Report 594 - Subsea Well Source Control Emergency Response Planning Guide for Subsea Wells (2019). • The BassGas Relief Well Plan is current and maintained for immediate activation.
CM16: Well Operations Management Plan	• BassGas WOMP details well barriers and the integrity testing in compliance to regulations and industry standards.

Additional Control Measures Assessed		
Control	**Cost/Benefit Analysis**	**Control implemented?**
Relief well rig on standby	Any rig on standby would require an in-force Safety Case to operate in Australian Commonwealth waters. The key benefit would be a reduction in the overall shoreline loading from weathered, residual fractions of the condensate. There is no predicted shoreline exposure at moderate or high thresholds. Having a rig on standby would potentially halve the time to implement source control, therefore, the overall potential reduction in exposure to shorelines by halve. Halving the potential loading at a low threshold would produce a marginal overall environment benefit given the nature of weathered condensate. Although conceptual relief well planning will be performed as part of the SCCP, time would still be required to plan the relief well to address the actual situation. Rig availability will be a challenge and on top of this, having a relief well rig on standby would result in significant additional costs (approx. $1M / day) to Beach that that are considered grossly disproportionate to the level of environmental benefit gained given the relatively small level of potential low threshold shoreline oiling.	No

Table 7.62: Demonstration that Risks will be of an Acceptable Level

Consequence rating	Minor
Likelihood of occurrence	Remote

Residual risk	Low
Acceptability Assessment	
To meet the principles of ESD	The unplanned release hydrocarbons are assessed as having a Minor (1) consequence, which is not considered to have the potential to result in serious or irreversible environmental damage. The risk is assessed as a short-term, localised reduction of surface water quality around the discharge point and acute toxicity to marine fauna through ingestion/absorption of contaminated water. 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 the marine environment are expected to be low. Spill source volumes are limited in size, the environmental impact of condensate is well understood, a credible spill volume has been modelled, and a very conservative threshold has been selected to define the EMBA. There is high confidence in the potential risk, as Beach has significant experience undertaking activities such as these, having operated the BassGas operations since 2006 and has controls in place for existing offshore developments and associated activities. The EIA presented throughout this EP demonstrates that ESD principles (a), (b), (c) and (d) are met (noting that principle (e) is not relevant).
Internal context	The proposed management of the risk is aligned with the Beach Environment Policy. The following Beach management processes and procedures relevant to this aspect are listed as the following controls: • CM12: Beach Offshore Oil Pollution Emergency Plan (OPEP) • CM13: Beach Offshore Operational and Scientific Monitoring Plan • CM15: Source Control Contingency Plan (SCCP), inclusive of Relief Well Plan • CM16: NOPSEMA Accepted Well Operations Management Plan These Beach management controls also meet the requirements of OPGGS(E)R, Offshore Petroleum and Greenhouse Gas Storage (Safety) Regulations, Offshore Petroleum and Greenhouse Gas Storage (Resource Management and Administration) Regulations 2011, and International Oil and Gas Producers (IOGP) Report 594 - Subsea Well Source Control Emergency Response Planning Guide for Subsea Wells (2019); as listed in other requirements below. 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.
Other requirements	Operational activities undertaken at the platform and during planned activities will adhere to relevant legislative requirements as detailed in the controls section. • Vessel activities undertaken during the Operational activities will adhere to relevant legislative requirements as detailed in the controls section.

	• Integrity of wells, pipeline and subsea equipment is managed as per the requirements of the in-force EP, safety cases and WOMPs required under the OPGGS(E)R and OPGGS(E)R and OPGGS(RM)R, respectively. • EPBC Regulations 2000 – Part 8 Division 8.1 interacting with cetaceans requirements are implemented as per CM08: Whale Management Procedure.
Environmental MNES	
BIA	Integrated marine and coastal regionalisation of Australia (IMCRA) • Central Bass Strait ◦ Southern Right whale • Bass Strait Shelf Province ◦ Pygmy Blue Whale • South-east Marine Region: ◦ Waters off pinniped colonies White Shark ◦ Foraging by Albatross • North-western edge of Cape Barren Island ◦ Little Penguin – Foraging
Australian Marine Parks	As per the impact and risk assessment an unplanned event such as a LOC or LOWC will not intersect nearby AMPs.
Wetland of International Importance:	As per the impact and risk assessment an unplanned event such as a LOC or LOWC will not intersect nearby nearby Ramsar wetlands.
Threatened Ecological Communities	As per the impact and risk assessment an unplanned event such as a LOC or LOWC may intersect nearby TECs such as. • Giant Kelp Marine Forests of Southeast.
Nationally important wetlands	As per the impact and risk assessment an unplanned event such as a LOC or LOWC will not intersect nearby NIW.
Nationally threatened and migratory species	As per the impact and risk assessment, an unplanned event such as a LOC or LOWC may have an impact or risk to threatened or migratory species from exposure to surface oil, dissolved, and entrained hydrocarbons (Sections 5 and Section 7.15) .
State marine parks	As per the impact and risk assessment an unplanned event such as a LOC or LOWC may have an impact or risk on nearby SMPs..
Species Conservation Advice/ Recovery Plans/Threat Abatement Plans	As per the impact and risk assessment operational activities will be managed in accordance with and will not compromise the specific objectives or actions of the following plans: • Albatross and Giant Petrels Recovery Plan (DCCEEW, 2022) • National recovery plan for the Dwarf Galaxias (*Galaxiella pusilla*) (Department of Sustainability and Environment, 2010b) • White shark Recovery Plan (*Carcharodon carcharias*) (DSEWPaC 2013b). • Recovery Plan for the Grey Nurse Shark (*Carcharias taurus*) (DoE, 2014b) • Marine turtles as per the Recovery Plan for Marine Turtles in Australia (DoEE, 2017). • Conservation of listed seabirds as per the Wildlife Conservation Plan for Seabirds (CoA, 2020a). • National Recovery Plan for the Orange-bellied Parrot (DELWP 2016). • Conservation Management Plan for the Blue Whale (DoE, 2015).

	• National Recovery Plan for the Southern Right Whale (DCCEEW, 2024). • Conservation Advice for Fin Whales (TSSC, 2015c) and Conservation Advice for Sei Whales (TSSC, 2015b).
Monitoring and reporting	• Loss of containment resulting in a hydrocarbon spill is required to be reported as per OEMS • Impacts as a result of a loss of containment resulting in a hydrocarbon spill will be monitored and reported in accordance with the OSMP.
Acceptability outcome	**Acceptable**
Environmental Performance	EPOs represent the measurable levels of environmental performance Beach is seeking to achieve to ensure impacts are of an acceptable level. EPOs relevant to the effective management of impacts associated with infrastructure and maintenance from the Yolla-a platform, RGP and planned activities are: • EPO1: Undertake the activity in a manner that will not interfere with other marine users to a greater extent than is necessary for the exercise of right conferred by the titles granted. • EPO2: No death or injury to listed threatened or migratory species from the activity. • EPO3: Biologically important behaviours can continue while the activity is being undertaken. • EPO4: Anthropogenic noise in biologically important areas and habitat critical to the survival of a species will be managed such that: ◦ Any blue whale continues to utilise biologically important areas without injury and is not displaced from a foraging area. ◦ It does not prevent any southern right whale from utilising biologically important areas or habitat critical to the survival of a species or cause auditory impairment (TTS and PTS). ◦ Fauna use the waters around the BassGas Development without displacement or injury due to noise and vibration from offshore operations. • EPO6: No substantial or unrecoverable change in seabed quality which may adversely impact on biodiversity, ecological integrity, social amenity, cultural values or human health. • EPO7: No impact to submerged cultural heritage. • EPO9: No introduction of a known or potential invasive marine species. • EPO12: No spills of chemicals or hydrocarbons to the marine environment. • EPO13: Helicopter pilots must comply with the Australian National Guidelines for Whale and Dolphin Watching for Vessels (DoEE, 2017) when flying in the PSZ. This means: ◦ Not flying lower than 500 m within a 500-m radius of a whale or dolphin. ◦ Not approaching a whale or dolphin from head on. Table 7.93 sets out the EPS for the control measures identified above, and the measurement criteria to evaluate the achievement of EPOs and EPS.
Cumulative Impacts	A Loss of Well Control (LoWC) from the Yolla wells is considered a rare but high-consequence event, potentially resulting in the release of hydrocarbons to the marine environment. Modelling indicates floating oil would remain localised (~3 km), with no shoreline accumulation, while dissolved and entrained hydrocarbons could affect marine fauna over tens

	to hundreds of kilometres. Receptors potentially impacted include plankton, pelagic fish, cetaceans, pinnipeds, and seabirds, particularly within biologically important areas. Short-term exposure may cause acute effects, but strong wave action, the light nature of Yolla condensate, and conservative management thresholds are expected to reduce long-term environmental impacts. Preventive and mitigation measures (including well integrity management, operational procedures, the Source Control Contingency Plan with Relief Well Plan, and the Offshore Oil Pollution Emergency Plan) minimise the likelihood and severity of an incident. Marine assurance, procurement vetting, and operational monitoring ensure vessels and rigs meet regulatory and industry standards. In the unlikely event of a release, immediate spill response and monitoring under the accepted OPEP and OSMP frameworks would be implemented. Overall, the residual risk is low, and cumulative impacts are considered acceptable, supporting EPO1, EPO2, EPO3, EPO6, and EPO12 by protecting marine biodiversity, biologically important behaviours, seabed integrity, and avoiding chemical or hydrocarbon introduction to the environment.

7.17 RISK 6: LoC from Rupture of the Raw Gas Pipeline

7.17.1 Source of Aspect

The Assessment of the Risk of Pollution from Marine Oil Spills in Australian Ports and Waters (DNV, 2011) estimates the frequency of leaks from subsea pipelines in the open sea (from the platform safety zone to pipeline landfall) at 5.1×10^{-5} (0.000051) per pipeline-km per year. This estimate is based on North Sea data for pipelines 24 inches (61 cm) in diameter or less; the BassGas raw gas pipeline is 35 cm in diameter.

With 1,135 km of offshore pipeline in Australia at the time of the DNV report, this frequency suggests a 6% annual chance of a pipeline leak somewhere in Australian waters (DNV, 2011). According to AMSA records, no such leaks were reported between 1982 and 2010 (DNV, 2011). The reported frequency of oil spills over one tonne from pipelines in the open sea is 2.0×10^{-5} (0.00002) per pipeline-km per year. Notably, there have been no spills from the BassGas raw gas pipeline 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.

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.

Based on a spill volume of 14,500 barrels (~2,305 m^3), the release rate for the Pipeline 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 117.97 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 7.8 and Figure 7.9 in Section 7.16 show that evaporation is the key weathering mechanism.

The OSTM results for surface contact are presented in Figure 7.13, entrained hydrocarbons in Figure 7.14 and dissolved hydrocarbons in Figure 7.15.

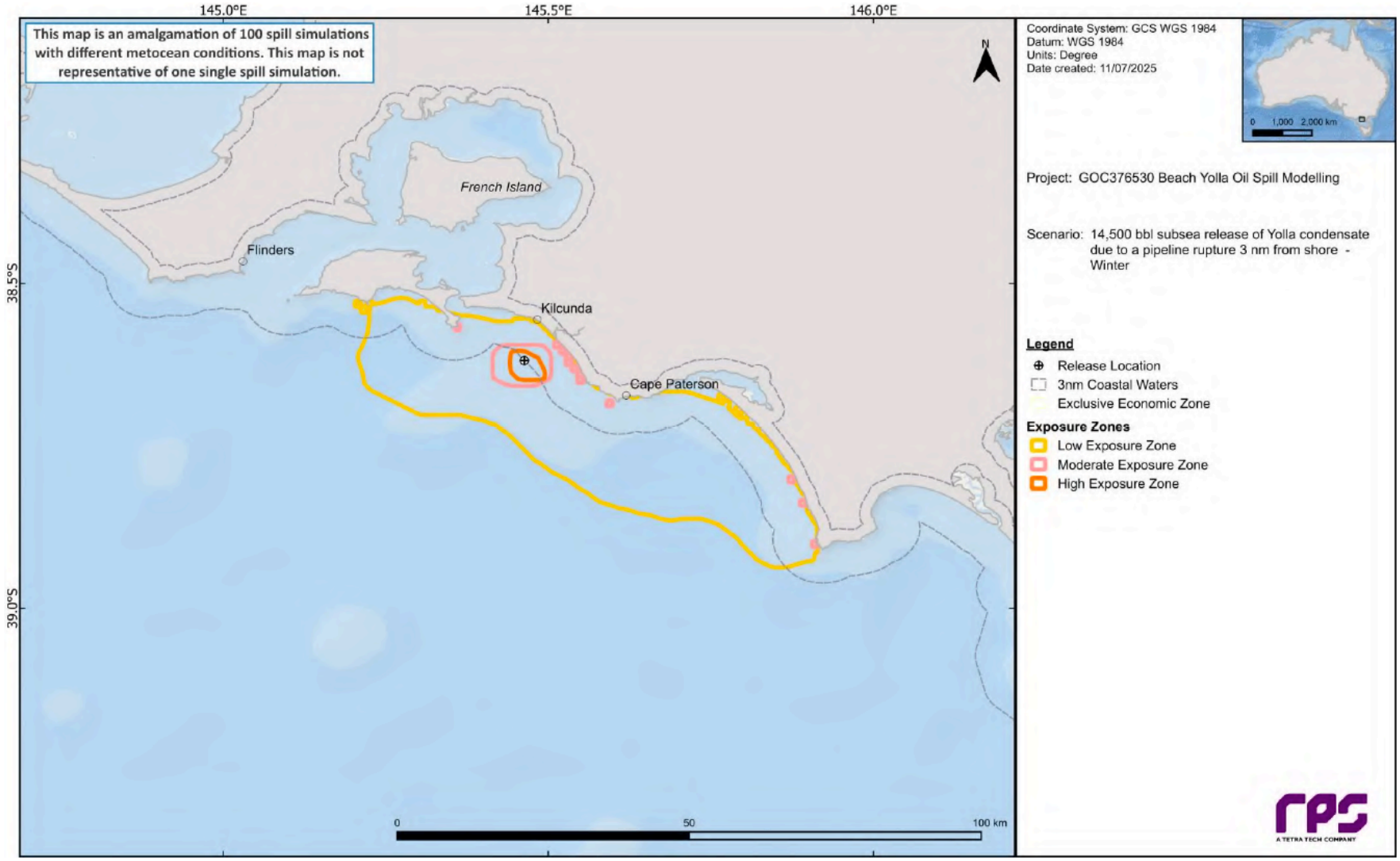


Figure 7.13: Predicted Area of Exposure for Low, Medium and High Thresholds from 14,500 bbl subsea release of condensate over 36 minutes from pipeline rupture 3 NM from shore during winter conditions

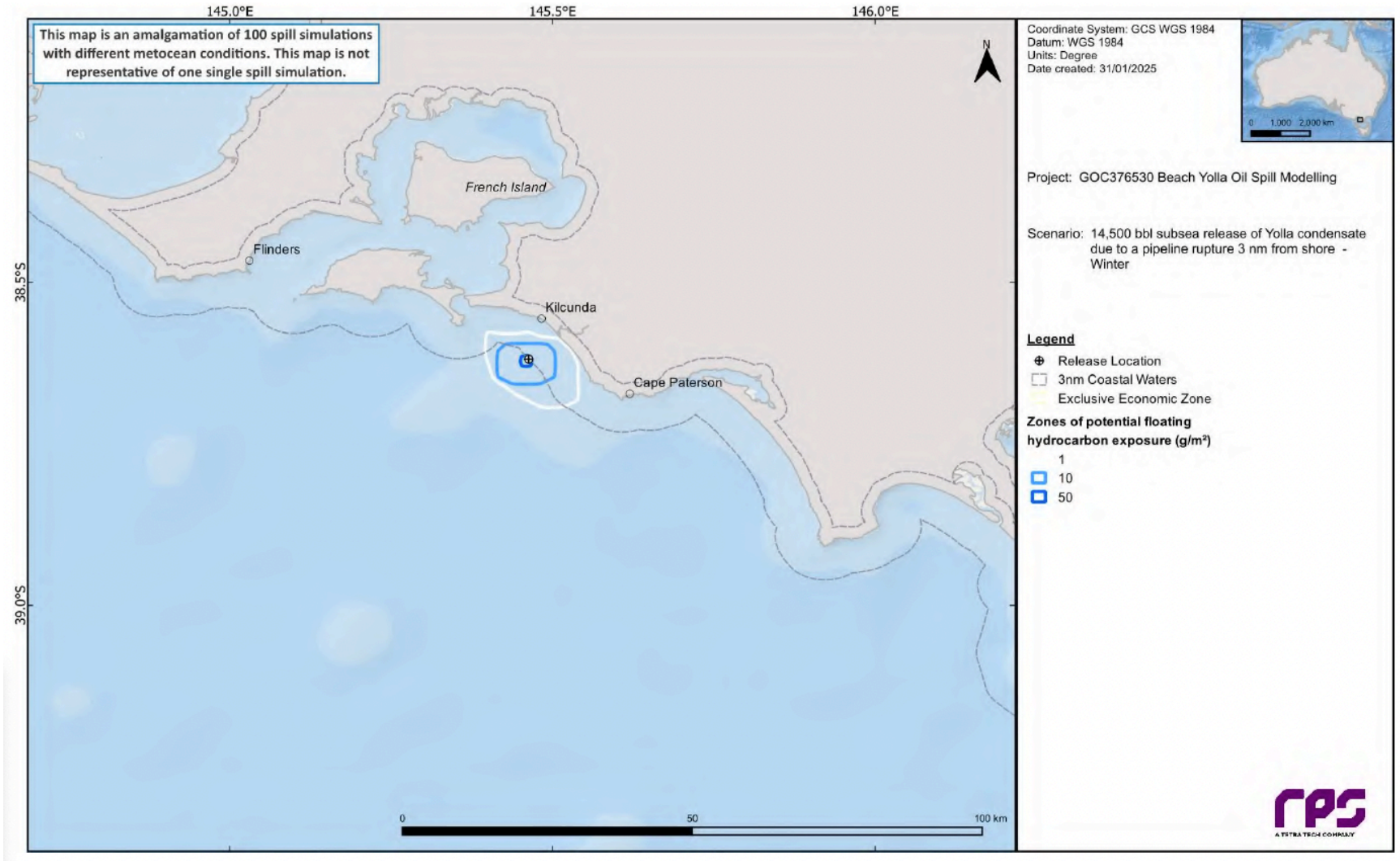


Figure 7.14: Zone of potential Floating Oil Exposure in the event of a 14,500 bbl subsea release of condensate over 36 minutes from pipeline rupture 3 NM from shore during winter conditions.

