Plan

CDN/ID S4000AD719712

Environment Plan

Otway Development

Pre-Drilling Anchoring Program

Revision	Date	Reason for issue	Reviewer/s	Author	Approver
0a	09/03/2020	For NOPSEMA assessment	PW	GP	PW
0	02/03/2020	For NOPSEMA completeness check	GP	PS	PW
A	26/02/2020	Draft for Beach review	GP	PS	PW

Review due	Review frequency
Not applicable – single activity only	

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

Document Information and History

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Document history

Rev	Date	Changes made in first document	Reviewer/s	Consolidator	Approver
0a	09/03/2020	Issued to NOPSSEMA for assessment after completeness check	NOPSEMA	Aventus Consulting	P. Wemyss
0	02/03/2020	Issued to NOPSEMA for assessment	NOPSEMA	Aventus Consulting	P. Wemyss
A	25/02/2020	Draft for internal review	P. Wemyss, M. Porter, W. Ralph	Aventus Consulting	N/A

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Acronyms

Acronym	Definition
AFMA	Australian Fisheries Management Authority
AFZ	Australian Fishing Zone
AHO	Australian Hydrographic Office
AHTS	Anchor Handling and Tug Supply
ALARP	As Low as Reasonably Practicable
AMOSC	Australian Marine Oil Spill Centre
AMP	Australian Marine Park
AMSA	Australian Maritime Safety Authority
APPEA	Australian Petroleum Production and Exploration Association
ASAP	As Soon As Practicable
Bbl	Barrel
Beach	Beach Energy Limited
BIA	Biologically Important Area
BOM	Bureau of Meteorology
BWMC	Ballast Water Management Certificate
BWMP	Ballast Water Management Plan
BWTS	Ballast Water Treatment System
CMT	Crisis Management Team
COLREG	Convention on The International Regulations for Preventing Collisions at Sea
CFSR	Climate Forecast System Reanalysis
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DELWP	Victorian Department of Environment, Land, Water and Planning
DPIPWE	Tasmanian Department of Primary Industries, Parks, Water and Environment
DJPR	Victorian Department of Jobs, Precincts and Regions
DNP	Commonwealth Director of National Parks
DAWE	Commonwealth Department of Agriculture, Water and the Environment (formerly DoEE)
DoEE	Commonwealth Department of the Environment and Energy
DP	Dynamic Positioning
DSEWPaC	Commonwealth Department of Sustainability, Environment, Water, Population and Communities
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EMBA	Environment That May Be Affected
EMPCA	*Environmental Management and Pollution Control Act 1994*
EMT	Emergency Management Team
EP	Environment Plan

EPA	Environmental Protection Authority
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
EPO	Environment Performance Outcome
EPS	Environment Performance Standard
ERT	Emergency Response Team
ESD	Ecologically Sustainable Development
ETBF	Eastern Tuna and Billfish Fishery
HFO	Heavy Fuel Oil
HLV	Heavy Lift Vessel
HSE	Health, Safety and Environment
HSEMS	Health, Safety and Environment Management System
Hz	Hertz
IAPP	International Air Pollution Prevention
IBRA	Interim Biogeographic Regionalisation for Australia
IC	Incident Commander
IMCRA	Integrated Marine and Coastal Regionalisation of Australia
IMO	International Maritime Organisation
IMS	Invasive Marine Species
IOGP	International Association of Oil and Gas Producers
IUCN	International Union for Conservation of Nature
JRCC	Joint Rescue Coordination Centre
KEF	Key Ecological Feature
Lattice	Lattice Energy Limited (100% owned by Beach)
LOC	Loss of Containment
MAE	Major Accident Event
MARPOL	International Convention for The Prevention of Pollution from Ships
MC	Measurement Criteria
MDO	Marine Diesel Oil
MDRT	Measure Depth Rotary Table
MNES	Matters of National Environmental Significance
MNP	Marine National Park
MO	Marine Order
MOC	Management of Change
MP	Marine Park
MT	Metric Tonne
NatPlan	National Plan for Maritime Environmental Emergencies
NEBA	Net Environmental Benefit Analysis

NOPSEMA	National Offshore Petroleum Safety and Environmental Management Authority
OGP	Otway Gas Plant
OGUK	Oil and Gas UK
OPEP	Oil Pollution Emergency Plan
OPGGS Act	Offshore Petroleum and Greenhouse Gas Storage Act 2006
OPGGS(E)R	Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (Commonwealth)
OSMP	Operational and Scientific Monitoring Plan
OSTM	Oil Spill Trajectory Modelling
OWR	Oiled Wildlife Response
PDG	Permanent Downhole Guage
PHG	Pre-hydrated Gel
PMS	Planned Maintenance System
POLREP	Marine Pollution Report
POWBONS Act	Pollution of Waters by Oil and Noxious Substances Act 1986
RO	Reverse Osmosis
ROV	Remotely Operated Underwater Vehicle
SBTF	Southern Bluefin Tuna Fishery
SCCP	Source Control Contingency Plan
SEEMP	Ship Energy Efficiency Management Plan
SEL	Sound Exposure Level
SEMR	South-East Marine Region
SESSF	Southern and Eastern Scalefish And Shark Fishery
SETFIA	South East Trawl Fishing Industry Association
SIMAP	Spill Impact Mapping Analysis Program
SIV	Seafood Industry Victoria
SMP	Scientific Monitoring Program
SMPEP/SOPEP	Shipboard Marine/Oil Pollution Emergency Plan
SMS	Scientific Monitoring Study
SPF	Small Pelagic Fishery
SPL	Sound Pressure Level
TEC	Threatened Ecological Community
TSSC	Threatened Species Scientific Committee
TTS	Temporary Threshold Shift
VLSFO	Very Low Sulphur Fuel Oil

1 Overview of the Activity

Beach Energy (Operations) Limited (Beach), proposes to drill up to six development wells and abandon three existing subsea wells (and potentially unsuccessful development wells) in Commonwealth waters of the Otway Basin.

Prior to drilling the first well of the campaign, it is planned that an Anchor Handling Tug Support (AHTS) vessel will pre-lay the anchors and mooring lines of the mobile offshore drilling unit (MODU); this is the scope of this EP and is referred to as the anchoring program (or the 'petroleum activity'). The closest point to shore for the anchoring program is approximately 66 km from Port Campbell off Victoria's southwest coast. The anchoring activities will be in water depths ranging from approximately 100 m to 105 m.

The operational area for the anchoring program is defined as a 2 km radius around the TN-1 and TW-1 well site (with both 2 km zones intersecting each other).

The anchoring program is planned to commence in Q1 or Q2 2020 and will take up to one week.

Activities included in the scope of this EP are detailed in Chapter 4.

1.1 Environment Plan Summary

This Environment Plan (EP) Summary has been prepared from material provided in this EP. The summary in Table 1-1 is required by Regulation 11(4) of the Commonwealth Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (OPGGS(E)R).

Table 1-1: EP Summary of material requirements

EP Summary Material Requirement	Relevant Section of EP
The location of the activity	Section 4.1
A description of the receiving environment	Chapter 5
A description of the activity	Chapter 4
Details of the environmental impacts and risks	Chapter 7
The control measures for the activity	Chapter 7
The arrangements for ongoing monitoring of the titleholder's environmental performance	Chapter 8
Response arrangements in the oil pollution emergency plan	Refer to OPEP
Consultation already undertaken and plans for ongoing consultation	Chapter 9
Details of the titleholders nominated liaison person for the activity	Section 2.2

2 Introduction

This document has been prepared to meet the requirements of an EP under the OPGGS(E)R. It addresses the activities relating to the pre-laying of anchors at the Thylacine field in Commonwealth waters of the Otway Basin off the southwest coast of Victoria. This activity is proposed to be undertaken in late March 2020, approximately six weeks prior to the drilling of the Thylacine wells. The proposed drilling of the wells is part of a separate application to NOPSEMA.

The Otway Development Anchoring Program will be undertaken within Permit T/L2. Figure 2-1 illustrates the two potential anchoring locations. The anchors will only be pre-laid at one of these locations.

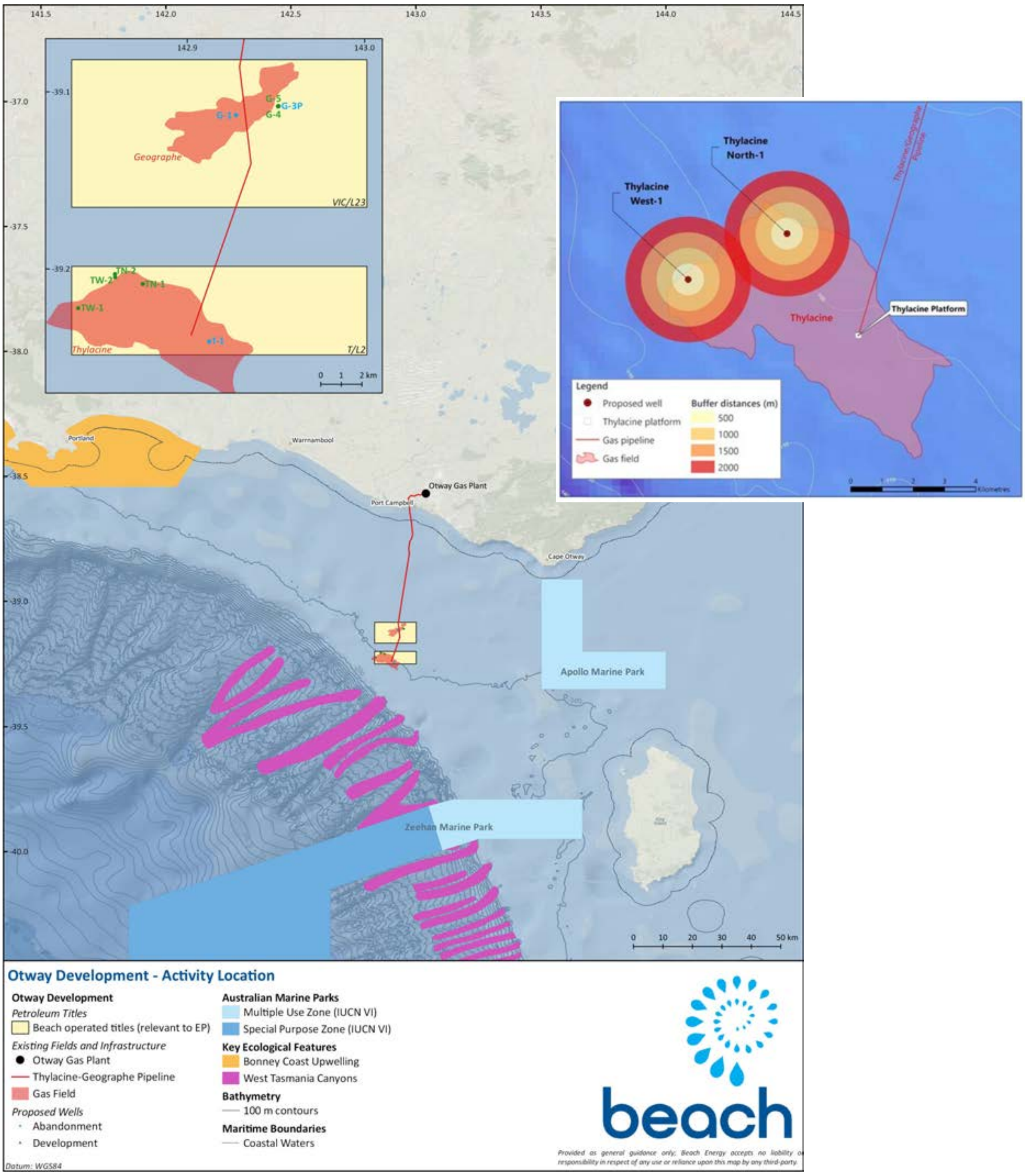


Figure 2-1: Otway development and pre-drilling anchoring activity location

2.1 Background

Beach has several gas producing assets in the Otway Basin. To date, three development phases have been completed to support natural gas supply via the onshore Otway Gas Plant (OGP):

- Phase 1: OGP and Thylacine offshore platform;
- Phase 2: Inlet Gas Compression; and
- Phase 3: Geographe Subsea Development.

To maintain continued economic natural gas production, further phases to develop additional offshore wells are being investigated.

2.2 Titleholder and liaison person details

The titleholder is Beach Energy Limited (Beach). Beach acquired Lattice (previously named Origin Energy Resources Limited (Origin)) on 31 January 2018. Subsequently in January 2020 Beach completed a name change of Lattice Energy to Beach Energy as owner and operator of VIC/L23 and T/L2 Production Licence/Permits and associated Access Authorities and existing consents.

Beach is an ASX-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 producing 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, the Taranaki and Canterbury basins of New Zealand.

Beach Energy is the titleholder, however the existing Lattice Health, Safety and Environment Management System (HSEMS) will be used for this activity. The Lattice HSEMS is consistent with Beach's Environmental Policy. The Lattice HSEMS has been developed considering Australian/New Zealand Standard ISO 14001:2004 Environmental Management Systems. As a member of the Beach group, these systems may be referred to in this application as 'Beach'.

The Lattice HSEMS is based on the continual improvement methodology of 'plan-do-check-act'. The elements of the continual improvement loop are executed through a set of standards which interpret, support and provide further details to the requirements of the HSE policy.

In accordance with Regulation 15(3) of the OPGGS(E)R, Beach shall notify the Regulator (the National Offshore Petroleum Safety and Environmental Management Authority, NOPSEMA) of a change to the 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 during the proposed activity.

Table 2-1: Details of titleholder and liaison person

Petroleum Title	Details	
T/L2	Titleholder	Beach Energy (Operations) Limited
	Business address	Level 8, 80 Flinders Street Adelaide South Australia 5000
	Telephone number	(08) 8338 2833

Petroleum Title	Details	
	Fax number	(08) 8338 2336
	Email address	info@beachenergy.com.au
	Australian Company Number	099 899 395
Titleholder Liaison Person		
Mr Mika Porter Lead Drilling Engineer	All details as above	

3 Applicable Requirements

This section provides information on the requirements that apply to the activity, in accordance with Regulation 13(4) of the OPGGS(E)R. Requirements include relevant laws, codes, other approvals and conditions, standards, agreements, treaties, conventions or practices (in whole or part) that apply to the jurisdiction that the activity takes place in.

The proposed activity is located within Commonwealth waters. Commonwealth legislation (including relevant international conventions) and other requirements relevant to anchoring activities are summarised in Table 3-1.

3.1 EPBC Act Primary Approval

Woodside Petroleum Ltd, as the original operator of the Otway Development, submitted an Environmental Impact Statement (EIS) under the EPBC Act for the Otway Development which was approved by the Minister of the Environment in 2004 (EPBC 2002/621). In March 2010, Origin Energy Resources Ltd commenced operatorship of the development (later changing its name to Lattice Energy Limited (Lattice)). In February 2018, Beach acquired Lattice, which included the acquisition of the Otway Development.

The scope of this EP consists of an anchoring program required prior to drilling.

The associated Otway Drilling and Well Abandonment Plan (CDN/ID S4100AH717905), currently with NOPSEMA for assessment, describes the linkages between the 2004 EPBC Act approval and the Otway drilling and abandonment campaign.

In brief, the proposed activity does not trigger a requirement for further approval under the EPBC Act (as would be met though an offshore project proposal) given the Environment Minister has approved, under Part 9 of the EPBC Act an equivalent action approved by the Minister under existing approval EPBC (2002/621) consistent with regulation 9(3)(b)(iii) of the OPGGS(E) Regulations 2009.

3.2 EPBC Act Requirements

This EP considers the impacts to matters of national environmental significance (MNES) protected under Part 3 of the *Environment Protection and Biodiversity Conservation Act* 1999 (EPBC Act). Relevant requirements associated with the EBPC Act, related policies, guidelines, plans of management, recovery plans, threat abatement plans and other relevant advice issued by the Department of the Environment and Energy (DoEE), now the Department of Agriculture, Water and the Environment (DAWE), are detailed throughout Chapter 5 as part of the description of the existing environment.

3.3 Victorian Legislation

Although activities under this EP are located entirely in Commonwealth waters, Victorian legislation relevant to offshore petroleum activities is described in Table 3-2 on the basis that a worst-case credible oil spill has the potential to intersect Victorian waters.

3.4 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 anchoring program occurs within Tasmanian state waters and as such, no environmental approvals for the development are required from the Tasmanian government. Tasmanian legislation is only relevant to this EP in the case of a large hydrocarbon release (i.e., Level 2 or 3 diesel spill), as the Environmental that May Be Affected (EMBA) intersects Tasmanian waters and shorelines (King Island and other Bass Strait islands). Tasmanian legislation relevant to marine pollution in Tasmanian state waters includes:

- *Pollution of Waters by Oil and Noxious Substances Act* 1987 – 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.
- *Marine and Safety Authority Act* 1997 – sets out powers to ensure the safe operation of vessels in Tasmanian state waters.

3.5 Government Management Plans

Recovery plans, threat abatement plans and species conservation advices applicable to species identified in Section 0 are detailed in Table 3-3.

Table 3-1: Commonwealth environmental legislation relevant to the anchoring program

Legislation	Scope	Related International Conventions	Administering Authority
Australian Maritime Safety Authority Act 1990	This Act facilitates international cooperation and mutual assistance in preparing and responding to a major oil spill incident and encourages countries to develop and maintain an adequate capability to deal with oil pollution emergencies. Requirements are effected through AMSA who administers the National Plan for Maritime Environmental Emergencies (NatPlan). **Application to activity**: AMSA is the designated Control Agency for oil spills from vessels in Commonwealth waters. *These arrangements are detailed in the OPEP.*	International Convention on Oil Pollution Preparedness, Response and Cooperation 1990 Protocol on Preparedness, Response and Co-operation to Pollution Incidents by Hazardous and Noxious Substances, 2000 International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties 1969 Articles 198 and 221 of the United Nations Convention on the Law of the Sea 1982	Australian Maritime Safety Authority (AMSA)
Australian Ballast Water Management Requirements (DoEE, 2017)	The Australian Ballast Water Management Requirements set out the obligations on vessel operators with regards to the management of ballast water and ballast tank sediment when operating within Australian seas. **Application to activity**: Provides requirements on how vessel operators should manage ballast water when operating within Australian seas to comply with the Biosecurity Act. Section *7.7 details these requirements in relation to the management of ballast water.*	International Convention for the Control and Management of Ships' Ballast Water and Sediments (adopted in principle in 2004 and in force on 8 September 2017)	DAWE
Biosecurity Act 2015 Biosecurity Regulations 2016	This Act is the primary legislation for the management of the risk of diseases and pests that may cause harm to human, animal or plant health, the environment and the economy. The objects of this Act are to provide for: (a) managing biosecurity risks; human disease; risks related to ballast water; biosecurity emergencies and human biosecurity emergencies; (b) to give effect to Australia's international rights and obligations, including under the International Health Regulations, the Sanitary and Phytosanitary Agreement and the Biodiversity Convention.	International Convention for the Control and Management of Ships' Ballast Water and Sediments (adopted in principle in 2004 and in force on 8 September 2017)	DAWE

Legislation	Scope	Related International Conventions	Administering Authority
	Application to activity: The Biosecurity Act and regulations apply to 'Australian territory' which is the airspace over and the coastal seas out to 12 m from the coastline. For the activity the Act regulates vessels entering Australian territory regarding ballast water and hull fouling. *Biosecurity risks associated with the activity are detailed in Section 7.7.*		
EPBC Act	This Act applies to actions that have, will have or are likely to have a significant impact on matters of national environmental or cultural significance. The Act protects MNES and provides for a Commonwealth environmental assessment and approval process for actions. There are eight MNES, these being: • World heritage properties; • Ramsar wetlands; • listed Threatened species and communities; • listed Migratory species under international agreements; • nuclear actions; • Commonwealth marine environment; • Great Barrier Reef Marine Park; and • water trigger for coal seam gas and coal mining developments. **Application to activity**: Petroleum activities are excluded from within the boundaries of a World Heritage Area (Sub regulation 10A(f)). *The activity is not within a World Heritage Area.* The EP must describe matters protected under Part 3 of the EPBC Act and assess any impacts and risks to these. *Section 0 describes matters protected under Part 3 of the EPBC Act.* The EP must assess any actual or potential impacts or risks to MNES from the activity. *Section 7 provides an assessment of the impacts and risks from the activity to matters protected under Part 3 of the EPBC Act.*	1992 Convention on Biological Diversity and 1992 Agenda 21 Convention on International Trade in Endangered Species of Wild Fauna and Flora 1973 Agreement between the Government and Australia and the Government of Japan for the Protection of Migratory Birds and Birds in Danger of Extinction and their Environment 1974 Agreement between the Government and Australia and the Government of the People's Republic of China for the Protection of Migratory Birds and their Environment 1986 Agreement between the Government of Australia and the Government of the Republic of Korea on The Protection of Migratory Birds 2006 Convention on Wetlands of International Importance especially as Waterfowl Habitat 1971 (Ramsar) International Convention for the Regulation of Whaling 1946	DAWE