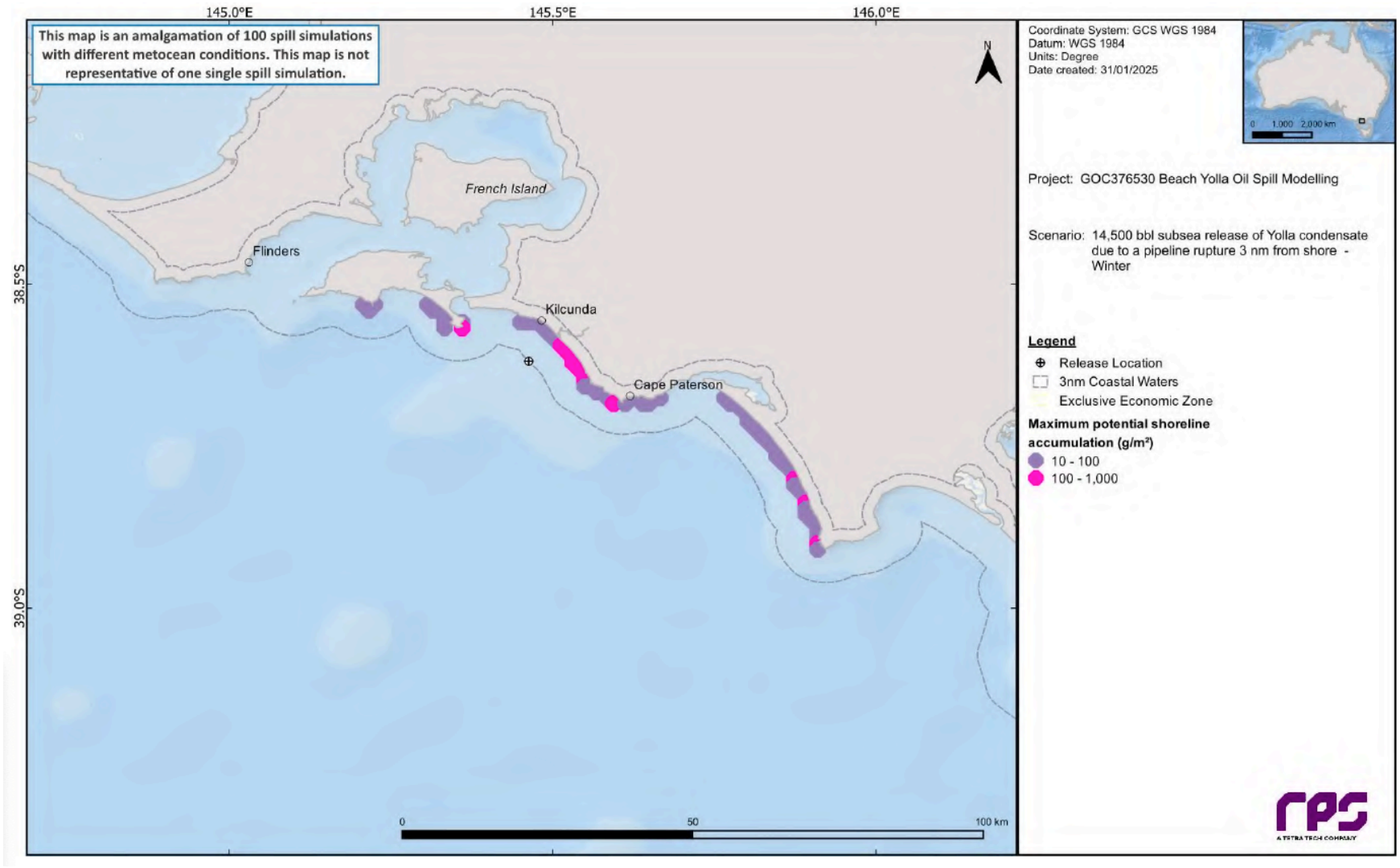


Figure 7.15: Maximum potential shoreline loading in the in the event of a 14,500 bbl subsea release of condensate over 36 minutes from pipeline rupture 3 NM from shore during winter conditions.

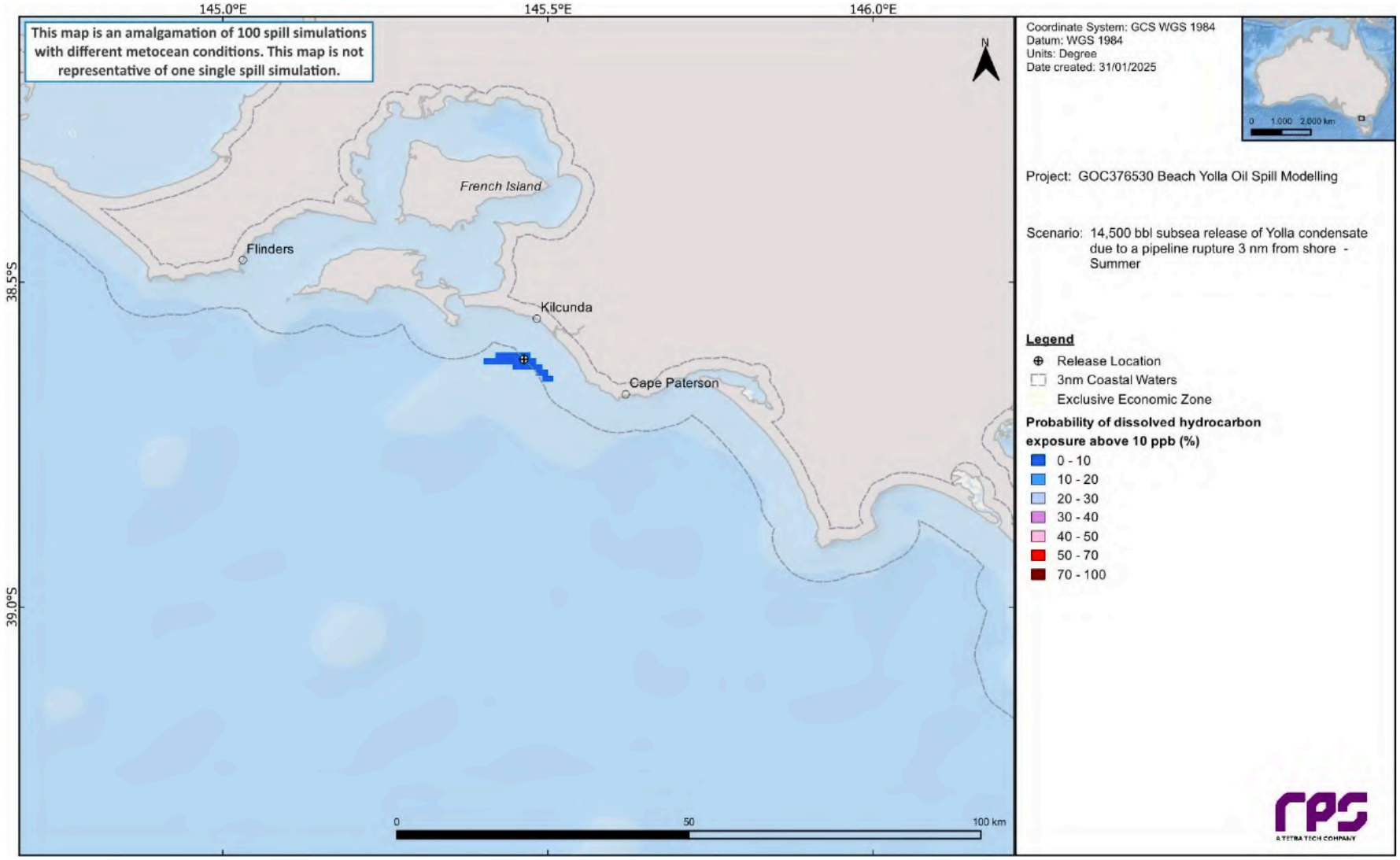


Figure 7.16: Probability of Dissolved Hydrocarbon Exposure above 10 ppb, at 0-10 m below the sea in the in the event of a 14,500 bbl subsea release of condensate over 36 minutes from pipeline rupture 3 NM from shore during winter conditions.

7.17.2 Known and Potential Environmental Risks

Potential environmental risks resulting from a LoC from the pipeline 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.

7.17.3 EMBA

Modelled results show that Kilcunda nearshore waters have a 100% probability of exposure above the low threshold of 1 g/m^2 in both summer and winter. The Kilcunda shoreline is most likely to experience oil accumulation at or above 10 g/m^2 during summer, with a probability of 53%. In winter, there is an 88% chance that entrained hydrocarbon concentrations in the Kilcunda nearshore waters will reach or exceed 10 ppb.

In the South-east Marine Region, the probability of exposure above the low threshold (1 g/m^2) is also 100% in both seasons. Venus Bay shoreline is most likely to see oil accumulation at or above 10 g/m^2 during winter, with a probability of 60%.Regarding sensitive species, the buffer zone for Little Penguin foraging around Phillip Island is predicted to have a maximum dissolved hydrocarbon exposure of 10.05 ppb during winter, although this outcome is only 1% probable. In the White Shark foraging areas, specifically, waters off pinniped colonies throughout the South-east Marine Region, the maximum dissolved hydrocarbon exposure is 63.19 ppb during summer, with a 2% probability. Moreover, there is an 86% likelihood that entrained hydrocarbon exposure will reach or exceed 10 ppb in these areas during summer.

Traditional Owners have cultural connections to these waters, species, and areas, and must be kept in mind as these risks are assessed.

7.17.4 Potential Level of Environmental Risks

The evaluation of environmental risks to these receptors (including fauna, marine parks and fisheries) resulting from a pipeline rupture 3 NM form sure is presented in the following tables . the criteria used to determine the sensitivity of receptors within the EMBA is outlined in Section 7.16 Table 7.50

Table 7.63: 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 5.5.1		
An outline of the sensitivity aspect for benthic fauna is provided in	Section 7.16 Table 7.51		
Potential risk form Pipeline Rupture 3 NM from shore			
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 7.64: 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 5.4.6.1
An outline of the sensitivity aspect for macroalgal communities is provided in	Section 7.16 Table 7.52

General sensitivity to oiling – macroalgal			
Potential risk form Pipeline Rupture 3 NM from shore			
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 7.65: 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 5.5.2		
An outline of the sensitivity aspect for plankton is provided in	Section 7.16 Table 7.53		
Potential risk form Pipeline Rupture 3 NM from shore			
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 7.66: Potential risk of hydrocarbon release from pipeline 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 5.5.7	
An outline of the sensitivity aspect for pelagic fish is provided in		Section 7.16 Table 7.54	
Potential risk form Pipeline Rupture 3 NM from shore			
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 117.97 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 7.67: 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 5.5.5
An outline of the sensitivity aspect for cetaceans is provided in	Section 7.16 Table 7.55
Potential risk form Pipeline Rupture 3 NM from shore	

General sensitivity to oiling – cetaceans			
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 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 7.68: 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 5.5.6	
An outline of the sensitivity aspect for pinnipeds is provided in		Section 7.16 Table 7.56	
Potential risk form Pipeline Rupture 3 NM from shore			
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		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.	Not Applicable

General sensitivity to oiling – pinnipeds	
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**.	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.**
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 7.69: 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 5.5.8	
An outline of the sensitivity aspect for marine reptiles is provided in		Section 7.16 Table 7.57	
Potential risk form Pipeline Rupture 3 NM from shore			
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 7.70: 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 5.5.4

General sensitivity to oiling – seabirds and shorebirds			
An outline of the sensitivity aspect for seabirds and shorebirds is provided in Section 7.16 Table 7.58			
Potential risk form Pipeline Rupture 3 NM from shore			
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. 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.

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 7.71: 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 5.3.7
An outline of the sensitivity aspect for sandy beaches is provided in	Section 7.16 Table 7.59
Potential risk form Pipeline Rupture 3 NM from shore	
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 7.72: 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 5.7.5	
An outline of the sensitivity aspect for commercial fishing is provided in		Section 7.16 Table 7.60	
Potential risk form Pipeline Rupture 3 NM from shore			
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 fishery is therefore considered moderate.			
No Commonwealth fisheries occur within the subsea pipeline rupture EMBA for this scenario. Victorian fisheries that occur within the subsea pipeline rupture EMBA for this scenario include; • Bass Trait Scallop Fishery. • Abalone Fishery. • Rock Lobster Fishery. • Wrasse Fishery. • Pipi Fishery. • Giant crab (western zone.			

7.17.5 Risk Assessment

A risk assessment for the Subsea Pipeline Rupture 3 nm from Shore is presented below in Table 7.73

Table 7.73: Risk assessment for the Subsea Pipeline Rupture 3 NM from Shore

ALARP decision context and justification	ALARP Decision Contact: Type B – new to the organisation or geographical area, infrequent or non-standard activity, some uncertainty, some partner interest, may attract media attention. Indirect impacts from unplanned LOC are well understood and impacts to the ocean and costal areas are well known and the extent of impact is predicted by modelled scenarios. Good practice is defined, and uncertainty is minimal. There are no conflicts with company values, no partner interests, and no significant media interests. As the impact consequence is rated as Minor (1) applying good industry practice is sufficient to manage the impact to ALARP.
Adopted Control Measures	**Description**
CM17: NOPSEMA accepted Safety Case	Offshore Petroleum and Greenhouse Gas Storage (Safety) Regulations 2009 set out the requirements for safety cases. The Yolla-A platform and RGP and Safety Case demonstrate how the risks to the integrity of the platform, pipeline and subsea facilities will be reduced to as low as reasonably practicable (ALARP). The safety case: • Identify the hazards and risks. • Describe how the hazards and risks are controlled. • Describe the management system in place to ensure the controls are effectively and consistently applied. • Describe the operation, monitoring, inspection and maintenance of the platform, pipeline and subsea facilities. • Describe the leak detection, and emergency shutdown and isolations systems to reduce the extent of loss of containment of hydrocarbons in the event of a loss of containment of the platform, pipeline or subsea facilities.
CM03: Third-party marine users.	Beach will undertake consultation relating to or in the event of a LOC or LOWC, actions as outline in the OPEP will be implemented.
CM04: Beach Fair Ocean Access Procedure	Upon notification of a claim of interference, Beach will enter the details into the CMO incident management system and follow its Investigations Procedure to investigate the complaint/incident and determine whether compensation is payable to the complainant.
CM08: Whale Management Procedure	The Whale Management Procedure outlines specific measures to minimise anthropogenic noise threats to relevant species, including the implementation of safe operating distances between vessels and whales, pre-activity surveys for specific activities, night-time and low visibility controls and establishment of safe points for operational activities. The procedure assumes that once an activity is underway foraging whales that enter the pre-activity survey zone are not displaced as foraging behaviour has not been disrupted as the whale has commenced or continued foraging and thus aligns with the Conservation Management Plan for the Blue Whale (DoE, 2015b) and DAWE (2021a) definitions. Prior to an activity commencing a pre-activity survey will be undertaken of the activity survey zone for the activity: • Resupply, Inspection, Maintenance, and Repair ◦ OSV – 6 km

	◦ AHTS – 22 km • Inspection, Maintenance, and Repair ◦ OSV – 6 km ◦ AHTS – 22 km The activity survey zones are based on the distance to the furthest modelled PTS, TTS, or behaviour criteria (Section 7.5), and have been rounded up to account for the accuracy of distance estimation at sea. 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.
CM09: *EPBC Regulations 2000 – Part 8 Division 8.1* Interacting with Cetaceans Requirement	Vessels and Whales - Vessel operators during vessel operations, well completions and well intervention sub-activities shall adhere to the distances and vessel management practices of EPBC Regulations (Part 8, Division 8.1) and report vessel interactions with whales, specifically: • Do not approach a whale. • Maintain a distance of 300m from a whale. • If a whale approaches the vessel try to maintain the separation distances without changing direction or moving into the path of the animal. Vessels and Dolphins - Vessel operators during vessel operations, well suspension and well intervention sub-activities shall adhere to the distances and vessel management practices of EPBC Regulations (Part 8, Division 8.2) and report vessel interactions with dolphins specifically: • Do not approach a dolphin • Maintain a distance of 150m from a dolphin (with the exception of bow riding) • If a dolphin approaches the vessel try to maintain the separation distances without changing direction or moving into the path of the animal. Helicopters and Whales and Dolphins - Helicopters will not fly lower than 1650 ft when within 500 m horizontal distance of a cetacean except when landing or taking off and will not approach a cetacean from head on)EPBC Regulations (Part 8, Division 8.3).
CM12: Beach Offshore Oil Pollution Emergency Plan	If a LOC or LOWC occurs, the OPEP will be implemented. The Offshore OPEP is developed to support all Beach activities offshore Victoria and includes response arrangements for a worst-case LOC / LOWC scenario from the activity. ◦ The OPEP includes Tactical Response Plans (TRPs) for identified protection priority areas within the region. ◦ Emergency spill response capability is maintained in accordance with the NOPSEMA accepted OPEP. • Implement spill response in accordance with relevant EPOs and EPSs in the accepted OPEP.