Legislation	Scope	Related International Conventions	Administering Authority
		Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention) 1979	
Environment Protection and Biodiversity Conservation Regulations 2000	Part 8 of the regulations provide distances and actions to be taken when interacting with cetaceans. **Application to activity**: The interaction requirements are applicable to the activity in the event that a cetacean is sighted. *Section 7 details how these requirements will be applied.*	-	DAWE
National Biofouling Management Guidelines for the Petroleum Production and Exploration Industry 2009	The guidance document provides recommendations for the management of biofouling risks by the petroleum industry. **Application to activity**: Applying the recommendations within this document and implementing effective biofouling controls can reduce the risk of the introduction of an introduced marine species. *Section 7 details the requirements applicable to vessel activities.*	Certain sections of MARPOL International Convention for the Safety of Life at Sea 1974 Convention on the International Regulations for Preventing Collisions at Sea (COLREG) 1972	DAWE
National Strategy for Reducing Vessel Strike on Cetaceans and other Marine Megafauna (Commonwealth of Australia, 2017a)	The overarching goal of the strategy is to provide guidance on understanding and reducing the risk of vessel collisions and the impacts they may have on marine megafauna. **Application to activity**: Applying the recommendations within this document and implementing effective controls can reduce the risk of the vessel collisions with megafauna. *Section 7.8 details the requirements applicable to vessel activities.*		DAWE
Navigation Act 2012	This Act regulates ship-related activities and invokes certain requirements of the International Convention for the Prevention of Pollution from Ships (MARPOL 73/78) relating to equipment and construction of ships. Several Marine Orders (MO) are enacted under this Act relating to offshore petroleum activities, including: • MO 21: Safety of navigation and emergency arrangements. • MO 30: Prevention of collisions. • MO 31: Vessel surveys and certification.	Certain sections of MARPOL International Convention for the Safety of Life at Sea 1974 COLREG 1972	AMSA

Legislation	Scope	Related International Conventions	Administering Authority
	Application to activity: The relevant vessels (according to class) will adhere to the relevant MO with regard to navigation and preventing collisions in Commonwealth waters. *Section 7 details the requirements applicable to vessel activities.*		
Offshore Petroleum and Greenhouse Gas Storage Act 2006 (OPGGS Act) OPGGS(E)R	The Act addresses all licensing, health, safety, environmental and royalty issues for offshore petroleum exploration and development operations extending beyond the three-nautical mile limit. Part 2 of the OPGGS(E)R specifies that an EP must be prepared for any petroleum activity and that activities are undertaken in an ecologically sustainable manner and in accordance with an accepted EP. **Application to activity**: The OPGGS Act provides the regulatory framework for all offshore petroleum exploration and production activities in Commonwealth waters, to ensure that these activities are carried out: • consistent with the principles of ecologically sustainable development as set out in section 3A of the EPBC Act. • so that environmental impacts and risks of the activity are reduced to as low as reasonably practicable (ALARP). • so that environmental impacts and risks of the activity are of an acceptable level. *Demonstration that the activity will be undertaken in line with the principles of ecologically sustainable development, and that impacts and risks resulting from these activities are ALARP and acceptable is provided in Section 7.*	-	NOPSEMA
Protection of the Sea (Prevention of Pollution from Ships) Act 1983	This Act regulates Australian regulated vessels with respect to ship-related operational activities and invokes certain requirements of the MARPOL Convention relating to discharge of noxious liquid substances, sewage, garbage, air pollution etc. **Application to activity**: All ships involved in petroleum activities in Australian waters are required to abide to the requirements under this Act. Several Marine Orders (MOs) are enacted under this Act relating to offshore petroleum activities, including:	Various parts of MARPOL	AMSA

Legislation	Scope	Related International Conventions	Administering Authority
	• MO 91: Marine Pollution Prevention – Oil. • MO 93: Marine Pollution Prevention – Noxious Liquid Substances. • MO 94: Marine Pollution Prevention – Packaged Harmful Substances. • MO 95: Marine Pollution Prevention – Garbage. • MO 96: Marine Pollution Prevention – Sewage. • MO 97: Marine Pollution Prevention – Air Pollution. *Section 7 details the requirements applicable to vessel and MODU activities.*		
Protection of the Sea (Harmful Antifouling Systems) Act 2006	Under this Act, it is an offence for a person to engage in negligent conduct that results in a harmful anti-fouling compound being applied to or present on a ship. The Act also provides that Australian ships must hold 'anti-fouling certificates', provided they meet certain criteria. **Application to activity**: All ships involved in offshore petroleum activities in Australian waters are required to abide to the requirements under this Act. The MO 98: Marine Pollution Prevention – Anti-fouling Systems is enacted under this Act. *Section 7 details the requirements applicable to vessel activities.*	International Convention on the Control of Harmful Anti-fouling Systems on Ships 2001	AMSA
Underwater Cultural Heritage Act 2018	Protects the heritage values of shipwrecks, sunken aircraft and relics (older than 75 years) in Australian Territorial waters from the low water mark to the outer edge of the continental shelf (excluding the State's internal waterways). The Act allows for protection through the designation of protection zones. Activities / conduct prohibited within each zone will be specified. **Application to activity**: In the event of removal, damage or interference to shipwrecks, sunken aircraft or relics declared to be historic under the legislation, activity is proposed with declared protection zones, or there is the discovery of shipwrecks or relics. *Section 5.9.1 identifies no known shipwrecks or sunken aircraft in the EMBA.*	Agreement between the Netherlands and Australia concerning old Dutch Shipwrecks 1972	DAWE

Table 3-2: Victorian environment legislation relevant to potential impacts and risks to State waters and shorelines

Legislation	Scope	Application to Activity	Administering Authority
Environment Protection Act 2017 (& various regulations)	This is the key Victorian legislation which 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 licence premises discharges to the marine environment, control marine discharges and to undertake prosecutions. Provides for the maintenance and, where necessary, restoration of appropriate environmental quality.	Oil pollution management in Victorian State waters	EPA
	The State Environment Protection Policy (Waters of Victoria) designates: • Spill response responsibilities by Victorian Authorities to be undertaken in the event of spills with EPA enforcement consistent with the *Environment Protection Act 2017* 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.	Discharge of domestic ballast water from emergency response vessels into Victorian State waters must comply with these requirements.	
Emergency Management Act 2013 (& Regulations 2003)	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 State waters. Emergency management structure will be triggered in the event of a spill impacting or potentially impacting State waters. See OPEP.	Department of Justice and Regulation (Inspector General for Emergency Management)
Flora and Fauna Guarantee Act 1988 (& Regulations 2011)	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 or need to be taken to conserve and manage the species and community.	Action Statement controls for threatened species present in the zone of potential impact (EMBA) as adopted (as relevant) within this EP. Triggered if an incident results in the injury or death of a FFG Act listed species (e.g. collision with a whale).	Department of Environment, Land, Water and Planning (DELWP)

Legislation	Scope	Application to Activity	Administering Authority
Heritage Act 1995	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 State 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-located shipwreck in Victorian State waters whilst undertaking emergency response activities.	Heritage Victoria (DELWP)
Marine Safety Act 2010 (& Regulations 2012)	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* & *International Convention for the Safety of Life at Sea*. The Act also defines marine incidents and the reporting of such incidents to the Victorian Director of Transport Safety.	Applies to vessel masters, owners, crew operating vessels in Victorian State waters.	Maritime Safety Victoria
National Parks Act 1975	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.	Applies where there are activities within marine reserve areas.	DELWP
Pollution of Waters by Oil and Noxious Substances Act 1986 (POWBONS) (& Regulations 2002)	The purpose of the POWBONS Act is to protect the sea and other waters from pollution by oil and noxious substances. This Act also implements the MARPOL Convention (the International Convention for the Prevention of Pollution from Ships 1973) in Victorian State waters. Requires mandatory reporting of marine pollution incidents. Act restricts within Victorian State waters the discharge of treated oily bilge water according to vessel classification (>400 tonnes); discharge of cargo substances or mixtures; prohibition of garbage disposal and packaged harmful substances; restrictions on the discharge of sewage; regulator reporting requirements for incidents; ship construction certificates and survey requirements. Restriction on discharges within Victorian State waters incorporated into EP.	Triggered in the event of a spill impacting or potentially impacting State waters.	Jointly administered by the Department of Jobs, Precincts and Regions (DJPR) and the EPA

Legislation	Scope	Application to Activity	Administering Authority
Wildlife Act 1975 (& Regulations 2013)	The purpose of this Act is to promote the protection and conservation of wildlife. Prevents wildlife from becoming extinct and prohibits and regulates persons authorised to engage in activities relating to wildlife (including incidents). The *Wildlife (Marine Mammal) Regulations 2009* 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 (150 m), whales (300 m) and seals (50 m).	Applies where vessels are within State waters responding to a spill event. Prescribed minimum proximity distances to whales, dolphins and seals will be maintained. Triggered if an incident results in the injury or death of whales, dolphins or seals.	DELWP

Table 3-3: Recovery plans, threat abatement plans and species conservation advices relevant to the anchoring program

Relevant Plan/Advice	***Description***	***Applicable Threats or Management Advice***
Birds		
Threat Abatement Plan for the Impacts of Marine Debris on Vertebrate Marine Life (DEWHA, 2009)	The plans focus on strategic approaches to reduce the impacts of marine debris on vertebrate marine life.	***Marine debris*** Evaluate risk of marine debris (including risk of entanglement and/or ingestion) and, if required, appropriate mitigation measures are implemented.
National Recovery Plan for Threatened Albatrosses and Giant Petrels 2011–2016 (DSEWPaC, 2011a)	The recovery plan is a co-ordinated conservation strategy for albatrosses and giant petrels listed as threatened.	***Marine pollution*** Evaluate risk of oil spill impact to nest locations and, if required, appropriate mitigation measures are implemented. ***Marine debris*** Evaluate risk of marine debris (including risk of entanglement and/or ingestion) and, if required, appropriate mitigation measures are implemented.
Approved Conservation Advice for *Pterodroma mollis* (soft-plumaged petrel) (TSSC, 2015c)	Conservation advice provides management actions that can be undertaken to ensure the conservation of the soft-plumaged petrel.	None identified.
Approved Conservation Advice for *Sternula nereis nereis* (Australian fairy tern) (DSEWPC, 2011c)	Conservation advice provides management actions that can be undertaken to ensure the conservation of the fairy tern.	***Marine pollution*** Evaluate risk of oil spill impact to nest locations and, if required, appropriate mitigation measures are implemented.
Conservation Advice for *Numenius madagascariensis* (eastern curlew) (DoE, 2015e))	Conservation advice provides management actions that can be undertaken to ensure the conservation of the eastern curlew.	Habitat degradation/ loss (oil pollution)
Conservation Advice *Limosa lapponica menzbieri* (bar-tailed godwit (northern Siberian)) (TSSC, 2016)	Conservation advice provides management actions that can be undertaken to ensure the conservation of the bar-tailed godwit (northern Siberian).	Habitat degradation/ loss (oil pollution)

Relevant Plan/Advice	*Description*	*Applicable Threats or Management Advice*
Conservation Advice *Limosa lapponica baueri* (bar-tailed godwit (western Alaskan)) (TSSC, 2016b)	Conservation advice provides management actions that can be undertaken to ensure the conservation of the bar-tailed godwit (western Alaskan).	Habitat degradation/ loss
Approved Conservation Advice for *Pachyptila subantarctica* (fairy prion (southern)) (TSSC, 2015d)	Conservation advice provides management actions that can be undertaken to ensure the conservation of the fairy prion (southern).	None identified.
Approved Conservation Advice for *Rostratula australis* (Australian painted snipe) (DSEWPaC, 2013c)	Conservation advice provides management actions that can be undertaken to ensure the conservation of the Australian painted snipe.	None identified.
Conservation Advice for *Charadrius leschenaultia* (greater sand plover) (TSSC, 2016c)	Conservation advice provides management actions that can be undertaken to ensure the conservation of the greater sand plover.	Habitat degradation/ loss (oil pollution)
Conservation Advice *Calidris ferruginea* (curlew sandpiper) (DoE, 2015f)	Conservation advice provides management actions that can be undertaken to ensure the conservation of the curlew sandpiper.	Habitat degradation/ loss (oil pollution)
Approved Conservation Advice for *Calidris canutus* (red knot) (TSSC, 2016d)	Conservation advice provides management actions that can be undertaken to ensure the conservation of the red knot.	***Marine pollution*** Evaluate risk of oil spill impact to nest locations and, if required, appropriate mitigation measures are implemented.
Approved Conservation Advice for *Botaurus poiciloptilus* (Australasian bittern) (TSSC, 2019)	Conservation advice provides management actions that can be undertaken to ensure the conservation of the Australasian bittern.	None identified.

Relevant Plan/Advice	*Description*	*Applicable Threats or Management Advice*
National Recovery Plan for *Pterodroma leucoptera leucoptera* (Gould's petrel) (DEC NSW, 2006)	Conservation advice provides management actions that can be undertaken to ensure the conservation of the Gould's petrel.	None identified.
National Recovery Plan for the *Neophema chrysogaster* (orange-bellied parrot) (DELWP, 2016a)	The recovery plan is a co-ordinated conservation strategy for the orange-bellied parrot.	Illuminated boats and structures: evaluate risk of lighting on vessels and offshore structures.
National Recovery Plan for the *Lathamus discolour* (swift parrot) (Saunders and Tzaros, 2011)	The recovery plan is a co-ordinated conservation strategy for the swift parrot.	None identified.
Approved Conservation Advice for the *Halobaena caerulea* (blue petrel) (TSSC, 2015e)	Conservation advice provides management actions that can be undertaken to ensure the conservation of the blue petrel	None identified.
Wildlife Conservation Plan for Migratory Shorebirds – 2015 (DoE, 2015b)	The long-term recovery plan objective for migratory shorebirds is to minimise anthropogenic threats to allow for the conservation status of these bird species.	Habitat degradation/ modification (oil pollution)
Fish		
National Recovery Plan for the *Prototroctes maraena* (Australian grayling) (Backhouse et al., 2008)	The recovery plan is a co-ordinated conservation strategy for the Australian grayling.	Poor water quality and siltation: Typically, from onshore sources. Impact of introduced fish: Typically, from onshore sources.
Recovery Plan for the *Carcharodon carcharias* (white shark) (DSEWPaC, 2013a)	The recovery plan is a co-ordinated conservation strategy for the white shark.	None identified.
Approved Conservation Advice for the *Rhicodon typus* (whale shark) (TSSC, 2015b)	Conservation advice provides management actions that can be undertaken to ensure the conservation of the whale shark	Vessel strike.

Relevant Plan/Advice	*Description*	*Applicable Threats or Management Advice*
Reptiles		
Recovery Plan for Marine Turtles in Australia, 2017-2027 (Commonwealth of Australia, 2017b)	The long-term recovery plan objective for marine turtles is to minimise anthropogenic threats to allow for the conservation status of marine turtles	• chemical and terrestrial discharge. • marine debris. • light pollution. • habitat modification. • vessel strike. • noise interference. • vessel disturbance.
Approved Conservation Advice for *Dermochelys coriacea* (leatherback turtle) (DEWHA, 2008)	See above for the recovery plan for marine turtles in Australia, 2017-2027.	
Marine mammals		
Conservation Management Plan for the Blue Whale (Commonwealth of Australia, 2015b)	The long-term recovery plan objective for blue whales is to minimise anthropogenic threats to allow for their conservation status to improve	***Noise interference*** Evaluate risk of noise impacts and, if required, appropriate mitigation measures are implemented. ***Vessel disturbance*** Evaluate risk of vessel strikes and, if required, appropriate mitigation measures are implemented.
Approved Conservation Advice for *Balaenoptera borealis* (sei whale) (TSSC, 2015g)	Conservation advice provides threat abatement activities that can be undertaken to ensure the conservation of the sei whale.	***Noise interference*** Evaluate risk of noise impacts to cetaceans and, if required, appropriate mitigation measures are implemented. ***Vessel disturbance*** Evaluate risk of vessel strikes and, if required, appropriate mitigation measures are implemented.
Approved Conservation Advice for *Megaptera novaeangliae* (humpback whale) (TSSC, 2015a)	Conservation advice provides threat abatement activities that can be undertaken to ensure the conservation of the humpback whale.	***Noise interference*** Evaluate risk of noise impacts to cetaceans and, if required, appropriate mitigation measures are implemented. ***Vessel disturbance***

Relevant Plan/Advice	*Description*	*Applicable Threats or Management Advice*
		Evaluate risk of vessel strikes and, if required, appropriate mitigation measures are implemented.
Conservation Management Plan for the Southern Right Whale 2011-2021 (DSEWPaC, 2012a)	Conservation management plan provides threat abatement activities that can be undertaken to ensure the conservation of the southern right whale.	***Noise interference*** Evaluate risk of noise impacts to cetaceans and, if required, appropriate mitigation measures are implemented. ***Vessel disturbance*** Evaluate risk of vessel strikes and, if required, appropriate mitigation measures are implemented.
Approved Conservation Advice for *Balaenoptera physalus* (fin whale) (TSSC, 2015f)	Conservation advice provides threat abatement activities that can be undertaken to ensure the conservation of the fin whale.	***Noise interference*** Evaluate risk of noise impacts to cetaceans and, if required, appropriate mitigation measures are implemented. ***Vessel disturbance*** Evaluate risk of vessel strikes and, if required, appropriate mitigation measures are implemented.
Conservation Listing Advice for the *Neophoca cinerea* (Australian sea lion) (TSSC, 2010) Recovery Plan for the *Neophoca cinerea* (Australian sea lion) (DSEWPaC, 2013).	Conservation advice provides threat abatement activities that can be undertaken to ensure the conservation of the Australian sea lion.	Known threats to this species include habitat and prey availability, competition with other seals, fisheries bycatch (bottom-set gillnet, rock lobster), entanglement in marine debris, disturbance, harassment and displacement, predation and direct killing. Potential threats to this species include habitat degradation, oil spills, pollution, toxins and climate change

3.6 Commonwealth guidance material

This EP has been prepared considering the following regulatory guidance:

- AMSA Technical guidelines for preparing contingency plans for marine and coastal facilities (2015);
- AMSA National Plan for Maritime Environmental Emergencies (the NatPlan);
- DAWR Offshore Installations - Biosecurity Guide (2019);
- DAWE Policy Statement: 'Indirect consequences' of an action: Section 527E of the EPBC Act (2013);
- NOPSEMA Guidance note: Environment plan content requirements – Rev 4 (GN1344) (2019);
- NOPSEMA Guidance note: Petroleum activities and Australian marine parks – Rev 0 (GN1785) (2018);
- NOPSEMA Guidance note: Oil pollution risk management – Rev 2 (GN1488) (2018);
- NOPSEMA Guidance note: Notification and reporting of environmental incidents – Rev 4 (GN0926) (2014);
- NOPSEMA Guidance note: ALARP – Rev6 (GN0166) (2015);
- NOPSEMA Policy: Environment plan assessment - Rev 7 (PL1347) (2019);
- NOPSEMA Guideline: Environment plan decision making – Rev 6 (GL1721) (2019);
- NOPSEMA Guideline: Environment plan summaries – Rev 2 (GL1566) (2019);
- NOPSEMA Guideline: Making submissions to NOPSEMA – Rev 17 (GL0255) (2019);
- NOPSEMA Information paper: Operational and scientific monitoring programs – Rev2 (IP1349) (2016);
- NOPSEMA Bulletin #1: Oil Spill Modelling – Rev 0 (A652993) (2019); and
- NOPSEMA Bulletin #2: Clarifying Statutory Requirements and Good Practice Consultation – Rev 0 (A696998) (2019).