CM13: Beach Offshore Operational and Scientific Monitoring Plan	• Operational and scientific monitoring capability is maintained in accordance with the NOPSEMA accepted OSMP. • Implementation strategies provide for monitoring of an oil pollution emergency. The OSMP details operational monitoring to inform response planning and scientific monitoring to inform the extent of impacts from hydrocarbon exposure and potential remediation requirements.
CM11: Procurement Vetting Process	Beach via its Procurement Vetting Process will ensure the appropriately licenced vessel and vessel contractor is contracted to meet the requirements of Operations Activities and follow the relevant Beach OEMS.

Additional Control Measures Assessed		
Control	**Cost/Benefit Analysis**	**Control implemented?**
None	N/A	N/A

Table 7.74: Demonstration that Risks will be of an Acceptable Level

Consequence rating	Moderate
Likelihood of occurrence	Remote
Residual risk	Low
Acceptability Assessment	
To meet the principles of ESD	The unplanned release of hydrocarbons are assessed as having a Moderate (1) consequence, which is not considered to have the potential to result in serious or irreversible environmental damage. The risk is assessed as a short-term, localised reduction of surface water quality around the discharge point and acute toxicity to marine fauna through ingestion/absorption of contaminated water. 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 the marine environment are expected to be low. Spill source volumes are limited in size, the environmental impact of condensate is well understood, a credible spill volume has been modelled, and a very conservative threshold has been selected to define the EMBA. There is high confidence in the potential risk, as Beach has significant experience undertaking activities such as these, having operated the BassGas operations since 2006 and has controls in place for existing offshore developments and associated activities. The EIA presented throughout this EP demonstrates that ESD principles (a), (b), (c) and (d) are met (noting that principle (e) is not relevant).
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.

Other requirements	Operational activities undertaken at the platform and during planned activities will adhere to relevant legislative requirements as detailed in the controls section. • Vessel activities undertaken during the Operational activities will adhere to relevant legislative requirements as detailed in the controls section. • Integrity of wells, pipeline and subsea equipment is managed as per the requirements of the in-force EP, safety cases and WOMPs required under the OPGGS(E)R and OPGGS(E)R and OPGGS(RM)R, respectively. • *EPBC Regulations 2000* – Part 8 Division 8.1 interacting with cetaceans requirements are implemented as per CM08: Whale Management Procedure.
Environmental MNES	
BIA	Integrated marine and coastal regionalisation of Australia (IMCRA) • Central Bass Strait ◦ Southern Right whale • Bass Strait Shelf Province ◦ Pygmy Blue Whale • South-east Marine Region: ◦ Waters off pinniped colonies White Shark ◦ Foraging by Albatross • North-western edge of Cape Barren Island ◦ Little Penguin – Foraging
Australian Marine Parks	As per the impact and risk assessment an unplanned event such as a LOC or LOWC will not intersect nearby AMPs.
Wetland of International Importance:	As per the impact and risk assessment an unplanned event such as a LOC or LOWC will not intersect nearby nearby Ramsar wetlands.
Threatened Ecological Communities	As per the impact and risk assessment an unplanned event such as a LOC or LOWC may intersect nearby TECs such as. Giant Kelp Marine Forests of Southeast.
Nationally important wetlands	As per the impact and risk assessment an unplanned event such as a LOC or LOWC will not intersect nearby NIW.
Nationally threatened and migratory species	As per the impact and risk assessment, an unplanned event such as a LOC or LOWC may have an impact or risk to threatened or migratory species from exposure to surface oil, dissolved, and entrained hydrocarbons (Sections 5 and Section 7.16) .
State marine parks	As per the impact and risk assessment an unplanned event such as a LOC or LOWC may have an impact or risk on nearby SMPs
Species Conservation Advice/ Recovery Plans/Threat Abatement Plans	As per the impact and risk assessment operational activities will be managed in accordance with and will not compromise the specific objectives or actions of the following plans: • Albatross and Giant Petrels Recovery Plan (DCCEEW, 2022) • National recovery plan for the Dwarf Galaxias (*Galaxiella pusilla*) (Department of Sustainability and Environment, 2010b) • White shark Recovery Plan (*Carcharodon carcharias*) (DSEWPaC 2013b). • Recovery Plan for the Grey Nurse Shark (*Carcharias taurus*) (DoE, 2014b)

	• Marine turtles as per the Recovery Plan for Marine Turtles in Australia (DoEE, 2017). • Conservation of listed seabirds as per the Wildlife Conservation Plan for Seabirds (CoA, 2020a). • National Recovery Plan for the Orange-bellied Parrot (DELWP 2016). • Conservation Management Plan for the Blue Whale (DoE, 2015). • National Recovery Plan for the Southern Right Whale (DCCEEW, 2024). • Conservation Advice for Fin Whales (TSSC, 2015c) and Conservation Advice for Sei Whales (TSSC, 2015b).
Monitoring and reporting	• Loss of containment resulting in a hydrocarbon spill is required to be reported as per OEMS • Impacts as a result of a loss of containment resulting in a hydrocarbon spill will be monitored and reported in accordance with the OSMP.
Acceptability outcome	**Acceptable**
Environmental Performance	EPOs represent the measurable levels of environmental performance Beach is seeking to achieve to ensure impacts are of an acceptable level. EPOs relevant to the effective management of impacts associated with infrastructure and maintenance from the Yolla-a platform, RGP and planned activities are: • EPO1: Undertake the activity in a manner that will not interfere with other marine users to a greater extent than is necessary for the exercise of right conferred by the titles granted. • EPO2: No death or injury to listed threatened or migratory species from the activity. • EPO3: Biologically important behaviours can continue while the activity is being undertaken. • EPO6: No substantial or unrecoverable change in seabed quality which may adversely impact on biodiversity, ecological integrity, social amenity, cultural values or human health. • EPO12: No spills of chemicals or hydrocarbons to the marine environment. Table 7.93 sets out the EPS for the control measures identified above, and the measurement criteria to evaluate the achievement of EPOs and EPS.
Cumulative Impacts	Uncontrolled releases of hydrocarbons from the Yolla operations, including condensate from a Loss of Well Control (LoWC), a subsea pipeline rupture, or marine diesel oil (MDO) from a vessel collision, are considered credible spill scenarios. Oil Spill Trajectory Modelling (OSTM) indicates that Yolla condensate, being light and highly volatile, would largely evaporate within 24 hours, with minimal shoreline accumulation. Dissolved and entrained hydrocarbons could affect marine fauna over tens to hundreds of kilometres, with receptors including seabirds, cetaceans, pinnipeds, and pelagic fish in biologically important areas. Seasonal variation influences spill dispersion, with winter conditions producing wider spreads. Despite short-term localized toxicity to marine life, strong wave action, the light condensate properties, and limited spill volumes are expected to minimise long-term environmental impacts. Preventive and mitigation measures are in place to reduce the likelihood and consequences of a release. These include robust well and pipeline integrity management, Safety Case requirements, the Offshore Oil Pollution Emergency Plan (OPEP) with Tactical Response Plans, monitoring via the Offshore Operational and Scientific Monitoring Plan (OSMP), and vessel

	compliance through marine assurance and procurement vetting. The residual risk from a credible hydrocarbon release is assessed as low, with impacts considered acceptable under ESD principles. Management measures aim to prevent interference with other marine users, protect threatened and migratory species, maintain biologically important behaviours, and avoid chemical or hydrocarbon introduction to the marine environment.

7.18 RISK 7: Marine Diesel Oil Release

7.18.1 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 and maintenance activities around the platform or along the raw gas pipeline. 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.

To date, there have been no MDO spills from vessels associated with the BassGas Operations Area.

7.18.1.1 MDO properties

Marine diesel oil (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 7.75).

MDO Characteristics

Table 7.75 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).

7.18.1.2 Spill Location

For this assessment, the spill location chosen was at 3 NM from shore along the raw gas pipeline, 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 pipeline, 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 pipeline rather than just the spill location.

7.18.1.3 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 current PSV, the Tek Ocean Spirit, is 99 m3, so the 300 m3 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.

7.18.2 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.

The OSTM results for surface contact are presented in Figure 7.17, entrained hydrocarbons in Figure 7.18, Shoreline loading Figure 7.19 and dissolved hydrocarbons in Figure 7.20.

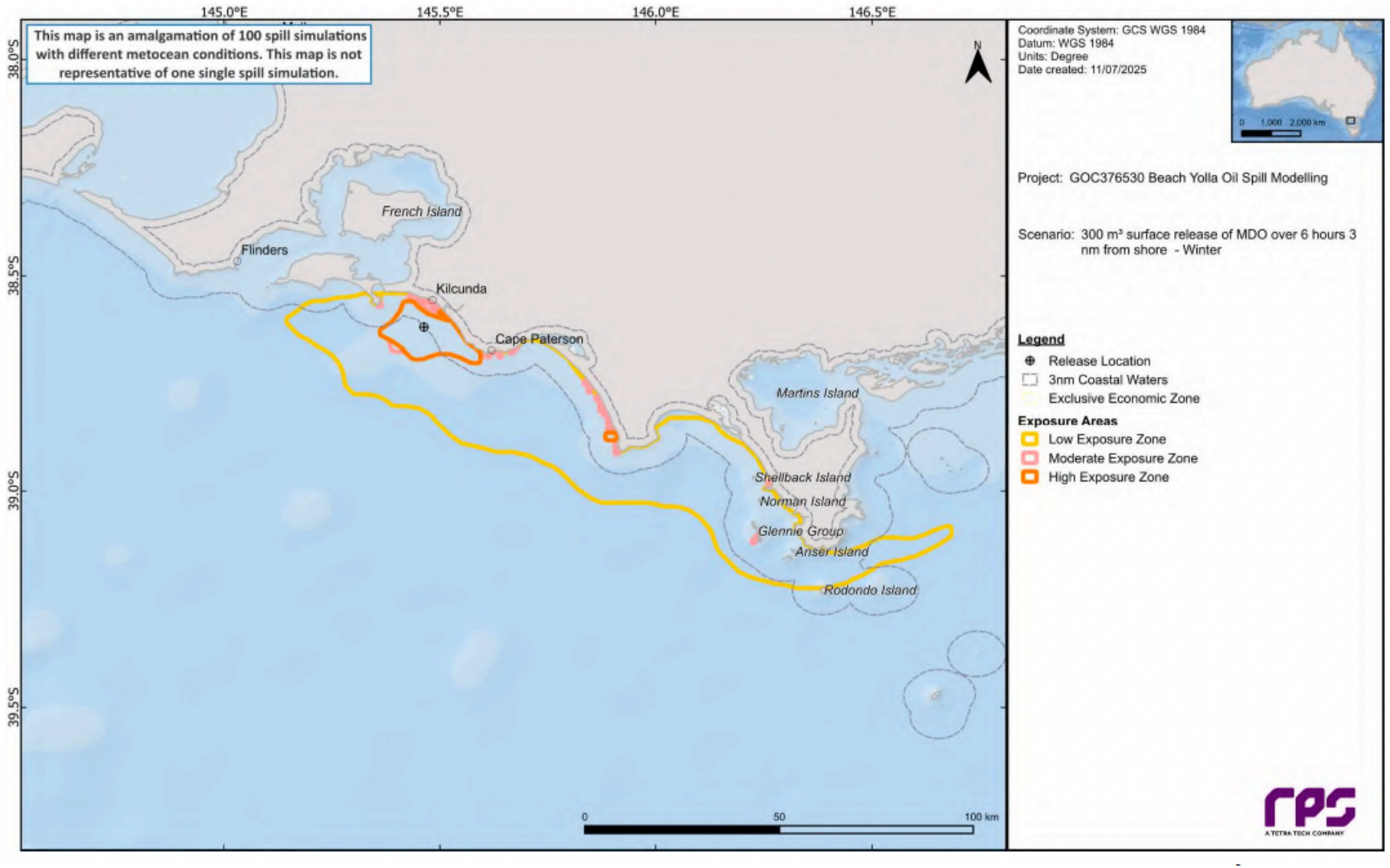


Figure 7.17: Predicted Area of Exposure for Low, Medium and High Thresholds from 300 m^3 surface release of MDO over 6 hours at a locaton 3 NM away from the shore during winter conditions.

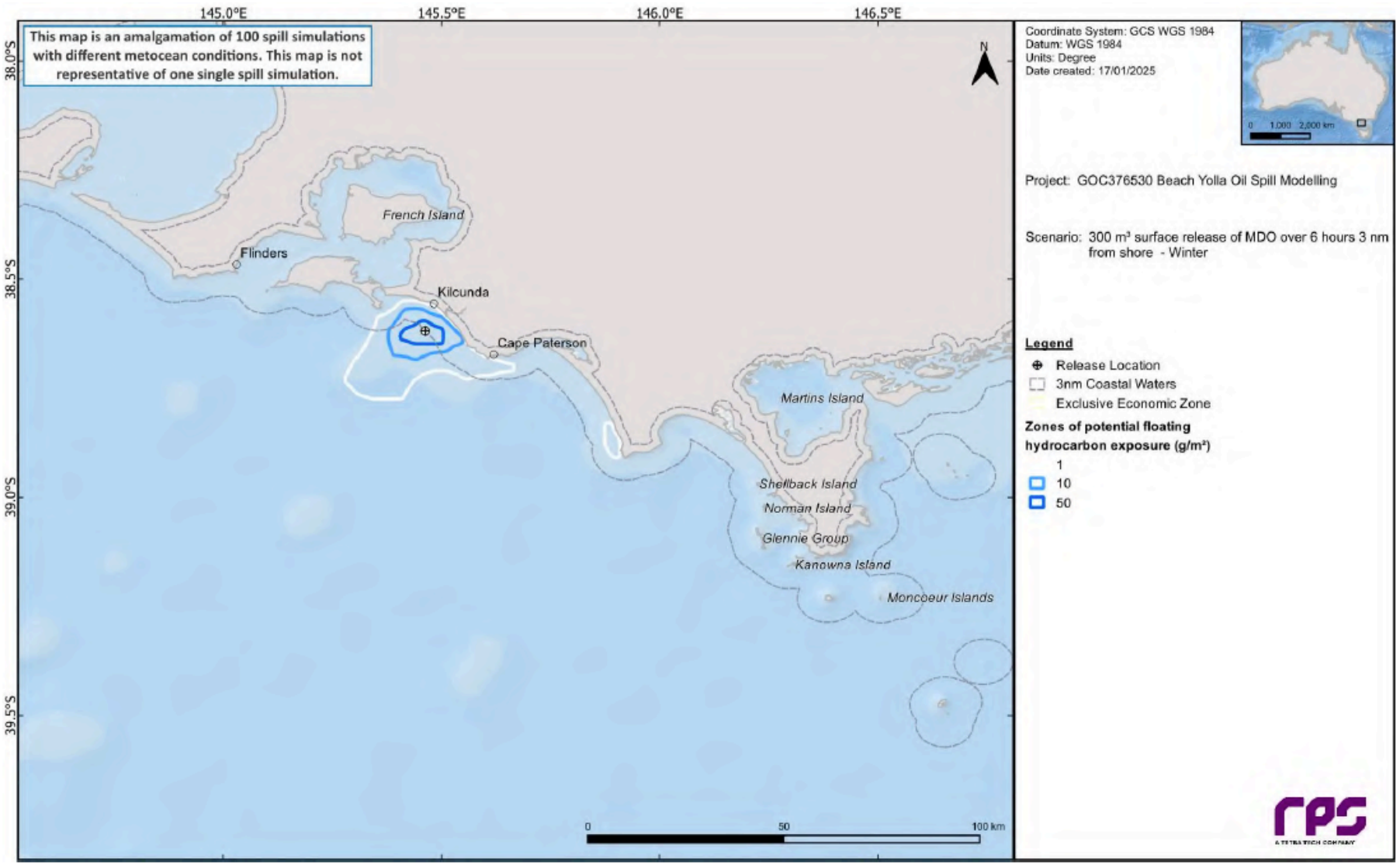


Figure 7.18: Zone of potential Floating Oil Exposure in the event of a 300 m^3 surface release of MDO over 6 hours at a location 3 NM away from the shore during winter conditions.

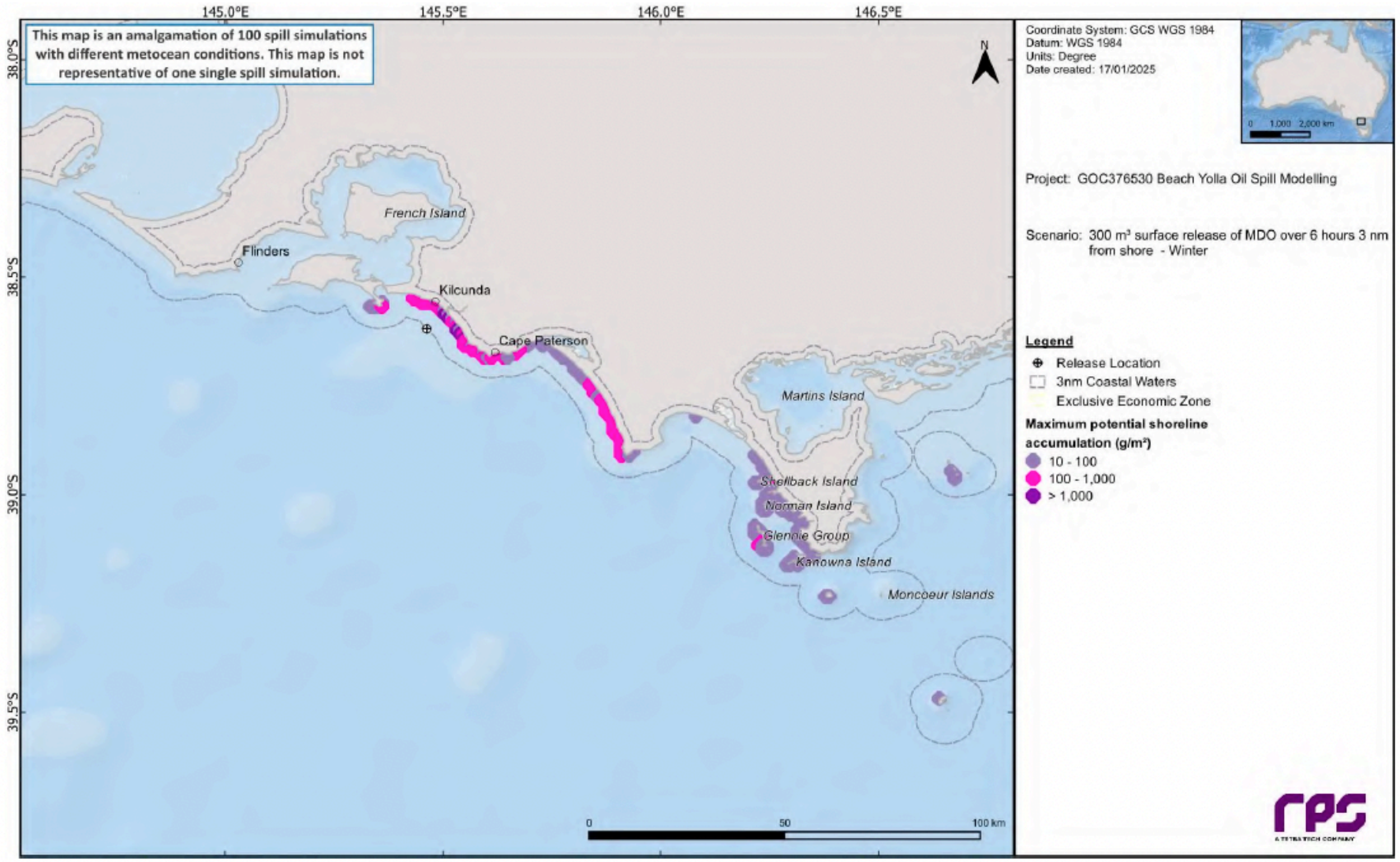


Figure 7.19: Maximum potential Shoreline Loading in the event of a 300 m^3 surface release of MDO over 6 hours at a location 3 NM away from the shore during winter conditions.

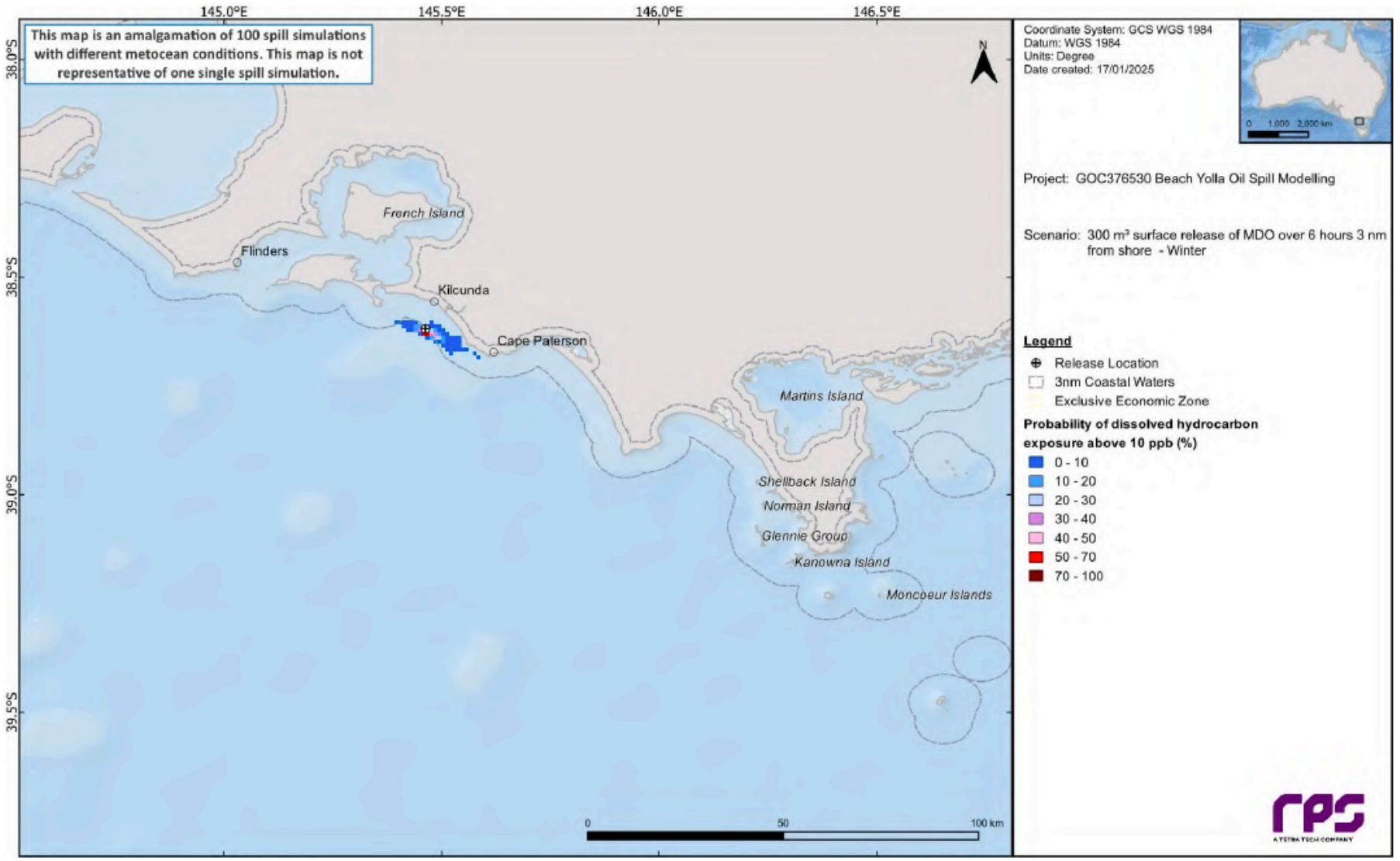


Figure 7.20: Probability of Dissolved Hydrocarbon Exposure above 10 ppb, at 0-10 m below the sea in the event of a 300 m^3 surface release of MDO over 6 hours at a location 3 NM away from the shore during winter conditions.

7.18.3 Known and Potential Environmental Risks

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.

7.18.4 EMBA

Surface release of MDO modelled (Section 5 Figure 5.1) 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.

7.18.5 Potential Level of Environmental Risks

The evaluation of environmental risks to these receptors (including fauna, marine parks and fisheries) resulting from an MDO surface release is presented in the following tables. The criteria used to determine the sensitivity of receptors within the EMBA is outlined in Section 7.16 Table 7.50. The cultural values and sensitivities of these areas and species to Traditional owners must also be taken into consideration throughout this process.

Table 7.76: 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 5.5.1	
An outline of the sensitivity aspect for benthic assemblages is provided in		Section 7.16 Table 7.51	
Potential risk form Surface Release of MDO 3 NM from shore			
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 7.77: 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 5.4.6.1
An outline of the sensitivity aspect for macroalgal communities is provided in	Section 7.16 Table 7.52
Potential risk form Surface Release of MDO 3 NM from shore	

General sensitivity to oiling – benthic fauna			
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 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 7.78: 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 5.5.2		
An outline of the sensitivity aspect for plankton is provided in	Section 7.16 Table 7.53		
Potential risk form Surface Release of MDO 3 NM from shore			
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.		

General sensitivity to oiling – plankton
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 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 7.79: 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 5.5.7	
An outline of the sensitivity aspect for pelagic fish is provided in		Section 7.16 Table 7.54	
Potential risk form Surface Release of MDO 3 NM from shore			
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 7.80: Potential risks of MDO release from vessel on cetaceans

General sensitivity to oiling – cetaceans			
Sensitivity rating of cetaceans	Low		
A description of cetaceans in the EMBA is provided in:	Section 5.5.5		
An outline of the sensitivity aspect for cetaceans is provided in	Section 7.16 Table 7.55		
Potential risk form Surface Release of MDO 3 NM from shore			
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 7.81: 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 5.5.6
An outline of the sensitivity aspect for pinnipeds is provided in	Section 7.16 Table 7.56

General sensitivity to oiling – pinnipeds			
Potential risk form Surface Release of MDO 3 NM from shore			
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 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 7.82: 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 5.5.8		
An outline of the sensitivity aspect for marine reptiles is provided in	Section 7.16 Table 7.57		
Potential risk form Surface Release of MDO 3 NM from shore			
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 7.83: 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 5.5.4		
An outline of the sensitivity aspect for seabirds and shorebirds is provided in	Section 7.16 Table 7.58		
Potential risk form Surface Release of MDO 3 NM from shore			
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 7.84: 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 5.3.7
An outline of the sensitivity aspect for sandy beaches is provided in	Section 7.15 Table 7.59
Potential risk form Surface Release of MDO 3 NM from shore	
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 7.85: Potential risks of MDO release from vessel 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 5.7.5
An outline of the sensitivity aspect for commercial fishing is provided in	Section 7.16 Table 7.60
Potential risk form Surface Release of MDO 3 NM from shore	

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 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 fishery is therefore considered moderate.			
No Commonwealth fisheries occur within the subsea pipeline rupture EMBA for this scenario. Victorian fisheries that occur within the subsea pipeline rupture EMBA for this scenario include; • Bass Trait Scallop Fishery. • Abalone Fishery. • Rock Lobster Fishery. • Wrasse Fishery. • Pipi Fishery. • Giant crab (western zone.			

7.18.6 Risk Assessment

A risk assessment for an MDO spill is presented below in Table 7.86.

Table 7.86: Risk assessment for an MDO spill

ALARP decision context and justification	ALARP Decision Contact: Type B – new to the organisation or geographical area, infrequent or non-standard activity, some uncertainty, some partner interest, may attract media attention. Indirect impacts from unplanned surface release of MDO are well understood and impacts to the ocean and coastal areas are well known and the extent of impact is predicted by modelled scenarios. Good practice is defined, and uncertainty is minimal. There are no conflicts with company values, no partner interests, and no significant media interests. As the impact consequence is rated as Minor (1) applying good industry practice is sufficient to manage the impact to ALARP.
Adopted Control Measures	**Description**
CM01: Marine Assurance Process	Vessels will meet relevant maritime laws and includes pre-commencement rig and vessel inspections of class certification requirements under the Navigation Act 2012 and associated Marine Orders, including but not limited to: • Marine Order 21: Safety and emergency arrangements gives effect to SOLAS regulations. • Marine Order 27: Safety of navigation and radio equipment gives effect to SOLAS • Marine Order 31: SOLAS and non-SOLAS certification details survey, maintenance, and certification requirements for vessel class. • Marine Order 91 Marine Pollution Prevention (MARPOL Annex I) – oil Operate navigational lights and communication systems. Maintain navigational lights and communication systems in accordance with their PMS. Have trained and competent crew maintaining 24-hour visual, radar and radio watch for other vessels.
CM03: Third-party marine users.	Beach will undertake consultation relating to or in the event of a LOC or LOWC, actions as outline in the OPEP will be implemented.
CM04: Beach Fair Ocean Access Procedure	Upon notification of a claim of interference, Beach will enter the details into the CMO incident management system and follow its Investigations Procedure to investigate the complaint/incident and determine whether compensation is payable to the complainant.
CM08: Whale Management Procedure	The Whale Management Procedure outlines specific measures to minimise anthropogenic noise threats to relevant species, including the implementation of safe operating distances between vessels and whales, pre-activity surveys for specific activities, night-time and low visibility controls and establishment of safe points for operational activities. The procedure assumes that once an activity is underway foraging whales that enter the pre-activity survey zone are not displaced as foraging behaviour has not been disrupted as the whale has commenced or continued foraging and thus aligns with the Conservation Management Plan for the Blue Whale (DoE, 2015b) and DAWE (2021a) definitions.

	Prior to an activity commencing a pre-activity survey will be undertaken of the activity survey zone for the activity:
	• Resupply, Inspection, Maintenance, and Repair
	  ◦ OSV – 6 km
	  ◦ AHTS – 22 km
	• Inspection, Maintenance, and Repair
	  ◦ OSV – 6 km
	  ◦ AHTS – 22 km
	The activity survey zones are based on the distance to the furthest modelled PTS, TTS, or behaviour criteria (Section 7.5), and have been rounded up to account for the accuracy of distance estimation at sea.
	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.

CM09: *EPBC Regulations 2000 – Part 8 Division 8.1* Interacting with Cetaceans Requirement	Vessels and Whales - Vessel operators during vessel operations, well completions and well intervention sub-activities shall adhere to the distances and vessel management practices of EPBC Regulations (Part 8, Division 8.1) and report vessel interactions with whales, specifically: • Do not approach a whale. • Maintain a distance of 300m from a whale. • If a whale approaches the vessel try to maintain the separation distances without changing direction or moving into the path of the animal. Vessels and Dolphins - Vessel operators during vessel operations, well suspension and well intervention sub-activities shall adhere to the distances and vessel management practices of EPBC Regulations (Part 8, Division 8.2) and report vessel interactions with dolphins specifically: • Do not approach a dolphin • Maintain a distance of 150m from a dolphin (with the exception of bow riding) • If a dolphin approaches the vessel try to maintain the separation distances without changing direction or moving into the path of the animal. Helicopters and Whales and Dolphins - Helicopters will not fly lower than 1650 ft when within 500 m horizontal distance of a cetacean except when landing or taking off and will not approach a cetacean from head on)EPBC Regulations (Part 8, Division 8.3).

CM12: Beach Offshore Oil Pollution Emergency Plan	If a LOC or LOWC occurs, the OPEP will be implemented.
	The Offshore OPEP is developed to support all Beach activities offshore Victoria and includes response arrangements for a worst-case LOC / LOWC scenario from the activity.
	  ◦ The OPEP includes Tactical Response Plans (TRPs) for identified protection priority areas within the region.
	  ◦ Emergency spill response capability is maintained in accordance with the NOPSEMA accepted OPEP.

	• Implement spill response in accordance with relevant EPOs and EPSs in the accepted OPEP.
CM13: Beach Offshore Operational and Scientific Monitoring Plan	• Operational and scientific monitoring capability is maintained in accordance with the NOPSEMA accepted OSMP. Implementation strategies provide for monitoring of an oil pollution emergency. The OSMP details operational monitoring to inform response planning and scientific monitoring to inform the extent of impacts from hydrocarbon exposure and potential remediation requirements.
CM11: Procurement Vetting Process	Beach via its Procurement Vetting Process will ensure the appropriately licenced vessel and vessel contractor is contracted to meet the requirements of Operations Activities and follow the relevant Beach OEMS.