3.7 Industry codes of practice and guideline material

This EP has been prepared considering the following petroleum industry codes of practice and guidance material:

- IFC environmental, health, and safety guidelines for offshore oil and gas development (2015). These guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP) and contain the performance levels and measures that are generally considered to be reasonably achievable, depending on the impacts and risks associated with the activity.
- AMSA technical guidelines for preparing contingency plans for marine and coastal facilities (Commonwealth of Australia, January 2015).
- Commonwealth Scientific and Industrial Research Organisation (CSIRO) Oil Spill Monitoring Handbook (2016).
- DoEE Antifouling and in-water cleaning guidelines (2015).
- Australian Standard AS ISO 31000:2018 Risk Management and Handbook 203:2012 Managing Environment-related Risk.

- Department of Transport (DoT) Marine Pollution Response Arrangements in Victoria – An Industry Perspective, Sean Moran, Security and Emergency Management Division, Department of Transport (Victoria) (2012).
- Victorian Department of Transport, Planning and Local Infrastructure Advisory Note on Offshore Petroleum Industry Oil Spill Contingency Planning Consultation (2013).
- Australian Petroleum Production and Exploration Association (APPEA) Code of Environmental Practice (2008).
- IOGP Report 254: Environmental Management in Oil and Gas Exploration and Production (2008).

4 Description of the Activity

4.1 Activity location

This EP provides for the activities associated with laying anchors and mooring lines prior to the MODU arriving to start drilling the Thylacine North-1 (TN-1) or Thylacine West-1 (TW-1) (as part of the Otway Development and Abandonment drilling campaign). The activity is being undertaken in Commonwealth waters of the Otway Basin, approximately 66-68 km from Port Campbell off Victoria's southwest coast.

The first well to be drilled in the Thylacine field will be either TN-1 or TW-1, and these specific locations are provided for in the scope of activities of this EP and are listed in Table 4-1.

Table 4-1: Anchoring location

Well name	Well type	Well location		Petroleum title	Water depth (m)	Distance from Port Campbell
		Latitude	Longitude			
Thylacine North-1 (TN-1)	Development	39° 12.510' S	142° 52. 496' E	T/L2	~100 m	~66 km
Thylacine West-1 (TW-1)	Development	39° 13.338' S	142° 50.318' E	T/L2	~105 m	~68 km

All coordinates are provided as GDA94 UTM54S.

4.2 Operational area

The operational area has been defined as the area within which anchoring and mooring operations occur from the well site. For this anchoring program, the operational area is defined as a 2 km radius around the drilling location. This radius encompasses the outer extent of mooring equipment on the seabed (Figure 4-1).

4.3 Activity timing

The Otway Development Drilling and Well Abandonment Program is planned to commence in Q1 or Q2 2020, with the anchoring program to be completed immediately prior to this. The anchoring program is expected to take up to one week.

4.4 The Vessel

An anchor handling tug supply (AHTS) vessel will be used to undertake the anchor and mooring laying activity. This will be sourced from the Siem Offshore fleet of AHTS vessels. Beach has conducted a pre-qualification audit and assessment of Siem Offshore to ensure that the it meets its HSE requirements, as well as a pre-mobilisation audit to ensure vessel compliance.

The vessel will hold station using dynamic positioning (DP); it will only anchor in an emergency. The Thylacine pipeline and associated subsea equipment will be included in support vessel navigation equipment so that any emergency anchoring activities avoid this subsea infrastructure. The nearest subsea infrastructure is more than 2.8 km from the well locations.

Given the short duration of the activity, refuelling of the vessel will only take place within port. The vessel is likely to be mobilised from Geelong. No helicopter transfers of personnel are planned.

Table 4-1 presents the typical key vessel dimensions and tank capacities for AHTS vessels in the Siem Offshore fleet. Photo 4-1 provides an image of the *Siem Sapphire* AHTS vessel (indicative of the vessel that will be used).

Table 4-2: Typical Siem Offshore AHTS vessel specifications

Parameter	**Specification**
Crew accommodation	60 people (20 single cabins, 20 double cabins)
Gross tonnage	7,473 tonnes
DP class	2
Thrusters	2 x bow (1,000 kW each), 2 x stern (880 kW each) and 1 x azimuth (830 kW)
Dimensions	
Length	91 m
Breadth	22 m
Draught	7.95 m
Cargo deck area	813 m2
Tank capacities	
Fresh water	1,072 m^3
Fuel oil	1,224 m^3
Ballast water	2,887 m^3

Photo 4-1: The Siem Sapphire AHTS vessel

Environmental Credentials

Part of Beach's pre-qualification audit involved ensuring that the AHTS vessel fleet has, at a minimum, the following current and valid environmental credentials in place:

- International Oil Pollution Prevention (IOPP) certificate in accordance with MARPOL Annex I (enacted under AMSA Marine Orders Part 91, Marine Pollution Prevention – Oil);
- International Sewage Pollution Prevention (ISPP) certificate in accordance with MARPOL Annex IV (enacted under AMSA Marine Orders Part 96, Marine Pollution Prevention – Sewage);
- International Air Pollution Prevention (IAPP), Engine International Air Pollution Prevention (EIAPP) and International Energy Efficiency (IEE) certificates and Ship Energy Efficiency Management Plan (SEEMP) in accordance with MARPOL Annex VI (enacted under AMSA Marine Orders Part 97, Marine Pollution Prevention – Air Pollution);
- International Anti-fouling System certificate in accordance with the International Convention on the Control of Harmful Anti-fouling Systems on Ships 2008 (enacted under AMSA Marine Orders Part 98, Marine Pollution Prevention – Anti-fouling Systems).
- Shipboard Marine Pollution Emergency Plan (SMPEP) in accordance with MARPOL Annex I (enacted under AMSA Marine Orders Part 93, Marine Pollution Prevention – Noxious Liquid Substances); and
- Shipboard Garbage Management Plan in accordance with MARPOL Annex V (enacted under AMSA Marine Orders Part 95, Marine Pollution Prevention – Garbage).

Because the AHTS vessel is greater than 400 MT, it requires all the MARPOL certifications listed above. The vessel will generate and emit atmospheric emissions, treated sewage, treated bilge water and wastes in accordance with the certifications listed above.

Regulatory Jurisdiction

The vessel is considered part of the 'petroleum activity' while it is within the operational area (i.e., 2 km radius of the given Thylacine well). While in this area, hydrocarbon spills to sea from will be combatted in accordance with the vessel SMPEP and/or the Beach Offshore Victoria Otway Basin OPEP (depending on the size of the spill).

When the vessel is outside the activity area (e.g., steaming to or from location, or holding position outside the operational area) and remains within Australian waters, it comes under the regulatory jurisdiction of the *Navigation Act* 2012 (Cth), which is administered by AMSA. Accordingly, this EP does not cover activities performed by the vessel while outside the operational area.

4.5 Anchoring Program

The vessel will position drill rig anchors and mooring lines on the seabed.

The MODU may be moored with eight (and possibly 12) Stevshark anchors ranging from 15 to 30 metric tonnes (MT) each, with an individual footprint of approximately 30 m^2 to 60 m^2 each (Photo 4-2).

A mooring analysis has been undertaken to determine specific mooring requirements for each well location. This mooring analysis incorporates the results from the recently acquired geophysical and geotechnical survey. Anchors are attached to the MODU by a chain or chain/wire system. The anchors will be positioned at approximately 1,300 m to 2,000 m from the drilling location.

Photo 4-2: A typical Stevshark anchor

The proposed 8-point mooring system is based on a 45° – 45° mooring design with anchor ranges of 1,375 m in all lines. The proposed mooring system consists of 500 m pre-lay chain connected to rig chain and wire as detailed below:

- 20 MT Stevshark REX Anchor, 9.5 MT ballast, set at 32° (UHC = 384 MT).
- 500 m of 82.55 mm/84 mm R5 DSM Chain (minimum breaking load [MBL] = 815 MT*/845 MT).
- 500 m of 84 mm R5 Rig Chain (MBL = 845 MT).
- 84 mm Chaser Stopper Assembly (MBL = 858 MT).
- 89 mm Rig Wire (MBL = 721 MT).

(*) For conservatism, an MBL of 815 MT has been utilised for the chain. The mooring system has been designed such that it satisfies the safety factor and offset requirements for the 1-yr RP environment for moorings in the vicinity of subsea infrastructures as well as for the survival condition based on 25-yr RP environment. The mooring analysis has been performed in accordance with API RP 2SK and MMATW using GMOOR version 9.85, developed by Global Maritime.

Transponders (attached to the anchors) may be required to inform anchor positioning. The expected frequency (Hz) of the signal from transponders is 18 – 36 kHz and source level is 196 dB re 1 uPa @ 1 m.

Buoys will be attached to the mooring lines to ensure that the mooring lines can be later retrieved by the AHTS vessel/s once the MODU arrives on location and to ensure that the mooring lines remain clear of any nearby subsea infrastructure.

The anchors will be lowered onto the seabed off the vessel's stern using the anchor handling winch (and the anchors are later lifted off the seabed using the same arrangement). An AHTS vessel position tolerance of <10.0 m radius can be applied when using a global navigation satellite system. Using this position tolerance, an anchor dropped from the sea surface is estimated to land within 32.0 m of the planned anchor position. As the planned anchor positions are over 100 m from existing Beach subsea infrastructure, the probability of a dropped anchor striking subsea infrastructure is considered to be negligible.

An indicative anchoring layout is provided in Figure 4-1, with the proposed catenary profile illustrated in Figure 4-2.

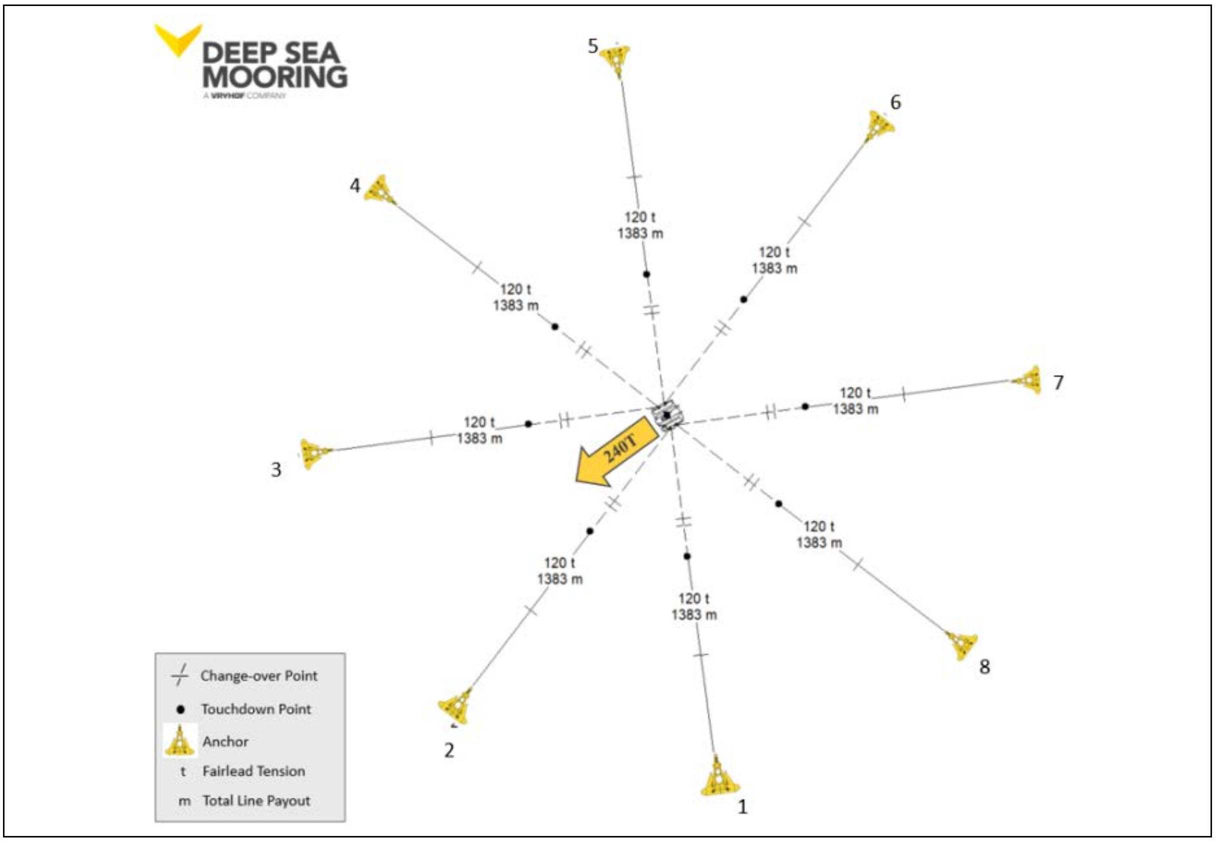


Figure 4-1: Mooring and anchor layout

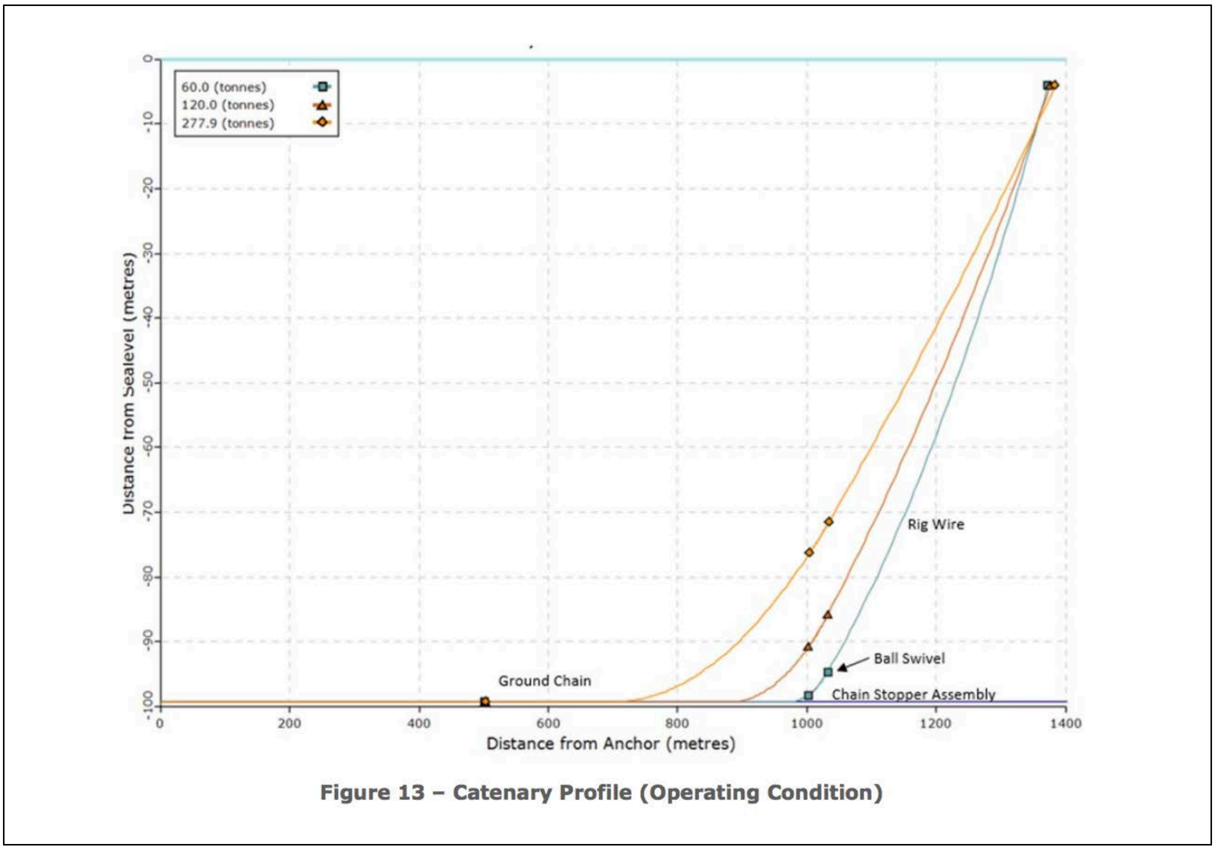


Figure 4-2: Catenary layout

Table 4-3 outlines the likely seabed disturbance involved with the deployment of the anchors and associated mooring lines. At its maximum, it is likely that 1,728 m^2 (0.1728 ha) of seabed will be disturbed (noting that this does not allow for unknown potential areas of seabed that may 'swept' by the ground chain portion of the mooring line as it moves side to side with water currents).

Table 4-3: Likely seabed disturbance

Equipment	Disturbance for single item	8 anchors	12 anchors
Anchor	30-60 m^2	240-480 m^2	360-720 m^2
Ground chain*	84 m^2	672 m^2	1,008 m^2
Total	**114-144 m^2**	**912-1,152 m^2**	**1,368-1,728 m^2**

* Based on details in Figure 2 (1,000 m of ground chain resting on the seabed with a diameter of 84 mm).

5 Description of the Environment

The physical, biological and socio-economic Environment that May Be Affected (EMBA) and the region in general are described in this section, together with the values and sensitivities of the region.

5.1 Environment that may be affected

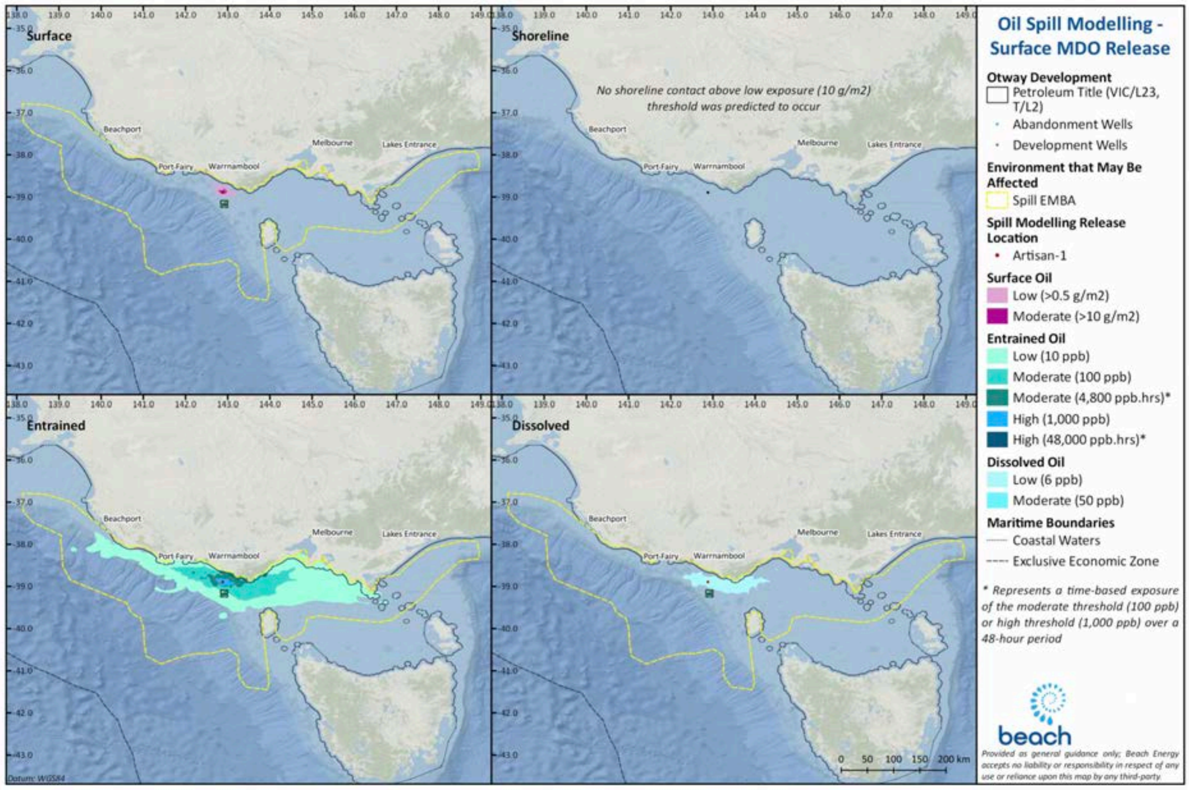
The EMBA has been defined as an area where a change to ambient environmental conditions may occur as a result of planned or unplanned events. It is noted that a change does not always imply that an adverse impact will occur; for example, a change may be required over a particular exposure value or over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

Table 5-1 describes and Figure 5-1 illustrates the operational area and EMBA associated with the activity that are used to describe the environmental context relevant to the activity and to support the impact and risk assessments.