Additional Control Measures Assessed		
Control	**Cost/Benefit Analysis**	**Control implemented?**
Preventative		
Eliminate or substitute the use of diesel.	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.	No
Remove support vessels from activity.	Vessels are required to support operational activities and provide essential safety standby duties including tracking/intersecting vessels that are coming towards or close to the MODU. Thus, there is an increased risk of collision by removing support vessels from the activity.	No
Reduction		
Reduce the volume of MDO carried.	May reduce the total volume of MDO released. Evaluation of trade-offs indicates that carrying less diesel would result in the need for more frequent port visits for refuelling and/or more frequent at-sea bunkering and may increase the risk of transit and bunkering related incidents. The trade-offs and associated costs are grossly disproportionate to the benefit gained.	No

Table 7.87: Demonstration that Risks will be of an Acceptable Level

Consequence rating	Moderate
Likelihood of occurrence	Remote
Residual risk	Low
Acceptability Assessment	
To meet the principles of ESD	The unplanned release of hydrocarbons are assessed as having a Moderate (1) consequence, which is not considered to have the potential to result in serious or irreversible environmental damage. The risk is assessed as a short-term, localised reduction of surface water quality around the MDO release point and acute toxicity to marine fauna through ingestion/absorption of contaminated water. Strong wave-action, an exposed coastline and the non-persistent characteristics of MDO are all likely to assist in the rapid weathering of hydrocarbons and the risk of short- and long-term affects to the marine environment are expected to be low. Spill source volumes are limited in

	size, the environmental impact of MDO is well understood, a credible spill volume has been modelled, and a very conservative threshold has been selected to define the EMBA. There is high confidence in the potential risk, as Beach has significant experience undertaking activities such as these, having operated the BassGas operations since 2006 and has controls in place for existing offshore developments and associated activities. The EIA presented throughout this EP demonstrates that ESD principles (a), (b), (c) and (d) are met (noting that principle (e) is not relevant).
Internal context	The proposed management of the risk is aligned with the Beach Environment Policy. The proposed management of the risk is aligned with the Beach Environment Policy. The following Beach management processes and procedures relevant to this aspect are listed as the following controls: • CM12: Beach Offshore Oil Pollution Emergency Plan (OPEP) • CM13: Beach Offshore Operational and Scientific Monitoring Plan These Beach management controls also meet the requirements of OPGGS(E)R, Offshore Petroleum and Greenhouse Gas Storage (Safety) Regulations, Offshore Petroleum and Greenhouse Gas Storage (Resource Management and Administration) Regulations 2011as listed in other requirements below. 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.
Other requirements	Operational activities undertaken at the platform and during planned activities will adhere to relevant legislative requirements as detailed in the controls section. • Vessel activities undertaken during the Operational activities will adhere to relevant legislative requirements as detailed in the controls section. • Integrity of wells, pipeline and subsea equipment is managed as per the requirements of the in-force EP, safety cases and WOMPs required under the OPGGS(E)R and OPGGS(E)R and OPGGS(RM)R, respectively.
Environmental MNES	

BIA	Integrated marine and coastal regionalisation of Australia (IMCRA)
	• Central Bass Strait
	  ◦ Southern Right whale
	• Bass Strait Shelf Province
	  ◦ Pygmy Blue Whale
	• South-east Marine Region:
	  ◦ Waters off pinniped colonies White Shark
	  ◦ Foraging by Albatross
	• North-western edge of Cape Barren Island and Phillip Island

	◦ Little Penguin - Foraging
Australian Marine Parks	As per the impact and risk assessment an unplanned event such as a LOC (MDO release) will not intersect nearby AMPs.
Wetland of International Importance:	As per the impact and risk assessment an unplanned event such as a LOC (MDO release) will not intersect nearby Ramsar wetlands.
Threatened Ecological Communities	As per the impact and risk assessment an unplanned event such as a LOC (MDO release) may intersect nearby TECs such as. Giant Kelp Marine Forests of Southeast.
Nationally important wetlands	As per the impact and risk assessment an unplanned event such as a LOC (MDO release) will not intersect nearby NIW.
Nationally threatened and migratory species	As per the impact and risk assessment, an unplanned event such as a LOC may have an impact or risk to threatened or migratory species from exposure to surface oil, dissolved, and entrained hydrocarbons (Sections 5 and Section 7.16) .
State marine parks	As per the impact and risk assessment an unplanned event such as a LOC (MDO release) may have an impact or risk on nearby SMPs.
Species Conservation Advice/ Recovery Plans/Threat Abatement Plans	As per the impact and risk assessment operational activities will be managed in accordance with and will not compromise the specific objectives or actions of the following plans: • Albatross and Giant Petrels Recovery Plan (DCCEEW, 2022) • National recovery plan for the Dwarf Galaxias (*Galaxiella pusilla*) (Department of Sustainability and Environment, 2010b) • White shark Recovery Plan (*Carcharodon carcharias*) (DSEWPaC 2013b). • Recovery Plan for the Grey Nurse Shark (*Carcharias taurus*) (DoE, 2014b) • Marine turtles as per the Recovery Plan for Marine Turtles in Australia (DoEE, 2017). • Conservation of listed seabirds as per the Wildlife Conservation Plan for Seabirds (CoA, 2020a). • National Recovery Plan for the Orange-bellied Parrot (DELWP 2016). • Conservation Management Plan for the Blue Whale (DoE, 2015). • National Recovery Plan for the Southern Right Whale (DCCEEW, 2024). • Conservation Advice for Fin Whales (TSSC, 2015c) and Conservation Advice for Sei Whales (TSSC, 2015b).
Monitoring and reporting	• Loss of containment resulting in a hydrocarbon spill is required to be reported as per the Beach Incident Management Procedure (CDN/ID 18985406) and Section 8.3 of this EP • Impacts as a result of a loss of containment resulting in a hydrocarbon spill will be monitored and reported in accordance with the OSMP.
Acceptability outcome	**Acceptable**
Environmental Performance	EPOs represent the measurable levels of environmental performance Beach is seeking to achieve to ensure impacts are of an acceptable level. EPOs relevant to the effective management of impacts associated with infrastructure and maintenance from the Yolla-a platform, RGP and planned activities are: • EPO1: Undertake the activity in a manner that will not interfere with other marine users to a greater extent than is necessary for the exercise of right conferred by the titles granted.

	• EPO2: No death or injury to listed threatened or migratory species from the activity. • EPO3: Biologically important behaviours can continue while the activity is being undertaken. • EPO6: No substantial or unrecoverable change in seabed quality which may adversely impact on biodiversity, ecological integrity, social amenity, cultural values or human health. • EPO9: No introduction of a known or potential invasive marine species. • EPO12: No spills of chemicals or hydrocarbons to the marine environment. Table 7.93 sets out the EPS for the control measures identified above, and the measurement criteria to evaluate the achievement of EPOs and EPS.
Cumulative Impacts	Cumulative impacts from potential hydrocarbon releases, including Yolla condensate and marine diesel oil (MDO), are expected to be low due to the light, non-persistent nature of these hydrocarbons and the strong natural dispersion in the Bass Strait environment. Modelling indicates that while localised exposure to floating, entrained, and dissolved hydrocarbons may occur, these effects are generally short-term, with rapid evaporation and dilution reducing the potential for long-lasting environmental harm. Shoreline accumulation is possible near the spill location, particularly under winter conditions, but volumes are limited, and the affected area is largely restricted to nearshore zones. When considered alongside other existing and planned offshore activities, the cumulative effects on marine and coastal ecosystems (including threatened and migratory species, biologically important areas, and sensitive habitats) are anticipated to be minimal. Existing management measures, such as emergency response plans, operational monitoring, and best-practice environmental controls, further reduce the likelihood of additive or synergistic effects. Consequently, even in combination with other pressures, unplanned hydrocarbon releases are unlikely to result in significant, long-term ecological impacts or compromise the objectives of regional conservation and recovery plans.

7.19 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 Oil Pollution Emergency Plan (OPEP) 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 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.

7.19.1.1 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.

7.19.1.2 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.

7.19.1.3 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.

7.19.1.4 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:

21. 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.

22. 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.

7.19.2 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. 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 Oiled Wildlife Response centres on shorelines can cause physical damage to those coastal areas.

7.19.3 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 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

7.19.4 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 (other than relief well drilling) is the defined BassGas Operations and Planning area extent as outlined in Section 5 and shown on Figure 5.1

7.19.5 Potential Level 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.

7.19.5.1 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.

7.19.5.2 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.

7.19.6 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 7.88.

Table 7.88: Risk assessment for hydrocarbon spill response activities (excluding relief well drilling)

ALARP decision context and justification	ALARP Decision Contact: Type B – new to the organisation or geographical area, infrequent or non-standard activity, some uncertainty, some partner interest, may attract media attention. Indirect impacts from unplanned LOC are well understood and impacts to the ocean and coastal areas are well known and the extent of impact is predicted by modelled scenarios. Good practice is defined, and uncertainty is minimal. There are no conflicts with company values, no partner interests, and no significant media interests. As the impact consequence is rated as Minor (1) applying good industry practice is sufficient to manage the impact to ALARP.
Adopted Control Measures	**Description**
CM12: Beach Offshore Oil Pollution Emergency Plan	• All spill response control measures and associated EPOs and EPSs are detailed within the OPEP (VIC 1000 SAF PLN. CDN/ID 18986979).
CM13: Beach Offshore Operational and Scientific Monitoring Plan	• All relevant operational and scientific monitoring studies are detailed within the OSMP (CDN/ID S4100AH717908) and OSMP Addendum for the Program (V-1000-P1-RP-0005).

Additional Control Measures Assessed		
Control	**Cost/Benefit Analysis**	**Control implemented?**
Engineering Risk Assessment		
Monitor and evaluate: AUVs (by Drone)	This control measure is not expected to provide significant environmental benefit as mobilisation of in-field monitoring, or aerial surveillance may be implemented rapidly via existing contracts. Costs associated with acquiring the equipment, maintenance, and training personnel to use AUVs is considered grossly disproportionate to the benefit gained.	No
Monitor and evaluate: Night-time monitoring – infrared	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.	No
Precautionary approach		
OWR: Pre-positioning of oiled wildlife response resources.	Oiled wildlife response equipment containers for first strike activities are positioned in Geelong (AMOSC). Positioning the equipment any closer to the potential spill area is not considered to provide a considerable environmental benefit considering that any visible shoreline contact is not predicted until day 4-5 of the spill (depending on the spill source location), therefore there is adequate time to deploy equipment	No

	positioned in Geelong. Additionally, spill modelling indicates potential (hypothetical) areas of exposure to hydrocarbons, post-spill operational monitoring would be required to predict actual or likely exposure locations, therefore determining an area to pre-position equipment may be inaccurate pre-spill.	
Shoreline protection and clean up: Tactical Response Plans (TRP)	Identified areas for priority protection have pre-populated tactical response plans to reduce response planning timeframes in the event of potential shoreline exposure. Refer to OPEP for TRPs. CM12: Beach Offshore Oil Pollution Emergency Plan	No
Chemical Dispersant: Pre-positioning of dispersant and application equipment. application equipment.	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.	No

Table 7.89: Demonstration that Risks will be of an Acceptable Level

Consequence rating	Minor
Likelihood of occurrence	Unlikely
Residual risk	Low
Acceptability Assessment	
To meet the principles of ESD	The unplanned release of hydrocarbon that will require activation of spill response activities is assessed as having a Minor (1) consequence. The risk is assessed as a short-term, localised reduction of surface water quality and response activity impacts around the discharge point. Identified risks of damage to shorelines and disturbance to local residents and marine users including commercial fishers. Spill source volumes are limited in size, the environmental impact of condensate and MDO are well understood, a credible spill volume has been modelled, and a very conservative threshold has been selected to define the EMBA. There is high confidence in the potential risk, as Beach has significant experience undertaking activities such as these, having operated the BassGas operations since 2006 and has controls in place for existing offshore developments and associated activities. The EIA presented throughout this EP demonstrates that ESD principles (a), (b), (c) and (d) are met (noting that principle (e) is not relevant).
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 (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.

Other requirements	Operational activities undertaken at the platform and during planned activities will adhere to relevant legislative requirements as detailed in the controls section. • Vessel activities undertaken during the Operational activities will adhere to relevant legislative requirements as detailed in the controls section. • Integrity of wells, pipeline and subsea equipment is managed as per the requirements of the in-force EP, safety cases and WOMPs required under the OPGGS(E)R and OPGGS(E)R and OPGGS(RM)R, respectively. • EPBC Regulations 2000 – Part 8 Division 8.1 interacting with cetaceans requirements are implemented as per CM08: Whale Management Procedure. • AMSA Technical Guideline for the Preparation of Marine Pollution Contingency Plans for Marine and Coastal Facilities (AMSA 2015).
Environmental MNES	
BIA	Integrated marine and coastal regionalisation of Australia (IMCRA) • Central Bass Strait ◦ Southern Right whale • Bass Strait Shelf Province ◦ Pygmy Blue Whale • South-east Marine Region: ◦ Waters off pinniped colonies White Shark ◦ Foraging by Albatross • North-western edge of Cape Barren Island and Phillip Island ◦ Little Penguin - Foraging
Australian Marine Parks	As per the impact and risk assessment an unplanned event such as a LOC or LOWC will not intersect nearby AMPs.
Wetland of International Importance:	As per the impact and risk assessment an unplanned event such as a LOC or LOWC will not intersect nearby nearby Ramsar wetlands.
Threatened Ecological Communities	As per the impact and risk assessment an unplanned event such as a LOC or LOWC may intersect nearby TECs such as. Giant Kelp Marine Forests of Southeast.
Nationally important wetlands	As per the impact and risk assessment an unplanned event such as a LOC or LOWC will not intersect nearby NIW.
Nationally threatened and migratory species	As per the impact and risk assessment, an unplanned event such as a LOC or LOWC may have an impact or risk to threatened or migratory species from exposure to surface oil, dissolved, and entrained hydrocarbons (Sections 5 and Section 7.16) .
State marine parks	As per the impact and risk assessment an unplanned event such as a LOC or LOWC may have an impact or risk on nearby SMPs.
Species Conservation Advice/ Recovery Plans/Threat Abatement Plans	As per the impact and risk assessment operational activities will be managed in accordance with and will not compromise the specific objectives or actions of the following plans: • Albatross and Giant Petrels Recovery Plan (DCCEEW, 2022) • National recovery plan for the Dwarf Galaxias (*Galaxiella pusilla*) (Department of Sustainability and Environment, 2010b) • White shark Recovery Plan (*Carcharodon carcharias*) (DSEWPaC 2013b).

	• Recovery Plan for the Grey Nurse Shark (*Carcharias taurus*) (DoE, 2014b) • Marine turtles as per the Recovery Plan for Marine Turtles in Australia (DoEE, 2017). • Conservation of listed seabirds as per the Wildlife Conservation Plan for Seabirds (CoA, 2020a). • National Recovery Plan for the Orange-bellied Parrot (DELWP 2016). • Conservation Management Plan for the Blue Whale (DoE, 2015). • National Recovery Plan for the Southern Right Whale (DCCEEW, 2024). • Conservation Advice for Fin Whales (TSSC, 2015c) and Conservation Advice for Sei Whales (TSSC, 2015b).
Monitoring and reporting	• Loss of containment resulting in a hydrocarbon spill is required to be reported as per OEMS • Impacts as a result of a loss of containment resulting in a hydrocarbon spill will be monitored and reported in accordance with the OSMP.
Acceptability outcome	**Acceptable**
Environmental Performance	Environmental Performance Outcomes (EPOs), Standards (EPS) and measurement criteria for response preparedness and implementation of response activities are detailed in the Beach OPEP (VIC 1000 SAF PLN. CDN/ID 18986979)
Cumulative Impacts	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 Oiled Wildlife Response (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.

7.20 RISK 9: Hydrocarbon Spill Response Activities - Relief Well Drilling

Beach has developed a regional Offshore Oil Pollution Emergency Plan (OPEP) 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.

7.20.1 Response Strategy - Source Control

Source control responses for consideration in this plan include:

- ROV Emergency BOP Intervention.
- Relief Well.
- Subsea First Response Toolkit.
- Vessel Source Control.

7.20.1.1 ROV Emergency BOP Intervention

Emergency BOP activation involves delivering hydraulic fluid to the BOP stack using an ROV to mitigate any problems that may have arisen with the BOP control system in the event of a loss of well containment.

7.20.1.2 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 Relief Well Plan (CM15) 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 Relief Well Plan.

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 design 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. The long lead items including wellhead and casing will be identified prior to

commencement of the campaign. A source control emergency response exercise will also be conducted to validate the planning and arrangements ahead of commencement of drilling operations. Should a blowout emergency occur, further planning for the relief well will begin simultaneously with other well intervention options. Outline relief well plans, and methodology are contained in each well-specific SCCP (CM15) The SCCP 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 SCCP and Relief Well Plan (15) includes technical details as to the design and equipment requirements to drill a relief well. Detailed well 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) similar to that used for Program activities. 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:

- The MODU broker can be contracted to identify and contract a suitably specified MODU (including Australian Safety Case status) within 14 days. This allows sufficient time to engage with other operators as well as drilling contractors to confirm availability of MODUs with suitable technical specifications to meet the required engineering well design. Note that a "sister" MODU to the Equinox will be operating in Australia during the time of the Beach campaign, given the known characteristics of the MODU with regards to the harsh environment and the existing Australian base safety case this will be our first call in emergency.

- 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 Otway Basin and the successful intersection of a flowing well would take approximately 86 days. Details of the most suitable source control methods applicable to the specific wells will be detailed in well-specific Source Control Contingency Plan, inclusive of the Relief Well Plan and dynamic kill modelling ((SCCP and Relief Well Plan (CM15)).

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.

7.20.1.3Vessel 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).

7.20.2 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.

Oil spill response strategies that could result in environment impacts are:

- ROV Emergency BOP Intervention.
- Relief Well.
- Subsea First Response Toolkit.
- Vessel Source Control.

7.20.3 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, 7.4, 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 7.7, 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).

7.20.4 Potential Level of Environmental Risks

7.20.4.1 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.

7.20.4.2 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 7.4, 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.

7.20.4.3 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 7.7, 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.

7.20.4.4 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.

7.20.4.5 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.

7.20.4.6 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.

7.20.4.7 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.

7.20.4.8 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.

7.20.5 Risk Assessment

A risk assessment for drilling a relief well is presented below in Table 7.90.

Table 7.90: Risk assessment for drilling a relief well.

ALARP decision context and justification	ALARP Decision Contact: Type B – new to the organisation or geographical area, infrequent or non-standard activity, some uncertainty, some partner interest, may attract media attention. Indirect impacts from unplanned LOC are well understood and impacts to the ocean and coastal areas are well known and the extent of impact is predicted by modelled scenarios. Good practice is defined, and uncertainty is minimal.