The EMBA is limited to the timing and duration of the anchoring activities which are scheduled to commence in Q1 or Q2 2020 for up to one week.

Table 5-1: Description of the operational area and EMBA

EMBAs	*Description*
Operational area	For this activity, the operational area is a 2 km radius around the well (either TN-1 or TW-1), which represents the outer extent of mooring equipment on the seabed. The EPBC Act Protected Matters Search Tool (PMST) report for the operational area is provided as **Appendix A.1** and has been used in this chapter to identify the environmental values and sensitivities that will be affected by planned activities.
Spill EMBA	Marine diesel oil (MDO) spill modelling was completed at the Artisan-1 well location (approximately 38 km north of TN-1). The results of this existing spill modelling were adapted for use in defining the spill EMBA for the anchoring activities in this plan which represent a worst case scenario of MDO spill from an AHTS vessel. Figure 5-1 shows the MDO spill EMBA. The EPBC Act PMST report for this spill EMBA is provided as **Appendix A.2** and has been used in this chapter to identify the environmental values and sensitivities that may be affected by an unplanned release of MDO.



* *Note – the yellow dashed outlined represents the EMBA for a gas condensate well blowout from the Artisan-1 well and has no relevance to this EMBA or this EP.*

Figure 5-1: The MDO spill EMBA.

5.2 Regulatory context

The OPGGS(E)R define 'environment' as the ecosystems and their constituent parts, natural and physical resources, qualities and characteristics of areas, the heritage value of places and includes the social, economic and cultural features of those matters. In accordance with the Regulations, this document describes the physical, ecological, and social components of the environment.

Under the OPGGS(E)R, the EP must describe the EMBA (Regulation 13(2a)), including details of the particular values and sensitivities (if any) within that environment (Regulation 13(2b)), Identified values and sensitivities must include, but are not necessarily limited to, the matters protected under Part 3 of the EPBC Act.

A greater level of detail is provided for those particular values and sensitivities as defined by the Regulations 13(3) of the OPGGS(E)R which states that particular relevant values and sensitivities may include any of the following:

a) The world heritage values of a declared World Heritage property within the meaning of the EPBC Act;

b) The national heritage values of a National Heritage place within the meaning of that Act;

c) The ecological character of a declared Ramsar wetland within the meaning of that Act;

d) The presence of a listed Threatened species or listed Threatened Ecological Community within the meaning of that Act;

e) The presence of a listed Migratory species within the meaning of that Act;

f) Any values and sensitivities that exist in, or in relation to, part or all of:

   i. Commonwealth marine area within the meaning of that Act; or
   ii. Commonwealth land within the meaning of that Act.

With regards to 13(3)(c), information on the ecological character of declared Ramsar wetlands is provided in section 5.5.5

With regards to 13(3)(d) and (e) more detail has been provided where listed Threatened or Migratory species have a spatially defined biologically important area (BIA) or habitat critical to survival – as they are spatially defined areas where aggregations of individuals of a regionally significant species are known to display biologically important behaviours such as breeding, foraging, resting or migration.

With regards to 13(3)(f) more detail has been provided in Section 5.5.11 for Key Ecological Features (KEFs) as they are considered as conservation values of the Commonwealth marine area; and in Section 5.5.1 for Australian Marine Parks (AMPs) as they are enacted under the EPBC Act.

5.3 Regional Environmental Setting

The EMBA is located in the South-East Commonwealth Marine Region (SEMR), which extends from the south coast of New South Wales to Kangaroo Island in South Australia and around Tasmania (DNP, 2013).

There are significant variations in seafloor features throughout the SEMR including seamounts, canyons, escarpments, soft sediments and rocky reefs, which support high levels of biodiversity and species endemism (DoE 2015a). Compared to other marine areas, the SEMR is relatively low in nutrients and primary production; however localised areas of high productivity are known to occur. There are areas of continental shelf, which includes Bass Strait and Otway Shelf, which have rocky reefs and soft sediments that support a wide range of species. The shelf break increases currents, eddies and upwelling, and the area is especially biodiverse, including species that are fished recreationally and commercially. There are seafloor canyons along the continental shelf which provide habitat for sessile invertebrates such as temperate corals. The Bonney Upwelling is an area of seasonally higher primary productivity which attracts baleen whales and other species (including EPBC-listed species) which feed on the plankton swarms (krill).

The SEMR has a high diversity of species and also a large number of endemic species. The fish fauna in the region includes around 600 species, of which 85% are thought to be endemic. Additionally, approximately 95% of molluscs, 90% of echinoderms, and 62% of macroalgae (seaweed) species are endemic to these waters (DNP, 2013).

5.4 Summary of Environmental Receptors within the EMBA

Table 5-2 lists the presence of ecological receptors and Table 5-3 lists the socio-economic and cultural receptors that may occur within the operational area and the MDO spill EMBA.

Values and sensitivities associated with each of the receptors have been included in the tables. These values and sensitivities have been identified based on:

- Presence of listed Threatened or Migratory species or Threatened Ecological Communities (TEC) identified in the EPBC PMST report (Appendix A);
- Presence of BIAs and habitats critical to the survival of the species;
- Presence of important behaviours (e.g. foraging, roosting or breeding) by fauna, including those identified in the EPBC PMST report (Appendix A);
- Important linkage to other receptors (e.g. nursery habitat, food source, commercial species); and
- Important benefit to human activities (e.g. recreation and tourism, aesthetics, economic benefit).

Table 5-2: Presence of ecological receptors within the operational area and MDO spill EMBA

Receptor Type	Receptor Category	Values and Sensitivities	Operational Area	Spill EMBA	Description and relevant management advice
Shoreline	Rocky	• foraging habitat (e.g. birds) • nesting or breeding habitat (e.g. birds, pinnipeds) • haul-out sites (e.g. pinnipeds)			The Otway coast includes areas of rocky and sandy beaches. Each of these shoreline types has the potential to support different flora and fauna assemblage due to the different physical factors (e.g. waves, tides, light etc.) influencing the habitat; for example: • pinnipeds are known to use rocky shores for haul-out and/breeding. • bird species may use sandy, rocky or cliff areas for roosting and breeding sites. • cliff and rocky coasts can provide a hard substrate for sessile invertebrate species (e.g. barnacles, sponges etc) to attach.
	Sandy	• foraging habitat (e.g. birds) • nesting or breeding habitat (e.g. birds, pinnipeds) • haul-out sites (e.g. pinnipeds)			
Mangroves	Intertidal/subtidal habitat, mangrove communities	• nursery habitat (e.g. crustaceans, fish) • breeding habitat (e.g. fish)			Mangroves are not a dominant habitat along the Otway coast, but are known to occur further east within bays and wetlands (e.g. Western Port Bay, Corner Inlet). Mangrove habitat can provide foraging, nesting and nursery habitat for many species. *See Section 5.7.2 for more detail.*
Saltmarsh	Upper intertidal zone, saltmarsh habitat, habitat for fish and benthic communities	• nursery habitat (e.g. crustaceans, fish) • breeding habitat (e.g. fish)			Saltmarsh, including the TEC 'Subtropical and Temperate Coastal Saltmarsh' is known to occur along the Otway coast. *See Section 5.7.3 for more detail.*
Soft sediment	Predominantly unvegetated soft sediment substrates	• key habitat (e.g. benthic invertebrates)			The anchoring activity will be conducted in water depths of approximately 100 m to 105 m. Unvegetated soft sediments are a widespread habitat in both intertidal and subtidal areas, particularly in areas beyond the photic zone. The Middle Otway Shelf (typically 70–130 m depth) is a zone of large tracts of open sand with little or no epifauna to characterise the area: infaunal communities and bivalves, polychaetes and crustaceans dominate in the open sand habitat. *See Section 5.7.1.1 for more detail.*
Seagrass	Seagrass meadows	• nursery habitat (e.g. crustaceans, fish) • food source (e.g. fish, turtles)			Seagrass typically occurs on soft sediment substrates within the photic zone (i.e. intertidal and shallow subtidal areas). Seagrass is known to occur in the nearshore area of the Otway coast, including within protected areas (e.g. Twelve Apostles Marine Park). *See Section 5.7.1.2 for more detail.*
Algae	Macroalgae	• nursery habitat (e.g. crustaceans, fish) • food source (e.g. birds, fish)			Macroalgae can occur on rocky substrates within the photic zone (i.e. intertidal and shallow subtidal areas). Macroalgae is known to occur in the nearshore area of the Otway coast, including within protected areas (e.g. Twelve Apostles Marine Park). Video surveys indicate that in waters shallower than approximately 20 m there is an area of significant, high profile reef and associated high density macroalgae dominated epibenthos encountered. *See section 5.7.1.3 for more detail.*
Coral	Soft corals, hard corals	• nursery habitat (e.g. crustaceans, fish) • breeding habitat (e.g. fish)			Hard corals will typically occur in shallower (<50 m) waters. They are not a dominant feature of reef habitat within the SEMR, but their presence has been recorded around Cape Otway and within the Wilsons Promontory National Park. Soft corals are typically present in deeper waters throughout the continental shelf, slope and off slope regions, to well below the limit of light penetration. Soft corals are typically smaller and often solitary. *See Section 5.7.1.4 for more detail.*
Plankton	Phytoplankton and zooplankton	• food source (e.g. fish, cetaceans, marine turtles)			Phytoplankton and zooplankton are widespread throughout oceanic environments. *See Section 5.7.4 for more detail.*
Marine invertebrates	Benthic and pelagic invertebrates	• food source (e.g. fish)			A variety of invertebrate species may occur within the operational area or spill EMBA, including sponges and arthropods. Shallower (typically <70 m) areas of the Otway Shelf contain areas of exposed limestone substrate that can host variable densities of encrusting mollusc, sponge, bryozoan and red algae assemblages. *See Section 5.7.5 for more detail.*
		• commercial species			Commercially important species (e.g. rock lobster, giant crab) may occur within operational area, light, waste water or noise behaviour EMBA. *See Section 5.8.8, 5.8.9 and 5.8.10 for more detail.*

Receptor Type	Receptor Category	Values and Sensitivities	Operational Area	Spill EMBA	Description and relevant management advice
Fish	Fish (including fish and sharks)	• listed marine species • listed Threatened species • listed Migratory species • BIA			A single threatened shark species, the white shark, is known to occur within the operational area. The following fish species (or species habitat) may occur within the EMBAs: • Australian grayling–light and spill • porbeagle shark—operational area, noise behaviour, light, wastewater, spill • shortfin mako shark; - operational area, noise behaviour, light, wastewater, spill • white shark- operational area, noise behaviour, light, wastewater, spill • whale shark - spill The EMBAs and the operating area are within a distribution BIA for the white shark. No habitat critical to the survival of the species or behaviours were identified. <u>Relevant Management Advice:</u> National Recovery Plan for the *Prototroctes maraena* (Australian Grayling) (Backhouse et al., 2008) Recovery Plan for the *Carcharodon carcharias* (white Shark) (DSEWPaC, 2013a) Approved Conservation Advice for *Rhincodon typos* (whale shark) (TSSC, 2015b) *See Section 5.7.7.3 for more detail.*
	Pipefish, seahorse, seadragons	• listed marine species			Syngnathid species (or species habitat) may occur within the operational area, light, noise behaviour, waste water and spill EMBAs. No important behaviours or BIAs have been identified. No management advice is applicable. *See Section 5.7.7.3 for more detail.*
Seabirds	Birds that live or frequent the ocean	• listed marine species • listed Threatened species • listed Migratory species • BIA			110 seabird and shorebird species (or species habitat) may occur within the spill EMBA; with breeding, foraging and roosting behaviours identified. The operational area overlaps foraging BIAs for several albatross species (Antipodean albatross, black-browed albatross, Buller's albatross, Campbell albatross, Indian yellow-nosed albatross, shy albatross, wandering albatross); common diving-petrel and wedge-tailed shearwater. The spill EMBA also overlaps BIAs for Australasian gannet, black-faced cormorant, little penguin, short-tailed shearwater and the white-faced storm petrel. Roosting and breeding for a variety of bird species, wader birds and terns, occurs within the spill EMBA. Relevant Management Advice: refer to Table 3-3 for relevant plans and advice. *See Section 5.7.7.4 for more detail.*
Marine reptiles	Marine turtles	• listed marine species • listed Threatened species • listed Migratory species			Three marine turtle species (or species habitat) may occur within the operational area and spill EMBA: • loggerhead turtle; • green turtle; and • leatherback turtle. No BIAs or habitat critical to the survival of the species occur within the operational area or spill EMBA. <u>Relevant management advice:</u> Recovery Plan for Marine Turtles in Australia (Commonwealth of Australia, 2017b) Approved Conservation Advice for *Dermochelys coriacea* (leatherback turtle) (DEWHA, 2008) *See Section 5.7.7.7 for more detail.*
Cetaceans and pinnipeds	Seals, sea lions	• listed marine species			The New Zealand and Australian fur-seal species or species habitat may occur within the operational area and spill EMBA. Known breeding colonies and a haul-out site are present within the spill EMBA for the Australian fur-seal. A breeding colony is present within the EMBA for the New Zealand fur-seal. <u>Relevant Management Advice:</u> Conservation Listing Advice for the *Neophoca cinerea* (Australian sea lion) (TSSC 2010) Recovery Plan for the *Neophoca cinerea* (Australian sea lion) (DSEWPaC 2013). *See Section 5.7.7.7 for more detail.*

Receptor Type	Receptor Category	Values and Sensitivities	Operational Area	Spill EMBA	Description and relevant management advice
	Whales	• listed marine species • listed threatened species • listed migratory species • BIA			A total of 26 whale species (or species habitat) may occur within the spill EMBA. Using the PMST, foraging behaviours were identified for some species (sei, blue, fin and pygmy right whales); and breeding behaviour was identified for the southern right whale within the spill EMBA. The EMBA intersects a foraging BIA for the pygmy blue whale and an aggregation BIA, connecting habitat BIA and a migration BIA for the southern right whale. Relevant Management Advice: Conservation Advice for humpback whales (TSSC, 2015a) The Conservation Management Plan for the blue whale (Commonwealth of Australia 2015b) The Conservation Management Plan for the southern right whale (DSEWPaC 2012a) Refer to the Conservation Advice in Table 3-3. *See Section 5.7.7.6 for more detail.*
	Dolphins	• listed marine species • listed Migratory species			Five dolphin species (or species habitat) may occur within the operational area and spill EMBA: • dusky dolphin • common dolphin • bottlenose dolphin • Risso's dolphin • southern right whale dolphin • Indian ocean bottlenose dolphin No important behaviours or BIAs have been identified *See Section 5.7.7.6 for more detail*

Green denotes presence of receptor, red denotes absence of receptor.

Table 5-3: Presence of socio-economic and cultural receptors within the operational area, light, waste water or noise behaviour EMBA

Receptor Type	Receptor Category	Values and Sensitivities	Operational area	Spill EMBA	Description and relevant management advice
Commonwealth Marine Area	Australian Marine Park (AMP)	• aggregations of marine life			No AMPs are overlapped by the operational area. The AMPs overlapped by the spill EMBA are: • Apollo; and • Beagle *See section 5.5.1 for more detail.* Relevant management advice: South-east Commonwealth Marine Reserves Network Management Plan 2013-23 (Director of National Parks, 2013).
	Key Ecological Feature (KEF)	• high productivity • aggregations of marine life			No KEFs are overlapped by the operational area. The KEFs that overlap the spill EMBA are: • Bonney Coast Upwelling • West Tasmanian marine canyons. • Shelf rocky reefs and hard substrates • Bass Cascade. *See Section 5.5.11 for more detail.* Relevant Management Advice is outlined in: South-east Commonwealth Marine Reserves Network Management Plan 2013-23 (Director of National Parks, 2013) Parks Victoria Marine Protected Areas Program Plan 2012-2014 (Parks Victoria, 2012)
	Threatened Ecological Communities (TECs)	• wildlife corridors • aggregations of marine life			No TECs overlap the operational area. The TECs that overlap the spill EMBA are: • Assemblages of species associated with open-coast salt-wedge estuaries of western and central Victoria ecological community • Giant kelp marine forests of south east Australia *See Section 5.7.6 for more detail.* Relevant Management Advice: South-east Commonwealth Marine Reserves Network Management Plan 2013-23 (Director of National Parks, 2013) Parks Victoria Marine Protected Areas Program Plan 2012-2014 (Parks Victoria, 2012)
State Parks and Reserves	Marine Protected Areas	• aggregations of marine life			No marine protected areas overlap the operational area. There are Victorian marine protected areas within the spill EMBA. *See Sections 5.5.7 and 0 for more detail.* Relevant Management Advice: Parks Victoria Marine Protected Areas Program Plan 2012-2014 (Parks Victoria, 2012)
	Terrestrial Protected Areas	• aggregations of terrestrial life			There are Victorian terrestrial protected areas present in the spill EMBA. *See Sections 5.5.8 and 5.5.9 for more detail.*

Receptor Type	Receptor Category	Values and Sensitivities	Operational area	Spill EMBA	Description and relevant management advice
Wetlands of International Importance	Ramsar Wetlands	• aggregation, foraging and nursery habitat for marine life			No Ramsar wetlands overlap the operational area. There is one Ramsar wetlands in the spill EMBA: • Port Phillip Bay (Western Shoreline) and Bellarine Peninsula *See Section 5.5.5 for more detail.* Relevant Management Advice: Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site Management Plan (DELWP, 2018).
Commercial Fisheries	Commonwealth-managed	• economic benefit			The Commonwealth-managed fisheries that overlap the spill EMBA are: • Bass Strait Central Zone Scallop Fishery; • Eastern Tuna and Billfish Fishery; • Skipjack Tuna Fishery; • Small Pelagic Fishery; • Southern and Eastern Scalefish and Shark Fishery; • Southern Bluefin Tuna Fishery; and • Southern Squid Jig Fishery. AFMA has confirmed there is no fishing effort for Commonwealth fisheries within the operational area. *See section 5.8.8 for more detail.*
	Victorian State-managed	• economic benefit			The Victorian State-managed fisheries that overlap the spill EMBA are: • Rock Lobster Fishery; • Giant Crab Fishery; • Abalone Fishery; • Scallop (Ocean) Fishery; • Wrasse (Ocean) Fishery, • Snapper Fishery (Ocean fishery trawl), • Pipi fishery, and • Eel fishery. Based on data from Victorian Fishing Authority (VFA) (2014 to 2018), the above listed fisheries have catch effort within the spill EMBA, however, only the Southern rock lobster fishery has catch effort near the operational area. *See section 5.8.9 for more detail.*
	Tasmanian State-managed	• economic benefit			No Tasmanian State-managed fisheries overlap the operational area. Based on historic catch assessments, the following Tasmanian fisheries are expected to be active within the spill EMBA: • Abalone Fishery • Commercial Dive Fishery • Giant Crab Fishery • Rock Lobster Fishery • Scalefish Fishery • Seaweed Fishery *See section 5.8.10 for more detail.*
Recreational Fisheries	State-managed	• community • recreation			There is unlikely to be recreational fishing in the operational area. Recreational fisheries that occur within the spill EMBA are: • Rock lobster; • Finfish; • Abalone; • Scallops; • Squid; and • Pipi. *See section 5.8.7 for more detail.*
Recreation and Tourism	Various human activities and interaction	• community • recreation • economic benefit			Consultation has identified the key areas of tourism in the region include sightseeing, chartered vessels, diving and fishing. *See section 5.8.5 and 5.8.6 for more detail.*
Industry	Shipping	• community • economic benefit			The SEMR is one of the busiest shipping regions in Australia and Bass Strait is one of Australia's busiest shipping routes. Commercial vessels use the route when transiting between ports on the east, south and west coasts of Australia, and there are regular passenger and cargo services between mainland Australia and Tasmania. *See section 5.8.4 for more detail.*
	Petroleum exploration and production	• economic benefit			Petroleum exploration has been undertaken within the Otway Basin since the early 1960s. The Cooper Energy Casino-Henry gas fields and pipeline and Minerva gas field and pipeline are located within the spill EMBA. *See sections 5.8.2 and 5.8.3 for more detail.*
Heritage	Maritime	• shipwrecks			There are up to 200 historic shipwrecks in the spill EMBA; however only one with a protection zone within the EMBA, the *SS Alert.* *See section 5.9.1 for more detail.*
	Cultural	• World Heritage Properties • Commonwealth Heritage Places			There are no World Heritage Properties or Commonwealth Heritage Places within the operational area or spill EMBA. There are three places of National Heritage that were identified by the PMST report but are located onshore, outside the spill EMBA and do not have marine or coastal components.

Receptor Type	Receptor Category	Values and Sensitivities	Operational area	Spill EMBA	Description and relevant management advice
		• National Heritage Places			*See sections 5.9.2 and 5.9.3 for more detail.*

Green denotes presence of receptor, red denotes absence of receptor.

5.5 Conservation values and sensitivities

The following section details the conservation values and sensitivities identified within the spill EMBA. No conservation values or sensitivities are identified in the operational area.

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, 2013). Provincial bioregions are large areas of the ocean where the fish species and ocean conditions are broadly similar. Ten provincial bioregions in the SEMR are represented in the network. As there is a lack of detailed information on the biodiversity of the deep ocean environment, seafloor features were used as surrogates for biodiversity to design the Marine Reserves Network. The SEMR network contains representative examples of the 17 seafloor features found in the Commonwealth waters of the region.

There are two Australian Marine Parks (AMPs) within the MDO spill EMBA, these being Apollo (surface and entrained hydrocarbons) and Beagle (entrained hydrocarbons only).

The AMPs, in whole or part, are classified as IUCN VI – Multiple Use Zones, in which a wide range of sustainable activities are allowed if they do not significantly impact on benthic (seafloor) habitats or have an unacceptable impact on the values of the area. Allowable activities include commercial fishing, general use, recreational fishing, defence and emergency response. Some forms of commercial fishing, excluding demersal trawl, Danish seine, gill netting (below 183 m) and scallop dredging, are allowed, provided that the operator has approval from the Director of National Parks and abides by the conditions of that approval.

The South-east Marine Reserves are managed under the South-east Marine Reserves Management Plan (DNP, 2013).

5.5.1.1 Apollo AMP

The Apollo AMP is located off Apollo Bay on Victoria's west coast in waters 80 m to 120 m deep on the continental shelf. The reserve covers 1,184 km^2 of Commonwealth ocean territory (DNP, 2013). The reserve encompasses the continental shelf ecosystem of the major biological zone that extends from South Australia to the west of Tasmania. The area includes the Otway Depression, an undersea valley that joins the Bass Basin to the open ocean. Apollo AMP is a relatively shallow reserve with big waves and strong tidal flows; the rough seas provide habitats for fur seals and school sharks (DNP, 2013).

The major conservation values of the Apollo AMP are:

- Ecosystems, habitats and communities associated with the Western Bass Strait Shelf Transition and the Bass Strait Shelf Province and associated with the seafloor features: deep/hole/valley and shelf.
- Important migration area for blue, fin, sei and humpback whales.
- Important foraging area for black-browed and shy albatross, Australasian gannet, short-tailed shearwater and rested tern.
- Cultural and heritage site - wreck of the MV City of Rayville (DNP, 2013).

5.5.1.2 Beagle AMP

The Beagle AMP is an area in shallow continental shelf depths of about 50 m to 70 m, which extends around south-eastern Australia to Tasmania covering an area of 2,928 km^2 (DNP, 2013). The reserve includes the fauna of central Bass Strait; an area known for its high biodiversity. The deeper water habitats are likely to include rocky reefs supporting beds of encrusting, erect and branching sponges, and sediment composed of shell grit with patches of large sponges and sparse sponge habitats.

The reserve includes islands that are important breeding colonies for seabirds and the Australian fur seal, and waters that are important foraging areas for these species. The species-rich waters also attract top predators such as killer whales and great white sharks.

The major conservation values of the Beagle AMP are:

- Ecosystems, habitats and communities associated with the Southeast Shelf Transition and associated with the seafloor features: basin, plateau, shelf and sill.
- Important migration and resting areas for southern right whales.
- It provides important foraging habitat for the Australian fur-seal, killer whale, great white shark, shy albatross, Australasian gannet, short-tailed shearwater, Pacific and silver gulls, crested tern, common diving petrel, fairy prion, black-faced cormorant and little penguin.
- Cultural and heritage sites including the wreck of the steamship SS Cambridge and the wreck of the ketch Eliza Davies (DNP, 2013).

5.5.2 World Heritage Properties

The are no marine or coastal World Heritage Areas in the vicinity of the operational area or in the MDO spill EMBA.

5.5.3 National Heritage Places

There are no National Heritage Places in the MDO spill EMBA (including shorelines).

5.5.4 Commonwealth Heritage Places

The MDO spill EMBA (entrained hydrocarbons) intersects two Commonwealth Heritage Places (Figure 5-2) present on the coastline, these being:

- Swan Island and Naval Waters (Natural, Listed place); and
- Swan Island Defence Precinct (Historic, Listed place).

These are discussed below.

5.5.4.1 Swan Island (and Naval Waters)

Swan Island is the largest emergent sand accumulation feature in Port Phillip Bay. The island, which has been built principally by wave actions rather than by aeolian forces, has played a major role in determining the pattern of sedimentation in Swan Bay and preserves geomorphological evidence of changing Quaternary sea levels. The eastern and northern shores of the eastern arm of Swan Island are of regional significance as an example of active coastal depositional and erosional processes (DotEE, 2004b).

Sand Island is the most important high tide roosting area in Swan Bay and at high tide regularly supports half of the shorebirds in the Swan Bay - Mud Islands complex. Sand Island maintains a regular breeding population of the fairy tern (S*terna nereis*) and provides the main roosting habitat in Swan Bay for the nationally endangered little tern (S*terna albifrons*) (DotEE, 2004b).

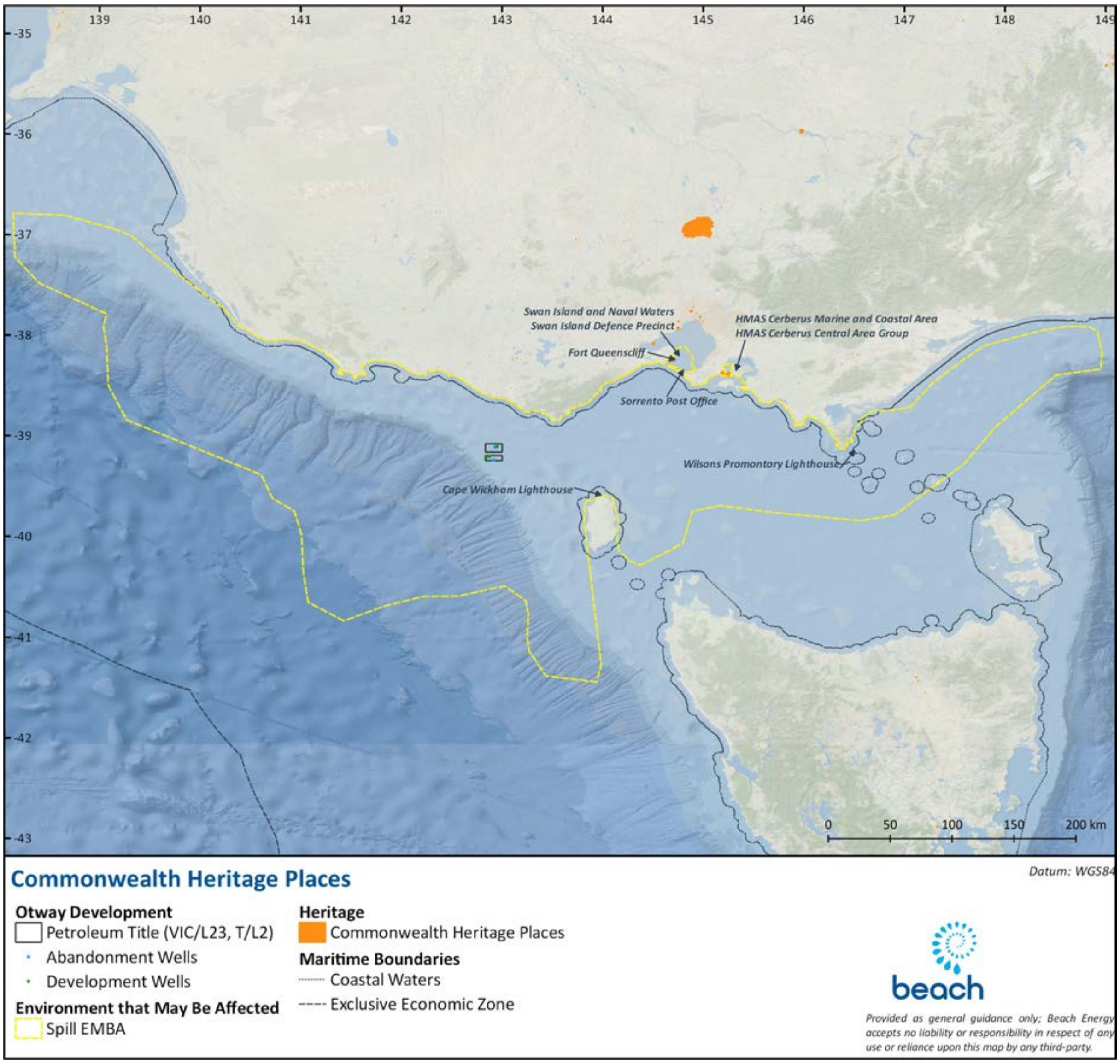


Figure 5-2: Commonwealth Heritage Places present within the EMBA

5.5.5 Wetlands of International Importance

The MDO spill EMBA (entrained hydrocarbons) intersects one Wetland of International Importance (Ramsar-listed wetlands) (Figure 5-3) – the Port Phillip Bay (Western shoreline) and Bellarine Peninsula. The ecological character and values of this Ramsar-listed wetland is described herein.

As defined in Regulations 13(3)(c) of the OPGGS(E)R, particular relevant values and sensitivities include: the ecological character of a declared Ramsar wetland within the meaning of that Act.

Ecological character is the combination of the ecosystem components, processes, benefits and services that characterise the wetland at a given point in time (Ramsar Convention 2005a). Changes to the ecological character of the wetland outside natural variations may signal that uses of the site or externally derived impacts on the site are unsustainable and may lead to the degradation of natural processes, and thus the ultimate breakdown of the ecological, biological and hydrological functioning of the wetland (Ramsar Convention 1996).

The ecological character description of a wetland provides the baseline description of the wetland at a given point in time and can be used to assess changes in the ecological character of these sites. Therefore, the baseline ecological character description of the Ramsar wetlands are described below. The potential to impact the ecological character of the wetlands is evaluated in the impact and risk assessments in Section 7.

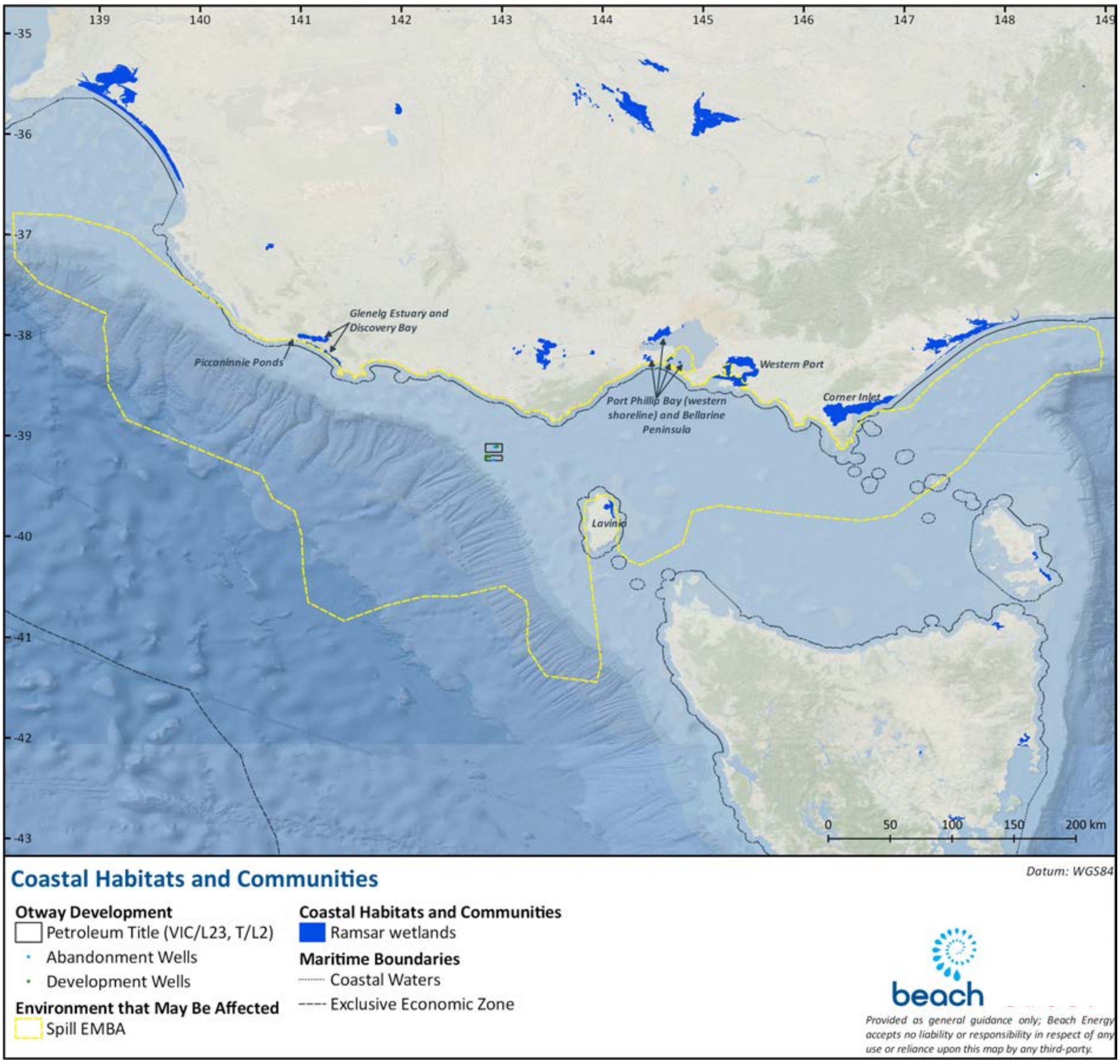


Figure 5-3: Ramsar wetlands

5.5.5.1 Port Philip Bay (Western shoreline) and Bellarine Peninsula

The Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar site is in the western portion of Port Phillip Bay, near the city of Geelong in Victoria. The description below provides the values and baseline ecological character of this Ramsar site.

The Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar site provides important connective habitat for migratory bird species, habitat for fauna staging and foraging, is home to indigenous cultural sites, provides use of resources, and a site for commercial and recreational activities and education initiatives. The ecological character of the Ramsar site is reliant on the management of human activities and health of environment and water ways. In Victoria, the Victorian Waterway Management Strategy (VWMS) guides the management of rivers, estuaries and wetlands. The Ramsar site Management Plan (DELWP, 2018) aligns with Actions in Water for Victoria by improving waterway health and knowledge of waterways and catchments. Since the requirement for a reduction in nitrogen to ensure the health of the Bay, Melbourne water has undertaken extensive management and monitoring which aimed to maintain the ecological character of the Ramsar Site, specifically targeting six populations: growling grass frog, migratory shorebirds, waterfowl, pied cormorant, straw-necked ibis, whiskered tern (DELWP, 2018).

The Port Phillip Bay Ramsar site consists of a number of component areas that include: parts of the shoreline, intertidal zone and adjacent wetlands of western Port Phillip Bay, extending from Altona south to Limeburners Bay; and parts of the shoreline, intertidal zone and adjacent wetlands of the Bellarine Peninsula, extending from Edwards Point to Barwon Heads and including the lower Barwon River. It is protected under the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site Management Plan (DELWP, 2018), which defines the key values as;

- Representativeness – it includes all eight wetlands types.
- Natural function – the interactions of physical, biological and chemical components of wetlands that enable them to perform certain natural functions and making them a vital element of the landscape.
- Flora and fauna – contains the genetic and ecological diversity of the flora and fauna of the region, with at least 332 floral species (22 state threatened species) and 304 species of fauna (29 threatened species).
- Waterbirds – provides habitat for migratory shorebirds, including some of international and national importance.
- Cultural heritage – many aboriginal sites, particularly shell middens and artefact scatters have been found at the site.
- Scenic – provide vistas of open water and marshland in a comparatively pristine condition.
- Economic – use of natural resources in agriculture, fisheries, recreation and tourism.
- Education and interpretation – offers a wide range of opportunities for education and interpretation of wildlife, marine ecosystems, geomorphological processes and various assemblages of aquatic and terrestrial vegetation.
- Recreation and tourism – provides activities such as recreational fishing, birdwatching, hunting, boating, swimming, sea kayaking and camping and activities by commercial operators.
- Scientific – site for long-term monitoring of waterbirds and waders.

5.5.6 Nationally Important Wetlands

The MDO spill EMBA intersects 14 marine or coastal Nationally Important Wetlands (Figure 5-4). No shoreline loading of MDO is predicted at these wetlands – it is entrained or dissolved hydrocarbons only.

5.5.6.1 Anderson Inlet

Anderson Inlet is one of the largest estuaries on the Victorian coast. The inlet mouth is permanently open to the sea so that flushing of the estuary constantly occurs. The inlet is of high value for its fauna, including 23 waterbird species. It is popular for recreational fishing, camping, sailing, power-boating and water-skiing.

5.5.6.2 Glenelg Estuary

The Glenelg Estuary is a large estuarine system consisting of the main channel of the Glenelg River and a side lagoon called the Oxbow. The estuary is fed by the Glenelg River which originates in the Grampians Range. Its major tributaries are the Wannon, Stokes and Crawford Rivers. Water drained from wetlands in the Lindsay-Werrikoo Wetlands and Mundi-Selkirk enters the Glenelg River.

5.5.6.3 Lake Connewarre State Wildlife Reserve

The Lake Connewarre State Wildlife Reserve consists of an extensive estuarine and saltmarsh system drained by the Barwon River. It includes a large permanent freshwater lake, a deep freshwater marsh, several semi-permanent saline wetlands and an estuary.