	There are no conflicts with company values, no partner interests, and no significant media interests. As the impact consequence is rated as Minor (1) applying good industry practice is sufficient to manage the impact to ALARP.
Adopted Control Measures	**Description**
CM15: Source Control Contingency Plan (SCCP), inclusive of Relief Well Plan	Beach has an RWP in place that describes the scope of activities, drill rig specifications, schedule and relief well schematic.

Additional Control Measures Assessed		
Control	**Cost/Benefit Analysis**	**Control implemented?**
None	N/A	N/A

Table 7.91: Demonstration that Risks will be of an Acceptable Level

Consequence rating	Minor
Likelihood of occurrence	Unlikely
Residual risk	Low
Acceptability Assessment	
To meet the principles of ESD	The unplanned release of hydrocarbon that will require activation of spill response activities is assessed as having a Minor (1) consequence. The risk is assessed as a short-term, localised reduction of surface water quality and response activity impacts around the discharge point. Identified risks of damage to shorelines and disturbance to local residents and marine users including commercial fishers. Spill source volumes are limited in size, the environmental impact of condensate and MDO are well understood, a credible spill volume has been modelled, and a very conservative threshold has been selected to define the EMBA. There is high confidence in the potential risk, as Beach has significant experience undertaking activities such as these, having operated the BassGas operations since 2006 and has controls in place for existing offshore developments and associated activities. The EIA presented throughout this EP demonstrates that ESD principles (a), (b), (c) and (d) are met (noting that principle (e) is not relevant).
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.
Other requirements	Operational activities undertaken at the platform and during planned activities will adhere to relevant legislative requirements as detailed in the controls section.

	• Vessel activities undertaken during the Operational activities will adhere to relevant legislative requirements as detailed in the controls section. • RWD, Integrity of wells, pipeline and subsea equipment is managed as per the requirements of the in-force EP, safety cases and WOMPs required under the OPGGS(E)R and OPGGS(E)R and OPGGS(RM)R, respectively. EPBC Regulations 2000 – Part 8 Division 8.1 interacting with cetaceans requirements are implemented as per CM08: Whale Management Procedure.
Environmental MNES	
BIA	Integrated marine and coastal regionalisation of Australia (IMCRA) • Central Bass Strait ◦ Southern Right whale • Bass Strait Shelf Province ◦ Pygmy Blue Whale • South-east Marine Region: ◦ Waters off pinniped colonies White Shark ◦ Foraging by Albatross • North-western edge of Cape Barren Island and Phillip Island ◦ Little Penguin - Foraging
Australian Marine Parks	As per the impact and risk assessment an unplanned event such as a LOC or LOWC will not intersect nearby AMPs.
Wetland of International Importance:	As per the impact and risk assessment an unplanned event such as a LOC or LOWC will not intersect nearby nearby Ramsar wetlands.
Threatened Ecological Communities	As per the impact and risk assessment an unplanned event such as a LOC or LOWC may intersect nearby TECs such as. Giant Kelp Marine Forests of Southeast.
Nationally important wetlands	As per the impact and risk assessment an unplanned event such as a LOC or LOWC will not intersect nearby NIW.
Nationally threatened and migratory species	As per the impact and risk assessment, an unplanned event such as a LOC or LOWC may have an impact or risk to threatened or migratory species from exposure to surface oil, dissolved, and entrained hydrocarbons (Sections 5 and Section 7.16) .
State marine parks	As per the impact and risk assessment, an unplanned event such as a LOC or LOWC may have an impact or risk on the management aims of state marine parks.
Species Conservation Advice/ Recovery Plans/Threat Abatement Plans	As per the impact and risk assessment operational activities will be managed in accordance with and will not compromise the specific objectives or actions of the following plans: • Albatross and Giant Petrels Recovery Plan (DCCEEW, 2022) • National recovery plan for the Dwarf Galaxias (*Galaxiella pusilla*) (Department of Sustainability and Environment, 2010b) • White shark Recovery Plan (*Carcharodon carcharias*) (DSEWPaC 2013b). • Recovery Plan for the Grey Nurse Shark (*Carcharias taurus*) (DoE, 2014b)

	• Marine turtles as per the Recovery Plan for Marine Turtles in Australia (DoEE, 2017). • Conservation of listed seabirds as per the Wildlife Conservation Plan for Seabirds (CoA, 2020a). • National Recovery Plan for the Orange-bellied Parrot (DELWP 2016). • Conservation Management Plan for the Blue Whale (DoE, 2015). • National Recovery Plan for the Southern Right Whale (DCCEEW, 2024). Conservation Advice for Fin Whales (TSSC, 2015c) and Conservation Advice for Sei Whales (TSSC, 2015b).
Monitoring and reporting	• Loss of containment resulting in a hydrocarbon spill is required to be reported as per OEMS • Impacts as a result of a loss of containment resulting in a hydrocarbon spill will be monitored and reported in accordance with the OSMP.
Acceptability outcome	**Acceptable**
Environmental Performance	Environmental Performance Outcomes (EPOs), Standards (EPS) and measurement criteria for response preparedness and implementation of response activities are detailed in the Beach OPEP (VIC 1000 SAF PLN. CDN/ID 18986979)
Cumulative Impacts	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. These impacts are consistent with EPO6 (no substantial or unrecoverable change in seabed quality), EPO2/EPO3/EPO4 (no injury, displacement, or disruption of biologically important behaviours of threatened or migratory species), EPO9 (no introduction of invasive marine species), and EPO10 (no unplanned discharge to the marine environment). Recovery of benthic communities 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. Compliance with the relevant EPOs ensures that temporary, localised impacts are reversible and do not result in long-term or ecosystem-level consequences.

7.21 Environmental Performance Objectives, Standards and Measurement Criteria

As detailed in the OPGGS(E)R the EP must set out the EPOs for the activity against which the performance of the titleholder in protecting the environment is to be measured. In addition, the EP must set EPSs for the control measures identified in the impact and risk assessment and include measurement criteria that the titleholder will use to determine whether each EPO and EPS is met.

The EPOs for the BassGas Operations activities are listed below (Table 7.92) with the controls and associated EPS and measurement criteria detailed in Table 7.93.

Table 7.92: Environmental Performance Objectives

Environmental Performance Objectives	
EPO1	EPO1: Undertake the activity in a manner that will not interfere with other marine users to a greater extent than is necessary for the exercise of right conferred by the titles granted.
EPO2	EPO2: No death or injury to listed threatened or migratory species from the activity.
EPO3	EPO3: Biologically important behaviours can continue while the activity is being undertaken.
EPO4	EPO4: Anthropogenic noise in biologically important areas and habitat critical to the survival of a species will be managed such that: • Any blue whale continues to utilise biologically important areas without injury and is not displaced from a foraging area. • It does not prevent any southern right whale from utilising biologically important areas or habitat critical to the survival of a species or cause auditory impairment (TTS and PTS). • Fauna use the waters around the BassGas Development without displacement or injury due to noise and vibration from offshore operations.
EPO5	EPO5: No substantial reduction of air quality within local airshed caused by atmospheric emissions produced during the activity.
EPO6	EPO6: No substantial or unrecoverable change in seabed quality which may adversely impact on biodiversity, ecological integrity, social amenity, cultural values or human health.
EPO7	EPO7: No impact to submerged cultural heritage.
EPO8	EPO8: No impact to water quality at a distance > 500 m from the vessel or rig from planned marine discharges.
EPO9	EPO9: No introduction of a known or potential invasive marine species.
EPO10	EPO10: No unplanned discharge of materials or waste to the marine environment.
EPO11	EPO11: Waste generated will be segregated and disposed of onshore in accordance with relevant legislation.
EPO12	EPO12: No spills of chemicals or hydrocarbons to the marine environment.
EPO13	EPO13: Achieve a 99% species protection level at the edge of the mixing zone: 37 m for regular operations and 247 m for descaling events, through the implementation of a comprehensive monitoring program. This program will include real-time TPH discharge monitoring, monthly trend analysis, and adaptive measures in the event of potential non-compliance, with marine toxicity assessed using the WET testing regime.

Table 7.93: Control Measures, Environmental Performance Standards and Measurement Criteria

Control Measure #	Environmental Performance Standard	Measurement Criteria
CM01: Marine Assurance Process	Beach Marine Assurance System ensures that vessels meet relevant maritime laws including to ensure discharges are in accordance with MARPOL 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 31: SOLAS and non-SOLAS Certification. Marine Order 42 Carriage, Stowage and Securing of Cargoes and Containers. Marine Order 57: Helicopter Operations. Marine Order 70 Seafarer Certification. Marine Order 91 Marine Pollution Prevention - Oil Marine Order 95 Marine Pollution Prevention – Garbage. Marine Order 96: Marine Pollution Prevention – Sewage. Marine Order 98: Marine Pollution – Anti-fouling Systems. 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 certificate and an International Energy Efficiency certificate. • A Ship Energy Efficiency Management Plan to reduce emissions. • Engine NO2 emission levels that comply with Regulation 13 of MARPOL 73/78 Annex VI. Vessels comply with the *Protection of the Sea (Prevention of Pollution from Ships) Act 1983*, which gives effect to MARPOL Annex V relating to the discharge of garbage putrescible waste. • Macerated putrescible waste (≤25 mm) is only discharged overboard when the vessel is >3 nm from the shoreline. • Un-macerated putrescible waste is only discharged overboard when the vessel is >12 nm from the shoreline and outside Yolla-A's PSZ. • For vessels without a macerator and for non-putrescible galley waste, waste is returned to shore for disposal. Platform, Rigs (Relief well) and vessels will have a Preventative Maintenance System that provides a status on the maintenance of equipment and detailed manufacturer's specification on maintenance procedures for: • Equipment detail as a control in this EP will be inspected to ensure effective operation. • Power generation and propulsion systems on vessels will be inspected to ensure efficient operation. Lighting requirements will meet the International Rules for Preventing Collisions at Sea (COLREGs) and industry standards. Workplace lighting is required to support safe working conditions at night in accordance with health and safety requirement. Combustion equipment is maintained by the manufacturer's instructions through the contractor's maintenance systems to ensure it operates efficiently	• International oil pollution prevention (IOPP) certificate is current. • Vessel Preventative Management System records verify that ◦ OWS is maintained to schedule. ◦ OWS is calibrated to schedule. • Platform Waste Management Plan (CDN/ID 3974553) is current. • Oil Record Book verifies that waste oil is transferred to shore. • Vessels (>100 t): Garbage Management Plan is current. • Shipboard Oil Pollution Emergency Plan (SMPEP) implemented. • Chemical inventories and SDS confirm deck cleaning detergents are biodegradable. • Notices to Mariners. • Vessel Communications logs. • Site inspection reports confirm: ◦ Hydrocarbon and chemical storage areas (process areas) are bunded and drain to the bilge tank (vessels) or are manually pumped to tote tanks (platform). ◦ 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). ◦ The vessel and platform crews are competent in spill response and have appropriate response resources in order to prevent or minimise hydrocarbon or chemical spills discharging overboard. ◦ Fully stocked SMPEP response kits and scupper plugs or equivalent drainage control measures are readily available and used in the event of a spill to deck to prevent or minimise discharge overboard. • Fuel-combusting equipment operates in accordance with MARPOL Annex VI (Prevention of Air Pollution from Ships) to keep emissions ALARP. • Only low-sulphur (<0.5% m/m) MDO is used in order to minimise SOx emissions.
CM02: Operational procedures	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.	• PSZ Gazettal records
	Waste will be managed in accordance with regulatory requirements and Beach's Waste Management Plan – Otway and Bass Strait Offshore (S4000AD719914) which requires 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. Waste is stored, handled and disposed of in accordance with vessel GMsP. This includes measures including: • No discharge of general operational or maintenance wastes or plastics or plastic products of any kind. • Waste containers are covered with secure lids to prevent solid wastes from blowing overboard.	• Daily Report. • Garbage record book. • Yolla-A Maintenance Management System • Platform Waste Management Plan (CDN/ID 3974553) is in place and kept current.

Control Measure #	Environmental Performance Standard	Measurement Criteria
	• All solid wastes are stored in designated areas before being sent ashore for recycling, disposal or treatment. • Any liquid waste storage on deck must have at least one barrier to minimise the risk of spills to deck entering the ocean. This can include containment lips on deck (primary bunding) and/or secondary containment measures (bunding, containment pallet, transport packs, absorbent pad barriers) in place. • Correct segregation of solid and hazardous wastes. Solid waste that is accidentally discharged overboard is recovered if reasonably practicable.	• Vessels Garbage Management Plan is in place and kept current. • Incident register/reports. • Service provider waste records. • Audit and inspection records.
	• Operating thrusters at reduced power or load levels where possible, since noise levels are significantly lower below cavitation inception speeds, with noise reductions of 5-12 dB achievable by avoiding cavitation through optimised thruster operation. • Selection of opportunistic vessels will be based on criteria that considers the activity scope and duration (including DP requirements). Where possible, the smallest vessel available will be selected to ensure safe scope delivery. • Through constant bridge watch, vessels comply with the Australian National Guidelines for Whale and Dolphin Watching for Vessels (DoEE, 2017) when working within the operational area. This means: ◦ 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. ◦ Vessel speeds within the Operational Areas will be restricted to ≤ 10 knots.	• Platform operations assessment/inspection/audit reports. • Vessel PMS records. • Wildlife incident reports. • Engineering technical reports (for flare volumes). • Personnel induction training records. • Incident register/reports. • Stakeholder consultation.
	• Bulk solids transferred in accordance with bulk transfer procedures to reduce the risk of an unintentional release bulk product (powder) to sea during tank venting. The procedures include standards for: • Certified equipment with confirmed integrity (e.g. hose and valves). • Transfer process (e.g. safety, communication, monitoring, inventory, emergency shut down procedures, procedural documents, and spill incident details). • Bunkering and bulk liquids will be transferred in accordance with bulk transfer procedures to reduce the risk of an unintentional release to sea during transfer. The procedures include standards for: ◦ Certified equipment with confirmed integrity (e.g. hose and valves). ◦ Transfer process (e.g. safety, communication, monitoring, inventory, emergency shut down procedures, procedural documents, and spill incident details) • AMSA JRCC and other marine users will be notified in the event of loss of materials with potential to affect safe navigation. • Crane transfers are undertaken in accordance with the Lifting and Load Safety Operations Procedure (CDN/ID 3674901) and under a Permit to Work (PTW).	• A licensed shore-based waste contract is in place for the management of onshore waste transport and disposal. • PTW records verify that crane transfers are undertaken in accordance with the procedure. • Platform Waste Management Plan (CDN/ID 3974553) is current. • Vessels Garbage Management Plan is current. • Platform and Vessels Vessel Preventative Management System records verify that the macerator is functional and regularly maintained or replaced. • Platform Vessel Inspection records. • Inspection/audit records verify that SMPEP kits are readily available on deck. • Training records verify that all marine crew are trained in waste and spill response. • The platform and vessels have approved SMPEPs (or equivalent appropriate to class) that are implemented in the event of a bulk LoC • Spill incident report verifies that the actions were taken in accordance with the SMPEP.
	• Combustion equipment is maintained by the manufacturer's instructions through the Beach Energy Planned Maintenance System to ensure it operates efficiently. • Flare auto-ignition, flame-out monitoring and OEM specifications back-up purge protection systems are maintained in accordance with the CMMS to minimise cold venting. • Flaring volumes are monitored so that abnormalities are rapidly detected and addressed. • Only low-sulphur (<0.5% m/m) MDO is used for the crane and diesel generator in order to minimise SOx emissions.	• Platform operations assessment/inspection/audit reports.