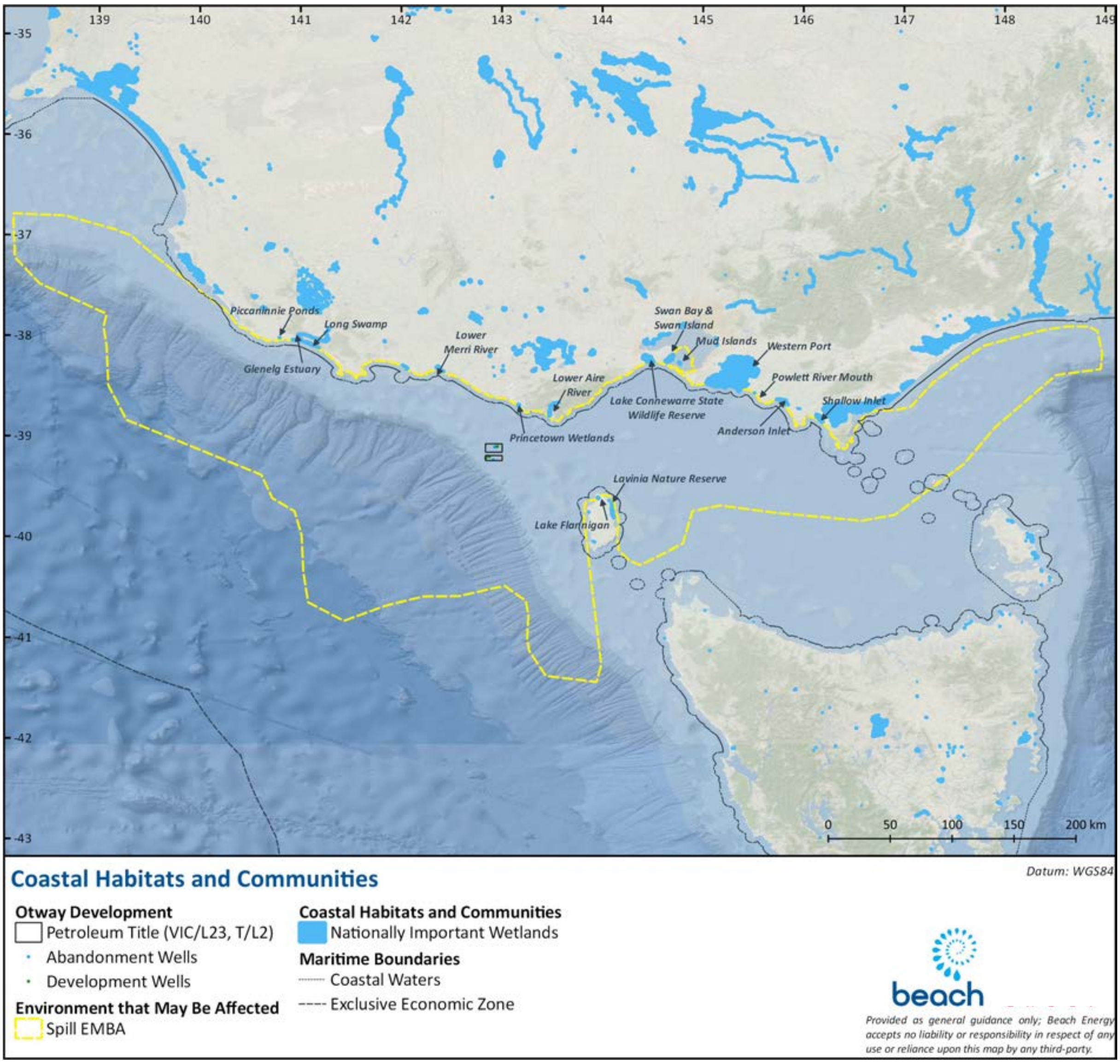


Figure 5-4: Nationally important wetlands

Lake Connewarre State Game Reserve is the largest area of native vegetation remaining on the Bellarine Peninsula. The Lake Connewarre State Game Reserve consists of a wide variety of wetland habitats which support a large and diverse waterbird population and contain a significant area of natural vegetation in this part of the South East Coastal Plain.

5.5.6.4 Long Swamp

Long Swamp is a freshwater wetland in the coastal zone Discovery Bay barrier system. It is separated from the sea by an extensive dunefield. The swamp consists of two major wetlands connected at a natural overflow by a deepened channel. There are three outlets, at Nobles Rocks, White Sands and Oxbow Lake VIC028. The wetlands are mainly fed by groundwater.

5.5.6.5 Lower Merri River Wetlands

The Lower Merri River Wetlands consist of two connected wetlands developed in a swale between calcareous dune ridges and fed by the Merri River.Lower Merri River Wetland is of high value for its avifauna. There are large areas of Common Reed Phragmites australis with Spiky Club-sedge Schoenoplectus pungens, saltmarsh and mudflats. Also, of high value for its geomorphology and are a well preserved example of interdunal wetlands fed by a small drainage system.

5.5.6.6 Lower Aire River Wetlands

These Victorian wetlands consist of three shallow freshwater lakes, brackish to saline marshes and an estuary on the Aire River floodplain. This floodplain occurs at the confluence of the Ford and Calder Rivers with the Aire River. It is surrounded by the Otway Ranges and dune-capped barrier along the ocean shoreline.

The Lower Aire River Wetlands have extensive beds of Common Reed and groves of Woolly Tea-tree which can support large numbers of waterbirds. These wetlands act as a drought refuge for wildlife.

Lake Hordern is considered to be of State significance for its geomorphology.

5.5.6.7 Mud Islands

Mud Islands are a group of low, sandy islands located in the southern part of Port Phillip Bay. The islands are narrow and arranged in a roughly circular configuration around a central tidal lagoon. On the southern, western and northern shores, extensive intertidal mudflats and sea-grass meadows are present.

The islands have very high value for fauna since they support large numbers of migratory wading birds and breeding seabirds.

Mud Islands has a high value for its ecological, recreational, scientific, educational and aesthetic features. It has a very high diversity of birds, 114 species, and is an important feeding and roosting site for many migratory birds. The wetland is an unusual offshore saltmarsh island complex providing breeding habitat for many birds. Mud Islands provides a wilderness experience for visitors.

5.5.6.8 Piccainnie Ponds

The Piccaninnie Ponds is a large spring-fed limestone wetland bounded by coastal dunes. The wetland has an ecological role by it containing a number of threatened plant, bird and fish species. Plant structural formations: Represents the only conserved site which supports a mixed tea-tree Leptospermum lanigerum and Melaleuca squarrosa closed shrub formation, and a reed swamp formation with Phragmites vulgaris and Typha angustifolia. This type of swamp vegetation formerly occupied extensive areas along the coastal region of the south east of the State, but most has been cleared for agriculture.

5.5.6.9 Powlett River Mouth

The Powlett River Mouth provides valuable habitat for the endangered Orange-bellied Parrot. The Powlett River Mouth area supports saltmarsh vegetation which is the required habitat of the Orange-bellied Parrot.

5.5.6.10 Princetown Wetlands

These wetlands consist of swamps of varying salinity on the floodplains of the Gellibrand River and its tributary, the Serpentine (Latrobe) Creek. Wetlands types present are a deep freshwater marsh, semi- permanent saline marshes and a shallow freshwater marsh.

The Princetown Wetlands have extensive beds of Common Reed (*Phragmites australis)* and meadows dominated by Beaded Glasswort which can support large numbers of waterbirds.

A series of relict spits adjacent to the Gellibrand Estuary and a number of levee banks at various sites have State significance for their geomorphology.

5.5.6.11 Shallow Inlet Marine & Coastal Park

Shallow Inlet is a large tidal embayment with a single channel to the sea. The seaward side is enclosed by a sandy barrier complex of spits, bars and mobile dunes. Shallow Inlet consists of Quaternary coastal and aeolian sediments deposited in a basin eroded into lower Palaeozoic and Pliocene sediments and enclosed by Pleistocene and Holocene coastal barrier and dune deposits.

Shallow Inlet is of high value for its avifauna and flora.

5.5.6.12 Swan Bay and Swan Island

Swan Bay is a shallow marine embayment partly enclosed by spits and barrier islands such as Swan Island. It is generally <2 m in depth, with 700-1,000 ha of mudflats exposed at low tide, and has extensive seagrass beds. The bay is fringed with saltmarsh including some extensive flats and there are some stands of remnant woodland.

The bay is of high value for its avifauna and flora. It is very productive for birds, molluscs and fish. The saltmarsh and intertidal seagrass meadows are regionally significant. The avifauna is particularly diverse, with 190 bird species recorded.

Swan Bay is a high value wetland for its ecological, recreational and educational features. Swan Bay is an unusual shallow embayment with a mixture of seagrass species which is relatively undisturbed and in good ecological condition.

5.5.6.13 Western Port

Western Port is a large bay with extensive intertidal flats, mangroves, saltmarsh, seagrass beds, several small islands and two large islands.

5.5.6.14 Yambuk Wetlands

The Yambuk Wetlands are a network of the estuary of the Eumeralla River and Shaw River (Lake Yambuk), associated freshwater meadows and semi-permanent saline wetlands.

The Yambuk Wetlands are high value for their flora and fauna and they act as drought refuges. The vegetation consists of extensive reed beds and narrow bands of saltmarsh. Lake Yambuk is an excellent example of an estuary with extensive overbank swamps.

5.5.7 Victorian Protected Areas – Marine

Victoria has a representative system of 13 Marine National Parks (MNPs) and 11 Marine Sanctuaries established under the *National Parks Act* 1975 (Vic). Seven MNPs and seven marine sanctuaries are located within the MDO spill EMBA as shown in Figure 5-5. Moving west to east along the coastline, these are:

- Discovery Bay MNP;
- Twelve Apostles MNP;
- Point Addis MNP;
- Port Phillip Heads MNP;
- Churchill Island MNP;
- Bunurong MNP; and
- Wilsons Promontory MNP.

The seven marine sanctuaries present within the Victorian state waters of the EMBA are (moving west to east):

- Merri;
- The Arches;

- Marengo Reefs;
- Eagle Rock;
- Point Danger;
- Barwon Bluff; and
- Mushroom Reef;

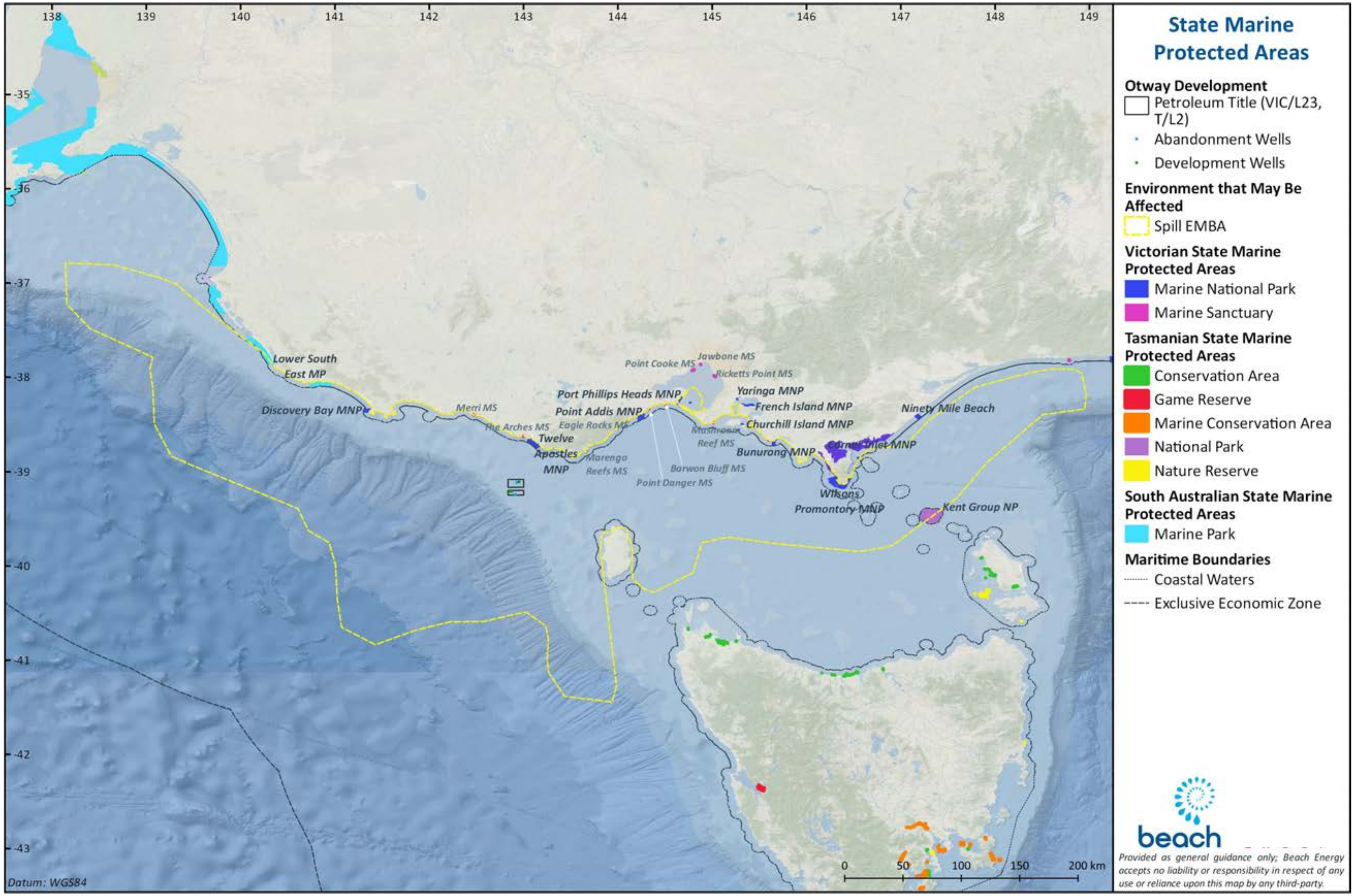


Figure 5-5: State Marine Protected Areas

5.5.7.1 Bunurong Marine National Park

The Bunurong MNP and Bunurong Marine Park are managed through the Bunurong Marine National Park Management Plan (Parks Victoria, 2006a). The Plan identifies the key values of the parks as;

- Extensive intertidal rock platforms and subtidal rocky reefs with a geology and form that is uncommon along the Victorian coast.
- Abundant and diverse marine flora and fauna including over 22 species of marine flora and fauna recorded, or presumed to be, at their eastern or western distributional limits (Plummer et al., 2003).
- Highest diversity of intertidal and shallow subtidal invertebrate fauna recorded in Victoria on sandstone (ECC 2000).
- A high proportion of the common invertebrates occurring along the Victorian coast.
- High diversity of vegetation communities, many of which are considered rare, depleted or endangered within the region (WGCMA, 2003; Carr, 2003).
- Important coastal habitat for several threatened species.
- Spectacular coastal scenery, featuring rugged sandstone cliffs, rocky headlands, intertidal rock platforms and sandy cove.
- Eagles Nest, a prominent rock stack, recognised as a site of national geological and geomorphological significance (Buckley 1993).
- One of the richest Mesozoic fossil areas in Victoria.
- Landscape and seascape of cultural significance to Indigenous people.
- Numerous places and objects of significance to Indigenous people.
- A European history rich in diversity, including sites associated with shipping, coal mining, holidaying and living on the coast.
- Two historical shipwrecks listed on the Victorian Heritage Register (Heritage Victoria, 2004).
- Opportunities for cultural values investigation in an area protected from human disturbance.
- Extensive subtidal reefs with magnificent underwater seascapes, offering numerous opportunities for diving and snorkelling.
- Highly accessible intertidal rock platforms offering opportunities for rock-pooling, marine education and interpretation.
- Spectacular coastal drive, with numerous lookouts and panoramic views of the coast and surrounding waters.
- Coastline offering opportunities for swimming, surfing, boating, fishing and rock-pooling in a natural setting.
- The Bunurong MNP is classified as IUCN II (National Parks) and the Bunurong Marine Park as IUCN IV (Habitat/species management area).

5.5.7.2 Churchill Island MNP

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 site, along with the following National Parks:

- Yaringa Marine National Park;
- French Island Marine National Park;

- Sandstone Island; and
- Elizabeth Island.

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 (Visit Victoria, 2019a).

5.5.7.3 Discovery Bay MNP

The Discovery Bay MNP is situated 20 km west of Portland and covering 2,770 ha and covers part of the largest coastal basalt formation in western Victoria. In deep water (30 – 60 m) there are low reefs forms from ancient shorelines or dunes. There is a rich diversity of marine life within this park due to the cold, nutrient rich waters of the area. The deep calcarenite reefs support diverse sponge gardens whilst the shallower reefs support the brown alga *Ecklonia radiata*. The offshore waters support a diverse array of invertebrates including southern rock lobster, black-lip abalone and gorgonians. The waters also support great white sharks and blue whales during the summer breeding season. The Discovery Bay National Park is protected as part of the Ngootyoong Gunditj Ngootyoong Mara South West Management Plan (Parks Victoria, 2015) which covers over 116,000 ha of public land and freehold Gunditjmaraland in south-western Victoria. The Plan (Parks Victoria, 2015) describes some key values of the Discovery Bay (which includes the National Park and the coastal reserve), namely;

- Recognised roosting, feeding and nesting area for birds such as the hooded plover.
- Important habitat for the orange-bellied parrot.
- Subtidal reefs with giant kelp forest communities (TEC).
- A foredune and dune complex that was formerly recognised on the National Estate.
- Surfing, boating and passive recreation.
- Tourism such as dune buggy tours.

5.5.7.4 Point Addis MNP

Point Addis MNP lies east of Anglesea and covers 4,600 hectares. This park protects representative samples of subtidal soft sediments, subtidal rocky reef, rhodolith beds and intertidal rocky reef habitats. The park also provides habitat for a range of invertebrates, fish, algae, birds and wildlife. The world-famous surfing destination of Bells Beach is within Point Addis MNP.

It is managed under the Management Plan for Point Addis Marine National Park, Point Danger Marine Sanctuary and Eagle Rock Marine Sanctuary (Parks Victoria, 2005a) and is classified as IUCN II. The Plan identifies the following environmental, cultural and social values for the parks and sanctuaries:

- Sandy beaches, subtidal soft sediments, subtidal rocky reefs, rhodolith beds and intertidal reefs.
- A high diversity of algal, invertebrate and fish species.
- A high diversity of sea slugs (opisthobranchs) and other invertebrate communities within Point Danger Marine Sanctuary.
- Evidence of a long history of Indigenous use, including many Indigenous places and objects adjacent to the park and sanctuaries near dunes, headlands, estuaries and creeks.
- Surf breaks, including those at Bells Beach, which are culturally important to many people associated with surfing.
- Coastal seascapes of significance for many who live in the area or visit.
- Recreational and tourism values
- Spectacular underwater scenery for snorkelling and scuba diving.

- Intertidal areas for exploring rock pools.
- Opportunities for a range of recreational activities.
- A spectacular seascape complementing well-known visitor experiences on the Great Ocean Road.

5.5.7.5 Port Phillip Heads MNP

Port Phillip Heads MNP is an area of 35.8 km^2 that is located at the southern end of Port Phillip bay. Many areas within the park are popular for a range of recreational activities.

The habitats that are found within the park are seagrass beds, sheltered intertidal mudflats, intertidal sandy beaches and rocky shores, subtidal soft substrate and rocky reefs. The bay has a high diversity and abundance of marine flora and fauna that provides a migratory site for wader birds (Visit Victoria, 2019b).

5.5.7.6 Twelve Apostles MNP

The Twelve Apostles MNP (75 km^2) is located 7 km east of Port Campbell and covers 16 km of coastline from east of Broken Head to Pebble Point and extends offshore to 5.5 km (Plummer et al, 2003).

The area is representative of the Otway Bioregion and is characterised by a submarine network of towering canyons, caves, arches and walls with a large variety of seaweed and sponge gardens plus resident schools of reef fish. The park contains areas of calcarenite reef supporting the highest diversity of intertidal and sub-tidal invertebrates found on that rock type in Victoria (DSE, 2012).

The park includes large sandy sub-tidal areas consisting of predominantly fine sand with some medium to coarse sand and shell fragment (Plummer et al, 2003). Benthic sampling undertaken within the park in soft sediment habitats at 10 m, 20 m and 40 m water depths identified 31, 29 and 32 species respectively based upon a sample area of 0.1 m^2. These species were predominantly polychaetes, crustaceans and nematodes with the mean number of individuals decreasing with water depth (Heisler & Parry, 2007). No visible macroalgae species were present within these soft sediment areas (Plummer et al, 2003; Holmes et al, 2007). These sandy expanses support high abundances of smaller animals such as worms, small molluscs and crustaceans; larger animals are less common.

The Twelve Apostles Marine Park is managed in conjunction with the Arches Marine Sanctuary under the Management Plan for Twelve Apostles MNP and The Arches Marine Sanctuary (Parks Victoria, 2006b) and is classified as IUCN II. The Plan describes the key environmental, cultural and social values as:

- Unique limestone rock formations, including the Twelve Apostles.
- A range of marine habitats representative of the Otway marine bioregion.
- Indigenous culture based on spiritual connection to sea country and a history of marine resource use.
- The wreck of the Loch Ard (shipwreck).
- Underwater limestone formations of arches and canyons.
- A diverse range of encrusting invertebrates.
- A spectacular dive site (Parks Victoria, 2006b).