Control Measure #	Environmental Performance Standard	Measurement Criteria
CM03: Third-party marine users.	Beach will undertake consultation for the implementation of the EP which will include at a minimum: • The BassGas offshore infrastructure and PSZ are marked on maritime nautical charts (nautical charts Aus 150, 487 & 801). • Navigational lights are operated on Yolla-A in accordance with Navigation Act 2012 (Cth) (Chapter 6, Part 3, Division 2 – Collisions, Lights and Signals). • Beach regularly liaises with fisheries and navigation agencies to ensure they are aware of planned vessel-based inspection and maintenance activities. • The Australian Hydrographic Office and/or Maritime Safety Victoria will be notified of the vessel-based activity no less than four weeks prior to it commencing to enable the promulgation of Notice to Mariners and AusCoast navigational warnings. • Visual and radar watch is maintained on the bridge of the project vessel at all times. 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 Sea-farers [STCW95], GDMSS proficiency). • The Vessel Master issues warnings (e.g., radio warning, flares, lights/horns) to third-party vessels approaching the vessel in order to prevent a collision. Beach will undertake consultation relating to or in the event of a LOC or LOWC, actions as outline in the OPEP will be implemented.	• BassGas stakeholder engagement register. • Vessel Preventative Management System records. • Notices to Mariners. • Vessel Communications logs. • Vessel Inspection records. • Consultation Records
CM04: Beach Fair Ocean Access Procedure	Upon notification of a claim of interference, Beach will enter the details into the CMO incident management system and follow its Investigations Procedure to investigate the complaint/incident and determine whether compensation is payable to the complainant.	• BassGas stakeholder engagement register. • Vessel Preventative Management System records. • Consultation Records
CM05: Chemical Management Procedure	All chemicals that will or could be discharged to the marine environment must be assessed prior to use to ensure the lowest toxicity, most biodegradable and least accumulative chemicals are selected which meet the technical requirements of the application as per the Beach Chemical Management Procedure. • 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.	• Chemical inventories. • Chemical assessment records • Site inspection verifies that greases and chemicals are stored in a chemical locker.
CM06: Light Management Plan	• The National Light Pollution Guidelines for Wildlife (CoA 2023) provide management options for mitigating the effect of light to marine fauna and specifically seabirds that includes migratory birds. • The Light Management Plan for BassGas operational activities to reduce the impact of artificial light to seabirds turtles and migrating shorebirds, to mitigate potential harm from light exposure, attraction and disorientation, the plans include the following practices and guidance: ◦ Non-essential lights are turned off when not in use. ◦ Lighting is directed onto work areas. ◦ Window screens or blinds are closed at night. ◦ National Light Pollution Guideline for Wildlife, DCCEEW ◦ Crew environmental induction covers handling and reporting requirements for marine fauna include grounded or injured seabirds. ◦ Planned infrastructure inspection and maintenance activity will where possible consider seasonal timing to minimise adverse impact to migratory seabirds and marine fauna. • Beach will contract appropriately qualified lighting practitioners, together with an appropriately qualified marine biologist or ecologist to develop and support the implementation of a Light Management Plan as per the National Light Pollution Guidelines for Wildlife (CoA 2023).	• Light Management Plan is implemented. • Fauna interactions with lighting during operations at the Planform and during routine inspection and maintenance programs. • Assessment/inspection/audit reports that verify. ◦ Lights are directed only onto work areas and are shielded. ◦ Platform navigation lights remain functional at all times. • Wildlife incident reports. • Engineering technical reports (for flare volumes). • Personnel induction training records. • Incident register/reports.
CM07:Produced Formation Water Monitoring Program	• No discharge >127 mg/L TPH at any time.	• Production database records indicate continuous TPH monitoring in place using continuous automatic PFW analysers. • CMMS records verify that cessation of PFW discharge takes place if continuous automatic PFW analyser indicates exceedance of 127 mg/L TPH. • Incidents over-specification water are captured in the Beach incident management system.
	• Daily average no >90 mg/L TPH.	• Production database records indicate continuous TPH monitoring in place using continuous automatic PFW analysers.

Control Measure #	Environmental Performance Standard	Measurement Criteria
		• Where required, corrective action in accordance with AMF is undertaken and documented. • Incidents of daily exceedances are captured in the Beach incident management system.
	• Twice daily manual logging of the PFW TPH readings from the continuous automatic PFW analysers.	• PFW sample log verifies continuous TPH concentration monitoring is in place and logged at least twice a day at the Lang Lang Gas Plant control room.
	• TPH and BTEX concentration is verified via sampling and independent NATA accredited laboratory testing to verify accuracy of the continuous automatic PFW analyser readings. Target weekly sampling events aligned with platform manning schedule.	• LIMS spreadsheet records TPH and BTEX analysis results. • Monthly technical report documents review of lab testing and analyser results. • Where required, corrective action in accordance with AMF is undertaken and documented. • Incidents over-specification water (TPH > 127mg/L) are captured in the Beach incident management system.
	• Only low toxicity process chemicals are discharged with the PFW stream. • Routine descaling events do not exceed average of 2 per month in any 12 month period. • Chemical inventory verifies only low toxicity ((i.e., PLONOR, 'D'/'E' (non-CHARM) or 'Gold'/'Silver' (CHARM) OCNS-rated) process chemicals discharged within the PFW stream.	• Chemical inventories. • Chemical assessment records • Introduction of new process chemicals is assessed in accordance with OEMS MOC processes.
	• Total PFW volume is monitored daily and recorded to ensure the worst-case volume (300 m^3/day) used for plume modelling is not exceeded (with alarm set at 300 m^3/day).	• Production database records daily PFW discharge total volume and confirm volume does not exceed 300 m^3/day. • CMMS records verify that cessation of PFW discharge takes place if discharge rate is >300 m^3/day. • Incidents of a PFW discharge rate >300 m^3/day are captured in Beach incident management system.
	• PFW characterisation testing is undertaken six-monthly. • Constituents of the PFW meet the ANZG 2018 guidelines at the mixing zone boundary (based on modelled dilutions). • NOTE: In accordance with application of the AMF following the introduction of descaling activity, sampling program for 2026 to include 2 x post descaling and 2 x normal operations characterisation testing with a decision to revert to baseline testing frequency to be determined based on review of results.	• LIMS spreadsheet records characterisation testing results. • Characterisation report reviewed by environmental specialist to ensure no significant change or exceedance of the ANZG guideline values at the mixing zone boundary is documented. • Where required, corrective actions or modifications to testing frequency are determined in accordance with AMF and are documented.
	• Competent operators manage the PFW system in accordance with Yolla-specific requirements.	• Training records verify operators' competency to manage the PFW system. • Induction records confirm that all operators are inducted into the PFW training module.
	Sampling and Verification Monitoring • PFW WET testing is undertaken annually, or as triggered via the AMF, to ensure that the data used to calculate the mixing zone remains current. • NOTE: In accordance with application of the AMF following the introduction of descaling activity, PFW WET testing program for 2026 to include 1 x post descaling and 1 x normal operations testing with a decision to revert to baseline testing frequency to be determined based on review of results.	• WET testing results database indicating yearly (minimum requirement) frequency. • WET testing review by environmental specialist is documented. • Where required, corrective actions or modifications to testing frequency are determined in accordance with AMF and are documented.
	• PFW plume dispersion verification monitoring is undertaken every 5 years or as triggered via AMF, to ensure that data used to calculate the mixing zone remains current.	• PFW plume dispersion modelling reports are available on the Beach document management system.

Control Measure #	Environmental Performance Standard	Measurement Criteria
		• Record of review of plume dispersion verification by environmental specialist is undertaken and documented. • Where required, corrective action in accordance with AMF are undertaken and documented.
	• Sediment sampling undertaken every 5 years to characterise sediment quality and impacts that may be attributable to the PFW discharge.	• Sediment sampling report is available on the Beach document management system. • Reviewed by environmental specialist to assess that impact is consistent with previous results.
	Reporting • Instances where analyser or laboratory testing results of TPH >127 mg/L or TPH >90 mg/L daily average or total PFW discharge volume is over 300 m^3/day are reported to NOPSEMA in the monthly recordable incident report.	• Monthly recordable incident reports.
CM08: Whale Management Procedure	The Whale Management Procedure outlines specific measures to minimise anthropogenic noise threats to relevant species, including the implementation of safe operating distances between vessels and whales, pre-activity surveys for specific activities, night-time and low visibility controls and establishment of safe points for operational activities. The procedure assumes that once an activity is underway foraging whales that enter the pre-activity survey zone are not displaced as foraging behaviour has not been disrupted as the whale has commenced or continued foraging and thus aligns with the Conservation Management Plan for the Blue Whale (DoE, 2015b) and DAWE (2021a) definitions. Prior to an activity commencing a pre-activity survey will be undertaken of the activity survey zone for the activity: • Resupply, Inspection, Maintenance, and Repair ◦ OSV – 6 km ◦ AHTS – 22 km • Inspection, Maintenance, and Repair ◦ OSV – 6 km ◦ AHTS – 22 km The activity survey zones are based on the distance to the furthest modelled PTS, TTS, or behaviour criteria (Section 7.5), and have been rounded up to account for the accuracy of distance estimation at sea. 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.	• Records show the Whale Management Procedure was implemented • Records show pre-start actions, start criteria, night-time and low visibility arrangements and noise control actions implemented in accordance with the Whale Management Procedure
CM09: *EPBC Regulations 2000 – Part 8 Division 8.1* Interacting with Cetaceans Requirement	Vessels and Whales - Vessel operators during vessel operations, well completions and well intervention sub-activities shall adhere to the distances and vessel management practices of EPBC Regulations (Part 8, Division 8.1) and report vessel interactions with whales, specifically: • Do not approach a whale. • Maintain a distance of 300m from a whale. • If a whale approaches the vessel try to maintain the separation distances without changing direction or moving into the path of the animal. Vessels and Dolphins - Vessel operators during vessel operations, well suspension and well intervention sub-activities shall adhere to the distances and vessel management practices of EPBC Regulations (Part 8, Division 8.2) and report vessel interactions with dolphins specifically: • Do not approach a dolphin • Maintain a distance of 150m from a dolphin (with the exception of bow riding) • If a dolphin approaches the vessel try to maintain the separation distances without changing direction or moving into the path of the animal. Helicopters and Whales and Dolphins - Helicopters will not fly lower than 1650 ft when within 500 m horizontal distance of a cetacean except when landing or taking off and will not approach a cetacean from head on)EPBC Regulations (Part 8, Division 8.3).	Records show the Whale Management Procedure was implemented

Control Measure #	Environmental Performance Standard	Measurement Criteria
CM10: Air Quality and GHG emissions	Beach Energy, 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 baseline) across its portfolio. Beach Energy has implemented a GHG Management Plan that details the following: • Methodology for recording and 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.	• Annual emissions and energy reporting as required under the NGER Act 2007 • Consultation Records • Annual Company reports such as Sustainability Report
CM11: Procurement Vetting Process	Beach via its Procurement Vetting Process will ensure the appropriately licenced waste handling contractor and appropriately licenced waste facility contracted to Beach, Beach's Waste Management Plan – Otway and Bass Strait Offshore (S4000AD719914) and relevant regulatory requirements. Beach via its Procurement Vetting Process (assesses suppliers emissions management and via this process would procure low emission vessels if available. Beach undertakes a pre-qualification of all contractors to ensure contractor legal obligations are met including vessel operators must comply with the most recent version of the Australian Ballast Water Management Requirements. Beach via its Procurement Vetting Process will ensure the appropriately licenced vessel and vessel contractor is contracted to meet the requirements of Operations Activities and follow the relevant Beach OEMS.	Procurement vetting records
CM12: Beach Offshore Oil Pollution Emergency Plan	• Emergency spill response capability is maintained in accordance with the NOPSEMA accepted OPEP. • Implement spill response in accordance with relevant EPOs and EPSs in the accepted OPEP. If a LOC or LOWC occurs, the OPEP will be implemented. The Offshore OPEP is developed to support all Beach activities offshore Victoria and includes response arrangements for a worst-case LOC / LOWC scenario from the activity. ◦ The OPEP includes Tactical Response Plans (TRPs) for identified protection priority areas within the region. ◦ Emergency spill response capability is maintained in accordance with the NOPSEMA accepted OPEP. ◦ Implement spill response in accordance with relevant EPOs and EPSs in the accepted OPEP.	• Beach Offshore Oil Pollution Emergency Plan is current. • Emergency Response training and testing regime is established • Debrief and Continual improvement proceses are in placed. • Beach Source Control Contingency Plan (SCCP), inclusive of Relief Well Plan is current. • Relief Well Plan Audit and test records.
CM13: Beach Offshore Operational and Scientific Monitoring Plan	• Operational and scientific monitoring capability is maintained in accordance with the NOPSEMA accepted OSMP. • Implementation strategies provide for monitoring of an oil pollution emergency. The OSMP details operational monitoring to inform response planning and scientific monitoring to inform the extent of impacts from hydrocarbon exposure and potential remediation requirements.	• Beach Operational and Scientific Monitoring Plan is current.
CM14: Beach Domestic IMS Biofouling Risk Assessment Process	Vessels, Rigs and support vessels mobilised from domestic waters to undertake activities within the Operational Areas will complete the Beach Domestic IMS Biofouling Risk Assessment Process as detailed in the Beach Introduced Marine Species Management Plan (S400AH719916) prior to the initial mobilisation into the Operational Areas. The Beach Domestic IMS Biofouling Risk Assessment Process: • Validates compliance with regulatory requirements (Commonwealth and State) in relation to biosecurity prior to engaging in activities within the Operational Areas. • Identifies the potential IMS risk profile of vessels and submersible equipment prior to deployment within the Operational Areas. • Identifies potentially deficiency of IMS controls prior to entering the Operational Areas. • 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 Areas).	• Domestic IMS Biofouling Risk Assessment records
CM15: Source Control Contingency Plan (SCCP), inclusive of Relief Well Plan	• The SCCP will be consistent with the International Oil and Gas Producers (IOGP) Report 594 - Subsea Well Source Control Emergency Response Planning Guide for Subsea Wells (2019). • The BassGas Relief Well Plan is current and maintained for immediate activiation.	• Beach Source Control Contingency Plan (SCCP), inclusive of Relief Well Plan is current. • Well integrity audit and inspection records
CM16: Well Operations Management Plan	• BassGas WOMP details well barriers and the integrity testing in compliance to regulations and industry standards.	• BassGas Well Operations Management Plan is current • Well integrity audit and inspection records

Control Measure #	Environmental Performance Standard	Measurement Criteria
CM17: NOPSEMA accepted Safety Case	Offshore Petroleum and Greenhouse Gas Storage (Safety) Regulations 2009 set out the requirements for safety cases. The Yolla-A platform and RGP and Safety Case demonstrate how the risks to the integrity of the platform, pipeline and subsea facilities will be reduced to as low as reasonably practicable (ALARP). The safety case: • Identify the hazards and risks. • Describe how the hazards and risks are controlled. • Describe the management system in place to ensure the controls are effectively and consistently applied. • Describe the operation, monitoring, inspection and maintenance of the platform, pipeline and subsea facilities. • Describe the leak detection, and emergency shutdown and isolations systems to reduce the extent of loss of containment of hydrocarbons in the event of a loss of containment of the platform, pipeline or subsea facilities.	• BassGas Safety Case is current • Pipeline integrity audit and inspection records

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 and has been developed using the principles of the IOGP Report 510.

The OEMS consists of 5 Management Standards Table 7.94 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 7.21: Beach Energy's Environment Policy

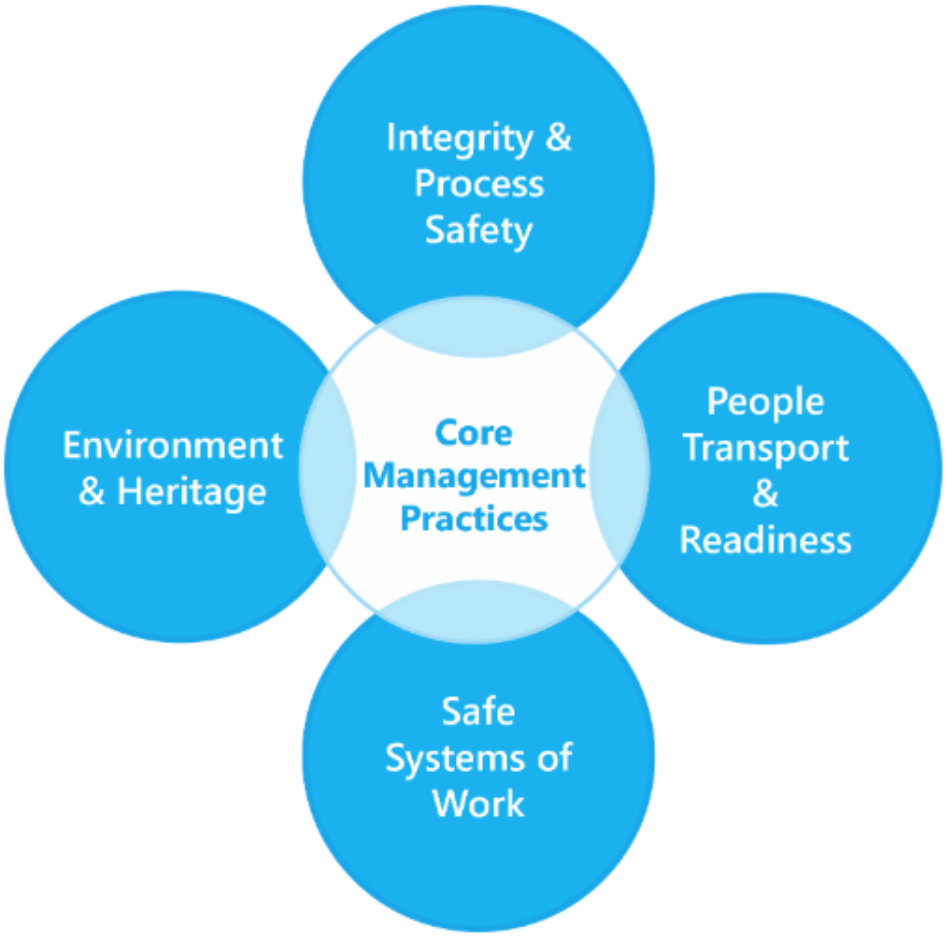


Figure 7.22: Beach OEMS

Table 7.94: 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

8.1.1 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.

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8.1.1.1 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 8.2.

8.1.1.2 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.

8.1.1.3 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 8.3.4.

8.1.1.4 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 8.3.1.

8.1.1.5 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 8.4.

8.1.1.6 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 8.3.2 and 8.3.3.

8.1.2 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.

8.1.2.1 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 8.5.3.

8.1.3 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.

8.1.3.1 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 8.2.2.

8.1.4 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.

8.1.4.1 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 8.1.6.

8.1.5 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.

8.1.5.1 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 8.1.6.

8.1.5.2 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.

8.1.5.3 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 8.3.8.

8.1.6 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.

8.1.6.1 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 7.95 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 7.95: 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.

Section	Description
	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/submersilbe equipment mobilisation by land or freight Ballast water

8.1.6.2 Chemical Management Plan (CDN/ID S4000AD719917)

All chemicals and hazardous materials are managed as per the Chemical Management Plan (S4000AD719917), which details the procedure to be followed by Beach Energy staff and their contractors for the selection, evaluation and approval of chemicals that are planned to be discharged during offshore campaigns.

This process includes the completion of a risk assessment to ensure that the impacts and risks associated with offshore discharge are reduced to ALARP. The risk assessment process considers aquatic toxicity, bioaccumulation and persistence data, along with the discharge concentration, duration, frequency, rate, and volume. Approval is recorded in ChemAlert.

Figure 7.23 provides a summary of the offshore chemical environmental risk assessment process.

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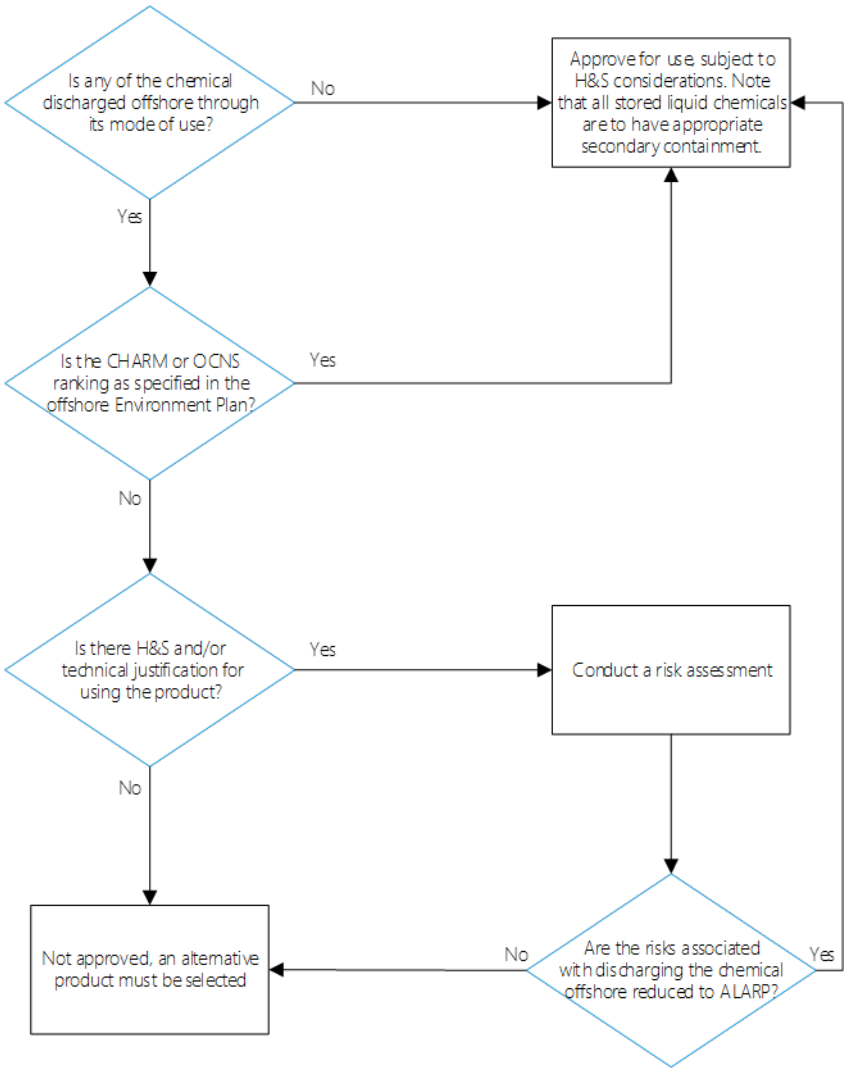


Figure 7.23: Summary of the offshore chemical environmental risk assessment process

8.1.6.3 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 8.3.8.

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 7.XX (List all appropriate RA sections) are implemented.

8.1.6.4 Whale Management Procedure (CDN/ID 19061955)

The Whale Management Procedure (WMP) details how Beach will avoid and minimise anthropogenic noise to whales undertaking biologically important behaviours during the Bass Gas operations that are the subject of this EP. Implementation of the WMP will ensure 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.

8.1.6.5 Light Management Plan Implementation Requirements (V-1000-01-MP-0003)

The Offshore Victoria Light Management Plan Implementation Requirements details the requirements for:

- The development of vessel specific Light Management Plans (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.

8.2 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.

8.2.1 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 **Error! Reference source not found.**.

Roles and responsibilities for an oil pollution emergency response are described in the OPEP.

Table 7.96: Roles and responsibilities for key role for the EP implementation

Role	Responsibilities
Onshore	
Executive Vice President Onshore and Offshore	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.
General Manager Offshore	Ensures: • Compliance with the Environment Policy, regulatory and other requirements, and this EP. • Communication regarding HSE issues as per Section 8.2.4. • Whale Management Procedure is implemented, records obtained, and reporting undertaken. • Records associated with activities are maintained as per Section 8.5.3. • 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 8.3.2 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 8.3.4. • Incidents are managed and reported as per Section 8.3.1. • Leads the investigation and reporting of any environmental incidents. • EP Performance Report is submitted to NOPSEMA as per Section 8.3.10. • 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 8.3.4. • Oil spill response arrangements are tested as per the OPEP. • Audits and inspections are undertaken in accordance with Section 8.3.3.
Bass Gas Production Manager	Activities are carried out in accordance with regulatory requirements and this EP. Ensure the OEMS plans and procedures are implemented for Bas Gas offshore operations. All personnel are competent to fulfil their designated role.

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Role	Responsibilities
	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 8.3.1. Emissions and discharges identified in Section 8.3.8 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 8.3.4. Inspections and monitoring are undertaken to ensure ongoing compliance with the EP as per Section 8.3.3 and communicate outcome and any non-conformance to General Manager Offshore.
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 7.12.8 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 8.12.2 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 7.8.1. • Incidents are managed and reported as per Section 7.10.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 7.8.1
General Manager Health, Safety and environment	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.
Senior Environmental Advisor	Maintains 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 8.3.2 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: • Coordinate the training and implementation of the Whale Management Procedure offshore.

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Role	Responsibilities
	• 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 8.5.1) 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 8.3.1. • Emissions and discharges identified in Section 8.3.8 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 8.3.4. • Inspections are undertaken to ensure ongoing compliance with the EP as per Section 8.3.3.
Vessel Masters	Ensure: • Vessel operations are carried out in accordance with regulatory requirements and this EP.

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Role	Responsibilities
	• 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 8.3.8 are recorded and provided to Activity Manager. • Environmental incidents are reported to Activity Manger within required timeframes as per Section 8.3.1. • 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 8.3.4. • 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.

8.2.2 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 8.5.3. 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.

8.2.3 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

8.2.4 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.

8.3 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.

8.3.1 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.

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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 8.3.2 and 8.3.3.

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 8.3.4.

Notification and reporting requirements for environmental incidents to external agencies are provided in Table 7.97

Table 7.97: 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 • 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.	Before the 15th day of the following calendar month	NOPSEMA – submissions@nopsema.gov.au	General Manager Offshore
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.			

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Requirement	Timing	Contact	Responsible Person
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	NOPSEMA – 1300 674 472 NOPSEMA – submissions@nopsema.gov.au DEECA ERR (Vic)– ERRChiefInspector@ecodev.vic.gov.au (0419 597 010) EPA (Tas): incidentresponse@epa.tas.gov.au (1800 005 171) NOPTA – reporting@nopta.gov.au	General Manager Offshore
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	NOPSEMA – submissions@nopsema.gov.au	General Manager Offshore

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Requirement	Timing	Contact	Responsible Person
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	DEECA ERR (Vic)– ERRChiefInspector@ecodev.vic.gov.au (0419 597 010) EPA (Tas): incidentresponse@epa.tas.gov.au (1800 005 171) NOPTA – reporting@nopta.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	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/	Vessel Master
Australian Marine Park (AMP) In the event an AMP may be exposed to hydrocarbons	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	DCCEEW – online National Ship Strike Database https://data.marinemammals.gov.au/report/shipstrike	Vessel Master
	ASAP for cetacean injury assistance	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	DCCEEW – 1800 803 772 EPBC.Permits@environment.gov.au	Team Lead Environment

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Requirement	Timing	Contact	Responsible Person
Suspected or confirmed Invasive Marine Species introduction	Verbal notification ASAP	Agriculture Victoria 136 186 marine.pests@agriculture.vic.gov.au DRET Invasive Species Branch 03 6165 3777 invasivespecies@nre.tas.gov.au	Team Lead Environment
Identification of any historic shipwrecks, aircraft, or relics	Written notification within 1 week	Written notification via the notification of discovery of an historic shipwreck or relic online submission form. Notification to the Victorian Department of Transport and Planning, Planning Implementation and Heritage Department via email. Notification to the Tasmanian Parks and Wildlife Service, via email.	General Manager Offshore
Identification of any First Nations cultural heritage relics or sites	Online notification within 24 hours after identification	DCCEEW Australasian Underwater Cultural Heritage Database, online Notification of Discovery of Underwater Cultural Heritage online form.	General Manager Corporate Affairs or First Nations Engagement Manager
Identification of any unexploded ordnance	Written notification within 1 week	Written notification via email to offshore.petroleum@defence.gov.au	General Manager Offshore

8.3.2 EP Assurance

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 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 8.3.4.

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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 7.98.

Table 7.98: 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 8.3.1.	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 8.3.5.	As required	General Manager Offshore with support from Senior Environmental Advisor
EP Performance Report covering: Review of EPOs and EPSs. See Section 8.3.10.	Annually	Senior Environmental Advisor
Activity emissions and discharge records See Section 8.3.8.	As detailed in Section 8.3.8.	General Manager Offshore

8.3.3 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 8.3.4.

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 8.3.1.

The assurance checks inform the annual performance report submitted to the relevant regulator as per Section 8.3.10.

8.3.4 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 7, and triggers a regulatory requirement to revise this EP, the revision shall be defined, endorsed, completed and communicated in accordance with the MoC Procedure.

8.3.5 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 7.
- 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 8.5.1.

Any revisions to the EP are to be assessed against the criteria for submission of a revised EP to NOPSEMA as detailed in Section 8.3.6 and MoC as per Section 8.3.4 shall be evaluated.

8.3.6 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 7.99.

Table 7.99: 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.

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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 7.

Increased impact or risk – one with greater extent, severity, duration, or uncertainty than is detailed in Section 7.

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 7.
- The change affects the ability to achieve the EPO and EPS contained in Section 7.

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 7.
- 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).

8.3.7 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 8.5.3).

8.3.8 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 7.4

Table 7.100 details the types of emissions and discharges that shall be recorded including the monitoring method and frequency of reporting. Air emissions (from fuel combustion) are reported annually as part of statutory *National Greenhouse and Energy Reporting Act* (NGER) 2007 reporting and National Pollution Inventory (NPI) reporting.

Table 7.100: 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 (in accordance with Produced Formation Water Sampling and Testing Procedure (CDN/ID 10020479))	TPH	Production database	Continuously via the two continuous automatic PFW analysers	BassGas Production Manager
			Twice daily manual logging of continuous automatic PFW analyser reading	BassGas Production Manager
	TPH, BTEX and phenol	PFW sample log	Target weekly sampling events 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 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

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Emission / Discharge	Monitoring parameter	Recording Method	Frequency	Responsibility
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

8.3.9 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.

8.3.10 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.

8.4 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.

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8.4.1 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 7.24 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 7.101.

The key emergency response arrangements for the activity are outlined below.

8.4.2 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.

8.4.3 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.

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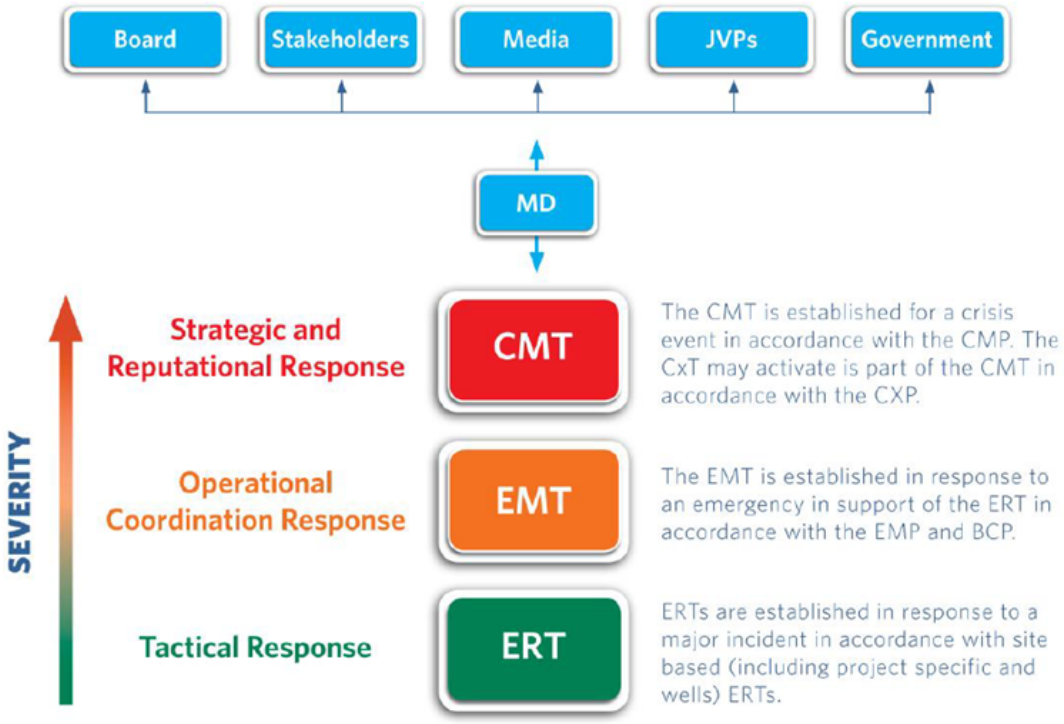


Figure 7.24: Beach Crisis and Emergency Management Framework

Table 7.101: 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.

8.4.4 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 8.3.3 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.

8.4.5 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).

8.4.6 Testing of Spill Response Arrangements

The OPEP details the oil spill response testing arrangements.

8.5 Consultation and Compliance

8.5.1 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 8.3.4).

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 7.102 details the ongoing consultation requirements for the activities described in this EP.

Table 7.102: 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

8.5.2 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 7.103.

Table 7.103: 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 8.1.1, 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 8.1.1, OEMS 1.6 and Section 8.3.5
(c) environmental performance outcomes and environmental performance standards in the environment plan are being met.	Section 8.1.1, OEMS 1.6 and Sections 8.3.2 and 8.3.3.
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 implementation, management and review of the environment plan, including during emergencies or potential emergencies.	Section 8.2.1 and 8.4.1
(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 8.2.2, 8.2.3 and 8.2.4
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 8.3
(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 8.3
(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 8.3.10
Oil pollution emergency response	
(8) The implementation strategy must contain an oil pollution emergency plan and provide for the updating of the plan.	Section 8.4.4 (detail within OPEP)
(9) The oil pollution emergency plan must include adequate arrangements for responding to and monitoring oil pollution, including the following:	Section 8.4.4 (detail within OPEP)

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OPGGS(E)R	EP Implementation Strategy Section
(a) the control measures necessary for timely response to an emergency that results or may result in oil pollution;	Section 8.4.4 (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 8.4.4 (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 8.4.4 (detail within OPEP)
(d) the arrangements and capability in place for monitoring oil pollution to inform response activities.	Section 8.4.4 (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 8.4.5 (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 8.4.4 (detail within OPEP)
(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 8.4.6 (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 8.4.6 (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 8.4.6 (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 8.5.1

OPGGS(E)R	EP Implementation Strategy Section
(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 8.5.2 and 8.5.4

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 7 and specifically details the environmental requirements pertaining to each aspect. The assurance processes described in Section 8.3 ensures periodic review to ensure that controls are implemented and to ensure ongoing compliance.

8.5.3 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.

8.5.4 OPGGS Act 2006 – Maintenance and removal of property

Under subsections 572(2) and 572(3) 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. Table 7.104 summarises how the activities will comply with section 572 of the OPGGS Act.

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. Planning for decommissioning is covered in Section 3.10 of this EP.

Table 7.104: Compliance with OPGGSA – maintenance and decommissioning

Assessment of compliance OPGGSA Section 572 (Maintenance and removal of property etc by titleholder)	
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 with section 572(2) will be achieved by Beach's integrity, Maintenance and repair programs (refer Section 3.7 of this EP).
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 3.10 of this EP and would be the subject of activity specific EP(s).
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	

Assessment of compliance OPGGSA Section 572 (Maintenance and removal of property etc by titleholder)	
NOPSEMA or the responsible Commonwealth Minister under: (i) Chapter 3; or (ii) this Chapter; and (d) any other law	
Assessment of compliance OPGGSA Section 270 (Consent to surrender title)	
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 3.10 of this EP indicting that preparation of activity specific EP(s) demonstrating compliance with Section 270(3).

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10. Appendices

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A. 2. Appendix 2 - Report on Consultation - 14 July to 29 November 2025

A. 3. Appendix 3 - Sufficient Information, 2025

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A. 12. Appendix 12 - BassGas Site Specific Dilution Factor and Revised Mixing Zone Report, 2025

A. 13. Appendix 13 - BassGas ALARP Assessment Removing calcite scale from Production System, 2025