5.5.7.7 Wilsons Promontory MNP

Wilsons Promontory MNP is in South Gippsland, about 200 km south-east of Melbourne and at 15,550 ha is Victoria's largest Marine Protected Area. It extends along 17 km of mainland coastline around the southern tip of Wilsons Promontory and is managed through the Wilsons Promontory Marine National Park and Wilsons Promontory Marine Park Management Plan May 2006 (Parks Victoria, 2006a) and is classified as IUCN II (National Parks). The Plan describes the key environmental, cultural and social values as;

- Granite habitats, which are unusual in Victorian marine waters, including extensive heavy reefs with smooth surfaces, boulders and rubble and low-profile reefs.
- Biological communities with distinct biogeographic patterns, including shallow subtidal reefs, deep subtidal reefs.
- Intertidal rocky shores, sandy beaches, seagrass and subtidal soft substrates.
- Abundant and diverse marine flora and fauna, including hundreds of fish species and invertebrates such as sponges, ascidians, sea whips and bryozoans.
- 68 species of marine flora and fauna recorded, or presumed to be, at their eastern or western distributional limits.
- Important breeding sites for a significant colony of Australian fur seals.
- Important habitat for several threatened shorebird species, including species listed under international migratory bird agreements.
- Outstanding landscapes, seascapes and spectacular underwater scenery.
- Seascape, cultural places and objects of high traditional and cultural significance to Indigenous people.
- Indigenous cultural lore and interest maintained by the Gunai / Kurnai and Boonwurrung people.
- Important maritime and other history.
- Historic shipwrecks, many of which are listed on the Victorian Heritage Register (Parks Victoria, 2006a).

5.5.7.8 Marengo Marine Sanctuary

The Marengo Reefs Marine Sanctuary (12 ha) is in Victorian State waters near Marengo and Apollo Bay, which are on the Great Ocean Road, approximately 220 km south-west of Melbourne. The sanctuary protects two small reefs and a wide variety of microhabitats. Protected conditions on the leeward side of the reefs are unusual on this high wave energy coastline and allow for dense growths of bull kelps and other seaweed. There is an abundance of soft corals, sponges, and other marine invertebrates, and over 56 species of fish have been recorded in and around the sanctuary. Seals rest on the outer island of the reef and there are two shipwrecks (the Grange and Woolamai) in the sanctuary (Parks Victoria, 2007a).

The Marengo Reefs Marine Sanctuary Management Plan (Parks Victoria, 2007a) identifies the environmental, cultural and social values as:

- Subtidal soft sediments, subtidal rocky reefs and intertidal reefs.
- High diversity of algal, invertebrate and fish species.
- Australian fur seal haul out area.
- Evidence of a long history of Indigenous use, including many Indigenous places and objects nearby.
- Wrecks of coastal and international trade vessels in the vicinity of the sanctuary.
- Spectacular underwater scenery for snorkelling and scuba diving.
- Intertidal areas for exploring rock pools.
- Opportunities for a range of aquatic recreational activities including seal watching.

5.5.7.9 The Arches Marine Sanctuary

The Arches Marine Sanctuary protects 45 ha of ocean directly south of Port Campbell. It has a spectacular dive site of limestone formations, rocky arches and canyons. The sanctuary is also ecologically significant, supporting habitats such as kelp forests and a diverse range of sessile invertebrates on the arches and canyons. These habitats support schools of reef fish, seals and a range of invertebrates such as lobster, abalone and sea urchins. The Arches Marine Sanctuary is managed in conjunction with the Twelve Apostles Marine Park under the Management Plan for Twelve Apostles MNP and The Arches Marine Sanctuary.

5.5.7.10 Barwon Bluff Marine Sanctuary

Barwon Bluff Marine Sanctuary (17 ha) is located at Barwon Heads, approximately 100 km south-west of Melbourne. The Barwon Bluff Marine Sanctuary Management Plan (Parks Victoria, 2007b) identifies the environmental, cultural and social values as:

- Intertidal reef platforms with a high diversity of invertebrate fauna and flora.
- Subtidal reefs that support diverse and abundant flora, including kelps, other brown algae, and green and red algae.
- Calcarenite and basalt reefs extending from The Bluff that are of regional geological significance.
- Intertidal habitats that support resident and migratory shorebirds, including threatened species.
- Subtidal habitats that support sedentary and mobile fish and are also used by migratory marine mammals.
- Marine habitats and species that are of scientific interest and valuable for marine education.
- Opportunities for underwater recreation, including visits to subtidal communities that are easily accessible from the shore.
- Outstanding coastal vistas, seascapes and underwater scenery.
- An important landmark and area for gathering fish and shellfish for the Wathaurong people.
- A strong historic and ongoing connection with marine education.
- Remnants from the Earl of Charlemont, a heritage-listed shipwreck.

5.5.7.11 Eagle Rock Marine Sanctuary

Eagle Rock Marine Sanctuary (17 ha) is about 40 km south-west of Geelong, close to Aireys Inlet. The sanctuary extends from high water mark around Split Point between Castle Rock and Sentinel Rock. It extends offshore for about 300 m and includes Eagle Rock and Table Rock. The main habitats protected by the sanctuary include intertidal and subtidal soft sediment, intertidal and subtidal reefs, and the water column. It is managed in conjunction with Point Addis MNP and Point Danger Marine Sanctuary.

5.5.7.12 Merri Marine Sanctuary

The Merri Marine Sanctuary is on the Victorian south-west coast near Warrnambool, approximately 260 km west of Melbourne. Merri Reefs Marine Sanctuary (25 ha) is located at the mouth of the Merri River, west of Warrnambool Harbour. Merri Marine Sanctuary contains a mixture of habitats, including intertidal reef, sand, shallow reef and rocky overhang. These areas provide a nursery for many fish species and a habitat for many algae species, hardy invertebrates and shorebirds. Bottlenose dolphins and fur seals are regular visitors to the shore (Parks Victoria, 2007c).

The Sanctuary is protected with the Merri Marine Sanctuary Management Plan (Parks Victoria, 2007c) identifies the environmental, cultural and social values as:

- Culturally significant to indigenous communities that have a long association with the area
- Merri River, wetlands and islands and headlands provide a variety of habitats
- Provision of nursery for many fish species and habitat for algal species, hardy invertebrates and shorebirds.

5.5.7.13 Mushroom Reef Marine Sanctuary

The Mushroom Reef Marine Sanctuary is on the Bass Strait coast at Flinders near the western entrance to Western Port, 92 km by road south of Melbourne. The sanctuary (80 ha) abuts the Mornington Peninsula National Parkland extends from the high-water mark to approximately 1 km offshore. The sanctuary is protected under the Mushroom Reef Marine Sanctuary Management Plan (Parks Victoria, 2005b) which identifies the environmental, cultural and social values 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.
- Excellent opportunities for underwater recreation activities such as diving and snorkelling among accessible subtidal reefs.

5.5.7.14 Point Danger Marine Sanctuary

Point Danger Marine Sanctuary (25 ha) is 20 km south-west of Geelong, close to the township of Torquay and nearby Jan Juc. It extends from the high-water mark at Point Danger offshore for approximately 600 m east and 400 m south, encompassing an offshore rock platform. It is managed in conjunction with Point Addis MNP and Eagle Rock Marine Sanctuary.

5.5.8 Victorian Protected Areas – Terrestrial

Figure 5-6 illustrates that there are 17 Victorian National Parks, Coastal Parks and Wildlife Reserves within the spill EMBA (i.e. protected areas that include land/water below the high tide mark). No shoreline contact with MDO is predicted in the modelling – any contact with the shorelines of these parks will be through hydrocarbons in the water column (entrained and dissolved).

5.5.8.1 Bay of Islands Conservation Park

This coastal park has outstanding ocean views and geological features and covers an extensive area of the coastline (~32 km in length and 950 ha), stretching east from Warrnambool to Peterborough. Sheer cliffs and rock stacks dominate the bays, and the heathlands contain wildflowers. Beaches are accessible at some points (Parks Victoria, 1998).

This park protects the terrestrial environment above the low water mark of this coastline. This Coastal Park is protected under the Port Campbell National Park and Bay of Islands Coastal Park Management Plan (Parks Victoria, 1998).

5.5.8.2 Cape Liptrap Conservation Park

Cape Liptrap Coastal Park is located in South Gippsland, 180 km south-east of Melbourne. It is protected under the Cape Liptrap Coastal Park Management Plan (Parks Victoria, 2003), which identifies the environmental, cultural and social values as:

- Extensive heathland and coastal forest vegetation communities.
- The occurrence of about 270 species of flowering plants, including 27 orchid species.
- Thirty threatened fauna species, including ten species listed as threatened under the Flora and Fauna Guarantee Act 1988 (Vic.), 17 migratory bird species and ten threatened flora species.
- One of the most interesting and complex geological sequences in the State, ranging from ancient Cambrian rocks to Recent sands.
- Spectacular coastal landforms at Cape Liptrap, Arch Rock and at Walkerville.
- Numerous middens and other significant Aboriginal sites.
- Relics of the lime-burning industry at Walkerville.
- Cape Liptrap lighthouse.
- Spectacular and diverse coastal scenery.
- Opportunities for fishing, nature observation, camping, and walking in natural settings.

This park protects the terrestrial environment above the low water mark of this coastline.

5.5.8.3 Cape Nelson State Park

Cape Nelson State Park is near Portland on Victoria's southwest coast with an area of 243 ha. The park offers an archaeologically, ecologically and geologically rich and diverse attractions.

5.5.8.4 Discovery Bay Coastal Park

The Discovery Bay Coastal Park is a remote coastal park that protects 55 km of ocean beach. Inland, the park encompasses high coastal cliffs, sand dunes, freshwater lakes and swamps, with thriving coastal vegetation and wildlife. The park extends along the coast of Discovery Bay from Cape Nelson north-westwards to the border of South Australia, covering an area of 10,460 ha (Parks Victoria, 2015).

5.5.8.5 Douglas Point Conservation Park

Douglas Point Conservation Park is popular for recreational bush walking, bird watching, fishing, diving and surfing that is located 11 km north-west of Port MacDonnell. The park has natural and cultural values and conserves the coastal health habitat and associated endangered and vulnerable plant and animal species (DEH, 2003).

5.5.8.6 French Island National Park

The French Island National Park is located 10 km south of Tooradin, French Island Marine National Park is adjacent to the northern shoreline of French Island National Park in Western Port. Extending 15 km along the shoreline, the park encompasses approximately 2800 ha. It includes one of Victoria's most extensive areas of saltmarsh and mangrove communities and also includes mudflats of state geomorphological significance (Parks Victoria, 2019a).

5.5.8.7 Great Otway National Park

The Great Otway National Park (103,185 ha) is located near Cape Otway and stretches from the low water mark inland on an intermittent basis from Princetown to Apollo Bay (approximately 100 km).

Landscapes within the park are characterised by tall forests and hilly terrain extending to the sea with cliffs, steep and rocky coasts, coastal terraces, landslips, dunes and bluffs, beaches and river mouths. There is a concentration of archaeological sites along the coast, coastal rivers and reefs. The park contains many sites of international and national geological and geomorphological significance including Dinosaur Cove (internationally significant dinosaur fossil site), Lion Headland and Moonlight Head to Milanesia Beach (internationally significant coastal geology and fossils).

The park provides habitats for the conservation of the rufous bristlebird, hooded plover, white-bellied sea eagle, fairy tern, Caspian tern and Lewin's rail and native fish such as the Australian grayling.

The park contains significant Aboriginal cultural sites adjacent to rivers, streams and the coastline including over 100 registered archaeological sites, particularly shell middens along the coast, as well as non-physical aspects such as massacre sites, song lines, family links and stories. The park also contains four sites listed on the Victorian Heritage Register including the Cape Otway Light Station and several shipwreck features along the coast (i.e. anchors) (Parks Victoria and DSE, 2009).

This park protects the terrestrial environment above the low water mark of this coastline. The Park is protected under the Great Otway National Park and Otway Forest Park Management Plan (Parks Victoria and DSE, 2009) and relevant values are:

- A large area of essentially unmodified coastline, linking the land to marine ecosystems and marine national parks.
- A diverse range of lifestyle and recreation opportunities for communities adjacent to the parks – for local permanent residents and holiday homeowners Regionally, nationally and internationally.
- Significant tourist attractions, close to access routes and accommodation, such as spectacular coastal scenery along the Great Ocean Road, access to beautiful beaches, clifftop lookouts, picnic areas, historic sites, waterfalls and walking tracks such as the Great Ocean Walk.
- The basis for continued growth of nature-based tourism associated with the parks and the region, providing economic opportunities for accommodation providers, food and services providers, and recreation, tourism and education operators.

5.5.8.8 Lady Julia Percy Island Wildlife Reserve

Lady Julia Percy Island is off the coast of Victoria near Port Fairy. It is one of the two largest breeding sites for the Australian fur seal species in Australia (DoE, 2017a) and provides habitat to migratory seabirds. There is no management plan for Lady Julia Percy Island Wildlife Reserve.

5.5.8.9 Mornington Peninsula National Park

Mornington Peninsula National Park is situated about 70 km south of Melbourne. Mornington Peninsula National Park runs along the coast from Point Nepean, at the western tip of the Mornington Peninsula, to Bushrangers Bay, where it turns inland along the Main Creek valley, still as a narrow band, until it joins the more expansive Greens Bush section of the Park. This park protects the terrestrial environment above the low water mark of this coastline. The Park is managed under the Mornington Peninsula National Park and Arthurs Seat State Park Management Plan, which has identified the key environmental, social and cultural values as (Parks Victoria, 2013):

- Largest and most significant remaining areas of native vegetation on the Mornington Peninsula. Numerous sites and features of geomorphic significance, particularly along the coast (cliffed calcarenite coast sandy forelands and basalt shore platforms).
- Only representation in the Victorian conservation reserve system of four land systems formed within the Southern Victorian Coastal Plains and the Southern Victorian Uplands.
- Many significant native plants and vegetation communities, especially in Greens Bush and former McKellar Flora Reserve, and the most extensive remnant coastal grassy forest habitat on the Mornington Peninsula.
- Highly scenic landscape values along the ocean coast and at Port Phillip heads and the prominent landscape feature of Arthurs Seat.
- Many significant fauna species, including populations of the nationally significant hooded plover, over 30 species of State significance and many species of regional significance.

- High quality marine and intertidal habitats, with some pristine areas within Point Nepean.
- Nationally significant and fascinating historic sites at Point Nepean.
- The historic Seawinds Gardens in Arthurs Seat State Park.
- One of the highest recorded densities of Aboriginal archaeological sites along the Victorian Coast
- South Channel Fort is an important component of the historic fortification defence system of Port Phillip (and an important bird nesting and roosting site).
- Spectacular scenery and popular surf beaches associated with a wild and rugged coastline.
- Local and regional economic benefits.
- Intensively used recreational nodes, e.g. at Portsea, Sorrento, Cape Schanck and Arthurs Seat.

5.5.8.10 Phillip Island Nature Park

Phillip Island is east of Melbourne and forms a natural breakwater for the shallow waters of Western Port. Phillip Island is Biologically Important Area (BIA) for the little penguin, with breeding and foraging sites present (Commonwealth of Australia, 2015a). There is no management plan for Phillip Island Nature Park.

5.5.8.11 Piccaninnie Ponds Conservation Park

The Piccaninnie Pond covers an area of 8.64 km^2, that has a wide diversity of fauna and flora with 60 bird species and six vegetation communities. Other vegetation found within the park includes reeds, sedge swamp, open heath and tussock grassland.

5.5.8.12 Port Campbell National Park

Port Campbell National Park is slightly west of Twelve Apostles Marine National Park and 10 km east of Warrnambool. The park is 1,750 ha that presents an extraordinary collection of wave-sculptured rock formations. Port Campbell National Park is home to various fauna such as the little penguin, short-tailed shearwater and various whale species (Parks Victoria, 2019b).

5.5.8.13 Reef Island and Bass River Mouth Nature Conservation Reserve

Reef Island and Bass River Mouth Nature Conservation Reserve is situated on the eastern shores of Westernport Bay. Reef Island is accessible at low tide via a narrow spit. The day visitor area on the banks of the Bass River is ideal for fishing and bird watching. There is no management plan for this Conservation Reserve,

5.5.8.14 Seal Island Wildlife Reserve

Seal Islands is east of Wilsons Promontory. Seal Island is one of the two largest breeding sites for the Australian fur seal (Commonwealth of Australia, 2015a). There is no management plan for Seal Islands Wildlife Reserve.

5.5.8.15 Swan Bay Wildlife Reserve

Swan Bay Wildlife Reserve is an internationally recognized wetland and marine ecosystem within Port Phillip Bay. Swan Bay supports diverse saltmarsh communities which form part of the habitat critical for survival of the endangered orange bellied parrot and is an important recreational and tourism resource (AANRO, 1991).

5.5.8.16 Wilsons Promontory National Park

The Wilsons Promontory National Park is in South Gippsland, about 200 km southeast of Melbourne and includes the Wilsons Promontory Wilderness Zone, Southern Wilsons Promontory Remote and Natural Area and Wilsons

Promontory Islands. It is managed under the Wilsons Promontory National Park Management Plan. The Plan identifies the key environmental, social and cultural values as (Parks Victoria, 2002):

- Entire promontory of national, geological and geomorphological significance containing a number of sites of State and regional significance.
- Diverse vegetation communities, including warm temperate and cool temperate rainforest, tall open forests, woodlands, heathlands, and swamp and coastal communities.
- Unmodified rivers and streams with no introduced fish species.
- Half of Victoria's bird species.
- Intertidal mudflats, which are an internationally important habitat for migratory wading birds.
- The largest coastal wilderness area in Victoria.
- Numerous middens and other significant Aboriginal sites.
- Remains of sites of several small European settlements and past uses including timber milling, mining and grazing.
- A number of shipwrecks in the waters around Wilsons Promontory.
- The heritage buildings of Wilsons Promontory Light Station.
- Outstanding natural landscapes including spectacular and diverse coastal scenery.

This park protects the terrestrial environment above the low water mark of this coastline.

5.5.8.17 Yambuk Wetlands Natural Conservation Reserve

Yambuk Wetlands Natural Conservation Reserve is located south of Lake Yambuk along the coastline with an area of 0.77km^2 (Protected Planet, 2019).

5.5.9 Tasmanian Protected Areas – Terrestrial

Figure 5-6 illustrates that there are nine Tasmanian terrestrial National Reserves, Conservations Areas and Game Reserves within the MDO spill EMBA. No shoreline contact with MDO is predicted in the modelling – any contact with the shorelines of these parks will be through hydrocarbons in the water column (entrained and dissolved).

Note that the MDO spill EMBA does not make contact with Tasmanian marine protected areas.

5.5.9.1 Cone Islet Conservation Area

Cone Islet Conservation Area has an area of about 0.06 km^2 and is part of the Curtis Island group. Cone Islet is lying in the northern Bass Strait between Furneaux Group and Wilsons Promontory in Victoria.

5.5.9.2 Curtis Island Nature Reserve

Curtis Island is located in the Bass Strait between Wilsons Promontory and Tasmania. It is designated IUCN 1a which is a strict nature reserve, which allows minimal human use (DPIPWE, 2015). It has a large population of breeding seabirds and waders (Carlyon et al., 2011). It is also a recognised BIA for breeding and feeding for little penguins (Commonwealth of Australia, 2015a). There is no management plan for the Curtis Island Nature Reserve.

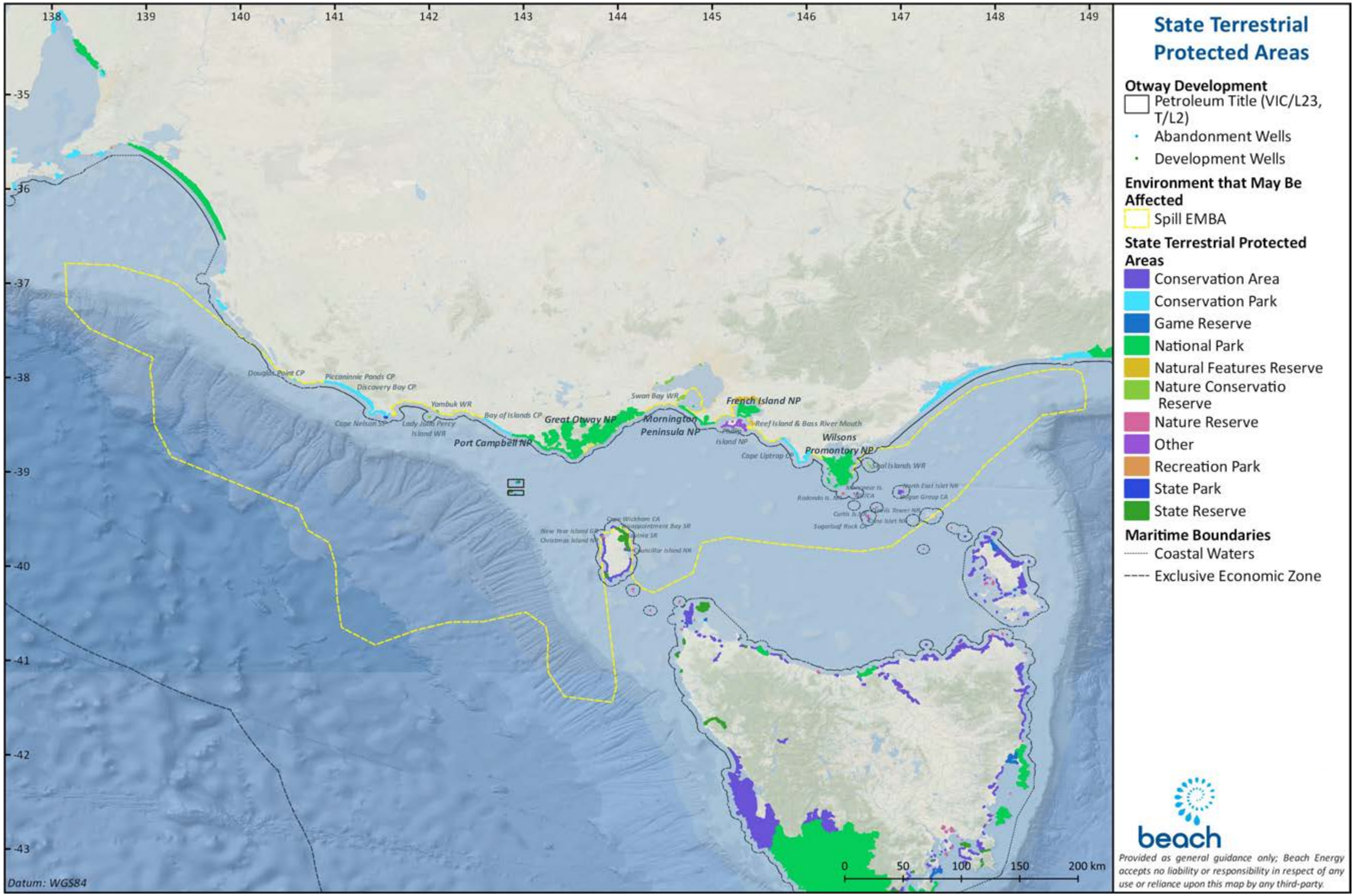


Figure 5-6: State Terrestrial Protected Areas

5.5.9.3 Devils Tower Nature Reserve

Devils Tower are two small granite islands which are part of the Curtis Group and are located in the Bass Strait between Wilsons Promontory and Tasmania. It is designated IUCN 1a which is a strict nature reserve, which allows minimal human use (DPIPWE, 2015) and is noted as being important for breeding seabirds and waders. There is no management plan for the Curtis Island Nature Reserve.

5.5.9.4 East Moncoeur Island Conservation Area

East Moncoeur Island is part of Tasmania's Rodondo Group off Wilsons Promontory in Victoria. It is designated as IUCN Category V which is a protected landscape/seascape. There is no management plan for the East Moncoeur Island Conservation Area.

5.5.9.5 West Moncoeur Island Nature Reserve

West Moncoeur Island Nature Reserve is an area of 0.14 km^2 that is situated 2.5 km east of East Moncoeur Island off Wilsons Promontory in Victoria. West Moncoeur is part of the Rodondo Group. It supports large breeding colonies of Australia fur-seals (Carlyon et al, 2015).

5.5.9.6 Hogan Group Conservation Area

The Hogan Group is in Bass Strait south of Wilsons Promontory. The Hogan archipelago is an important seabird location and supports major breeding colonies of many species (Carlyon et al, 2011). It is designated as IUCN Category IV which is habitat/species management area. There is no management plan for the Hogan Group Conservation Area.

5.5.9.7 North East Islet Nature Reserve

North East Islet (or Boundary Islet) is part of the Hogan Island Group. It is a haul-out site for the Australia fur-seal (Carlyon et al, 2011).

5.5.9.8 Rodondo Island Nature Reserve

Rodondo Island is located in Bass Strait, approximately 10 km south of Wilsons Promontory. Both Australian and New Zealand fur-seal have haul-out sites on Rodondo Island (Carlyon et al, 2015). It hosts a number of breeding seabirds, with the short-tailed shearwater being the most common (Carlyon et al, 2015).

5.5.9.9 Sugarloaf Rock Conservation Area

Sugarloaf Rock is a small granite island, with an area of 1.07 ha, in south-eastern Australia. It is part of Tasmania's Curtis Group, lying in northern Bass Strait between the Furneaux Group and Wilson's Promontory in Victoria. It is a known breeding site for the fairy prion and common diving-petrel along with a known haul-out site for the Australian fur-seals.

5.5.10 South Australian Protected Areas - Marine

Figure 5-6 illustrates that there is one South Australian marine park, the Lower South East Marine Park, in the MDO spill EMBA. No shoreline contact with MDO is predicted in the modelling – any contact with the shoreline of this park will be through hydrocarbons in the water column (entrained and dissolved).

The Lower South East Marine Park covers 360 km^2 and is divided into two sections: the area adjacent to Canunda National Park; and the area extending from Port MacDonnell Bay just west of French Point to the South Australian - Victorian border. The marine park borders Canunda National Park and partially overlays Piccaninnie Ponds Conservation Park.

The Lower South East Marine Park Management Plan 2012 (DEWNR, 2012) details the following values:

- High diversity of plants and animals, including blue whales, due to the influence of the Bonney Upwelling, an ocean current that supplies nutrient-rich water to the area.
- Diverse range of habitats ranging from high-energy sandy beaches and freshwater springs, various reef types (shore platforms, fringing and limestone),
- Kelp forests and algal communities and is strongly influenced by natural processes such as the Bonney Upwelling.
- Spring lakes such as Ewen Ponds and Piccaninnie Ponds (both Wetlands of National Importance) emerge from the beaches and are unusual in South Australia.
- Habitat for several threatened or potentially threatened species that require freshwater and marine environments during their lifecycle, including the pouched lamprey, short-headed lamprey and shortfinned eel.
- Feeding and resting grounds for migratory and resident shorebirds.
- Recreational activities including fishing, diving and snorkelling.
- Commercial fisheries including the Southern Zone Abalone Fishery, the Southern Zone Rock Lobster Fishery, the Marine Scalefish Fishery, the Charter Fishery and the Miscellaneous Giant Crab Fishery.
- The Buandig Aboriginal people have traditional associations with areas of the marine park.

5.5.11 Key Ecological Features

KEFs are elements of the marine environment, based on current scientific understanding, are considered to be of regional importance for either the region's biodiversity or ecosystem function and integrity of a Commonwealth Marine Area.

No KEFs occur within the operational area. The MDO spill EMBA intersects two KEFs, these being the Bonney Coast Upwelling and West Tasmanian Marine Canyons. The Shelf Rocky Reefs and Hard Substrates KEF and Bass Cascade KEF may occur within the spill EMBA.

5.5.11.1 Bonney Coast Upwelling

The Bonney Upwelling is an area of high productivity and aggregations of marine life. It is a predictable, seasonal upwelling which brings of cold, nutrient rich water to the sea surface typically occurs in the summer and autumn along the narrow continental shelf between Robe, SA, and Portland, Victoria. Surface expression of the upwelling is only intermittent further to the southeast where the shelf is wider. Nonetheless the upwelling can extend to at least as far as Beach’s Thylacine gas platform (Levings & Gill 2010).

This Bonney Upwelling phenomenon generally starts in the eastern part of the Great Australian Bight in November/December and spreads eastwards to the Otway Basin around February (Gill et al, 2011) as the latitudinal high-pressure belt migrates southward. The upwelling occurs via Ekman dynamics, where the ocean surface experiences a steady wind stress which results in a net transport of water at right angles to the left of the wind direction.

Ecological importance

The primary ecological importance of the Bonney Upwelling is as a feeding area for the blue whale (*Balaenoptera musculus*). The upwelled nutrient-rich re-heated Antarctic intermediate water promotes blooms of coastal krill, *Nyctiphanes australis*, which in turn attracts blue whales to the region to feed.

The Bonney Coast Upwelling is one of only two identified seasonal feeding areas for blue whales in Australian coastal waters and is one 12 known blue whale feeding aggregation areas globally. Sightings of the sei whale in the upwelling indicate this is potentially an important feeding ground for the species (Gill et al., 2015). There have also been sightings of the fin whale, which indicate this could potentially be an important feeding ground (Morrice et al., 2004)

The high productivity of the Bonney Upwelling also leads to other attributes such as algal diversity and its productivity as a fishery. This productivity is also capitalised on by other higher predator species such as little penguins and fur-seals feeding on baitfish. Robinson et al., (2008) postulated that upwelling waters may bring fish prey of Australian fur-seals to surface waters, which are then flushed into Bass Strait within foraging range of seals.

Variability

While the general characteristics of the Bonney Coast upwelling are broadly understood virtually nothing is known of the longer-term variability of the phenomenon. Alongshore wind is the predominant mechanism in the upwelling, which is, therefore, directly impacted by any changes to the strength or frequency of these winds. However, it should be noted, that not all favourable upwelling winds lead to an upwelling event.

The El Niño – Southern Oscillation (ENSO) has been identified by some authors as a potential driver of upwelling strength along the south Australian coast. The ENSO is the dominant global mode of inter-annual climate variability, is a major contributor to Australia's climate and influences Australia's marine waters to varying degrees around the coast. The two phases of ENSO, El Niño and La Niña, produce distinct and different changes to the climate.

Middleton et al., (2007) examined meteorological and oceanographic data and output from a global ocean model. The authors concluded that El Niño events lead to enhanced upwelling along Australia's southern shelves. However, it has been found that relationships between ENSO events and upwelling and production indices off southern Australia are weak due to the high interannual and inter-seasonal variability in these indices.

Linkages between climate, upwelling strength and blue whale abundance

The complex interaction between climatic conditions, upwelling strength and seasonal blue whale distribution and abundance within the Bonney Upwelling is currently poorly understood other than at a general level. Factors to be resolved to enable a more detailed understanding include observations that not all strong upwelling-favourable winds necessarily lead to strong upwelling events (Griffin et al., 1997) and that increased upwelling does not necessarily equate to increased productivity as conditions may be less optimal for plankton growth. Further an increase in plankton biomass does not necessarily coincide with the presence of the blue whales.

Review of pygmy blue whale aerial observation data from Gill et al., (2011) from the 2001-02 to 2006-07 seasons, and additional surveys in the Otway Basin commissioned by Origin during February 2011 and November -December 2012 (see Section 5.7.7.6) did not find a significant positive correlation between El Niño conditions and pygmy blue whale abundance. Such a positive correlation could be expected if El Niño conditions caused stronger upwelling, stronger upwelling led to increased planktonic productivity and blue whales were more likely to be present when productivity is higher.

Two of the six seasons subject to aerial surveys in the eastern section of the Otway Basin (Gill et al, 2011) were determined by the Bureau of Meteorology to demonstrate weak to moderate El Nino conditions. The remainder of the years were assessed to be neutral. The two El Nino seasons (2002-03 and 2006-07) corresponded with the lowest observation frequencies (sightings/1,000 km) for pygmy blue whales of all the yearly surveys.

Aerial surveys commissioned by Origin undertaken during February 2011 and November-December 2012 were undertaken during La Nina events classified by the BOM as very strong and strong respectively. Although observation frequencies are not available, the absolute numbers of pygmy blue whales observed was substantially higher than during the 2001-01 to 2006-07 surveys. Also, of note is that pygmy blue whales observed during February 2011 were congregated along the seaward edge of a plume of terrestrial runoff, potentially suggesting use of this plume as a feeding resource, which has no relationship to upwelling.

As such, the interactions between climate and ecology for this upwelling system are complex and no definitive linkages between climatic events, upwelling strength and blue whale abundance have yet been described. Given this, development of management strategies for petroleum activities in the area using prevailing climatic conditions as a predictor of seasonal blue whale abundance is not currently feasible.

5.5.11.2 West Tasmanian Canyons

The West Tasmanian Canyons are located on the relatively narrow and steep continental slope west of Tasmania. This location has the greatest density of canyons within Australian waters where 72 submarine canyons have incised a 500 km-long section of slope (Heap & Harris 2008). The canyons in the Zeehan AMP are relatively small on a regional basis, each less than 2.5 km wide and with an average area of 34 km^2 shallower than 1,500 m (Adams et al, 2009). The Zeehan canyons are typically gently sloping and mud-filled with less exposed rocky bottoms compared with other canyons in the south-east marine region (e.g. Big Horseshoe Canyon).

Submarine canyons modify local circulation patterns by interrupting, accelerating, or redirecting current flows that are generally parallel with depth contours. Their size, complexity and configuration of features determine the degree to which the currents are modified and therefore their influences on local nutrients, prey, dispersal of eggs, larvae and juveniles and benthic diversity with subsequent effects which extend up the food chain.

Eight submarine canyons surveyed in Tasmania, Australia, by Williams et al (2009) displayed depth-related patterns with regard to benthic fauna, in which the percentage occurrence of faunal coverage visible in underwater video peaked at 200-300 m water depth, with averages of over 40% faunal coverage. Coverage was reduced to less than 10% below 400 m depth. Species present consisted of low-relief bryozoan thicket and diverse sponge communities containing rare but small species in 150 to 300 m water depth.

Sponges are concentrated near the canyon heads, with the greatest diversity between 200 m and 350 m depth. Sponges are associated with abundance of fishes and the canyons support a diversity of sponges comparable to that of seamounts. Based upon this enhanced productivity, the West Tasmanian canyon system includes fish nurseries (blue wahoo and ocean perch), foraging seabirds (albatross and petrels), white shark and foraging blue and humpback whales (TSSC, 2015a).

5.5.11.3 Shelf Rocky Reefs and Hard Substrates

Rocky reefs and hard grounds are located in all areas of the SEMR continental shelf including Bass Strait, from the sub-tidal zone shore to the continental shelf break. The continental shelf break generally occurs in 50 m to 150–220 m water depth. The shallowest depth at which the rocky reefs occur in Commonwealth waters is approximately 50 m.

On the continental shelf, rocky reefs and hard grounds provide attachment sites for macroalgae and sessile invertebrates, increasing the structural diversity of shelf ecosystems. The reefs provide habitat and shelter for fish and are important for aggregations of biodiversity and enhanced productivity.

The shelf rocky reefs and hard substrates are defined as a KEF as they are an area of high productivity and aggregations of marine life. This KEF has not yet been spatially defined (DoE, 2015a).

5.5.11.4 Bass Cascade

The Bass Cascade refers to the "underwater waterfall" effect brought about by the northward flow of Bass Strait waters in winter that are more saline and slightly warmer than surrounding Tasman Sea waters. As the water approaches the mainland in the area of the Bass Canyon group it forms an undercurrent that flows down the continental slope. The cascading water has a displacing effect causing nutrient rich waters to rise, which in turn leads to increased primary productivity in those areas. The cascading water also concentrates nutrients and some fish and whales are known to aggregate along its leading edge.

Bass Cascade is defined as a KEF as it is an area of high productivity. The Bass Cascade occurs during winter months only and has not yet been spatially defined (DoE, 2015a).

5.6 Physical Environment

The physical marine environment of the Otway region is characterised by very steep to moderate offshore gradients, high wave energy and temperate waters subject to upwelling events (Figure 5-7).

5.6.1 Otway assessments and surveys - EMBA

A comprehensive assessment of the coast to continental shelf margin has been undertaken within approximately 4 km^2 of bathymetric data and video footage collected of the pipeline route options from the Otway Gas Project EIS (Woodside, 2003). These data have been supplemented by numerous benthic sampling events; however, data for this assessment have been referenced primarily from Boreen et al., (1993) (Table 5-4), and the Otway Gas Project EIS (Woodside, 2003).

In 2002, 2003 and 2004, Fugro undertook a number of bathymetric surveys of the two proposed pipeline routes: one constructed for the Thylacine Geographe pipeline (Table 5-5) and one extending from the completed Geographe A well to Flaxman's Hill (Table 5-6).

A review of the available geotechnical data was carried out in March 2011 for the Geographe location (Advanced Geomatics, 2011). Overall, the seabed in the Otway area surveyed slopes to the south at a gentle average gradient of less than 1. However, the local topography is predominantly irregular in nature, varying from gently undulating and locally smooth in areas of increased sediment deposition, to areas of outcropping cemented calcrete features that are from smooth to jagged relief. These areas are covered in marine growth. ROV video survey confirmed the presence of a shallow hard underlying substrate at a depth of 50 mm below the sediment in areas of marine growth (JP Kenny, 2012).

The Flaxman's Hill alignment traverses the Thistle drilling area and the Thylacine Geographe pipeline runs parallel and north east of this area. During 2003, bathymetric data was collected, and the right of way was assessed and recorded using an underwater video camera (CEE Consultants Pty Ltd, 2003).

The Flaxman's Hill pipeline route travels approximately 68 km from the Geographe gas field to the shoreline. Visual assessment of the sea floor was undertaken from a water depth of 99 m to 16 m terminating at Flaxman's Hill.

Table5-4: Otway margin geomorphology (Boreen et al., 1993)

Zone	Depth (m)	Width (m/km)	Gradient	Features
Shallow Shelf	30 - 70	4 - 28	1.5 - 10	Drops rapidly from strandline to depths of 30 m, characterised by rugged but subdued topography
Middle Shelf	70 - 130	7 - 65	1 - 8.5	Generally smooth topography with occasional rock out crops

Table 5-5: Thylacine to Geographe seabed morphology and benthic assemblages (CEE Consultants Pty Ltd, 2003)

Depth (m)	Seabed morphology	Benthic assemblage
92	High profile reef stone with deep sand gutters.	Diverse, high density sessile: sponge, coral dominated crinoids common and mobile species
88	Low profile with areas of high-profile limestone ridges; incomplete sand veneer.	Diverse, high density sessile: sponge, dominated and mobile species

Table 5-6: Geographe to Flaxman's Hill seabed morphology and benthic assemblages (CEE Consultants Pty Ltd, 2003)

Depth (m)	Seabed morphology	Benthic assemblage
82	Low profile with areas of high-profile limestone ridges; incomplete sand veneer	Medium density sessile: sponge, dominated low density mobile species. (small shark)
82	Equal % of exposed low-profile limestone and sand. Two reef outcrops. Low profile with areas of high-profile limestone ridges; incomplete sand veneer.	Medium density, sessile: sponge, dominated
78	Low profile with areas of high-profile limestone ridges; incomplete sand veneer	Medium density, sessile: sponge, dominated Motile: sea urchins dominated
76		Medium density, sessile: sponge, dominated
76		Low - Medium density, sessile: sponge, dominated
70		Diverse, med density sessile, sponge dominated
68		Medium density, sessile: sponge, dominated
65		Diverse, med density sessile, sponge dominated
60		Medium density, sessile: sponge, dominated

Table 5-7: Geographe to Rifle Range seabed morphology and benthic assemblages (CEE Consultants Pty Ltd, 2003)

Depth (m)	Seabed morphology	Benthic assemblage
82	Low profile with areas of high-profile limestone ridges; incomplete sand veneer	Very low density sessile; large sponge.
79		Diverse, low – high density sessile
75	Low profile with areas of high-profile limestone ridges; incomplete sand veneer	Medium density, sessile: sponge, dominated. Motile: sea urchins dominated
74		Medium density, sessile: sponge, dominated
70		Low - Medium density, sessile: sponge, dominated
67		Diverse, med density sessile, sponge dominated
66	Low profile limestone with sand gutters	Medium density, sessile: sponge, dominated
66	Low profile with areas of high-profile limestone ridges; incomplete sand veneer	Diverse, med density sessile, sponge dominated
70	(Pock marks) Data not documented.	Medium density, sessile: sponge, dominated
63	Corse gravel to fine sand	High density sessile: micro algae dominated

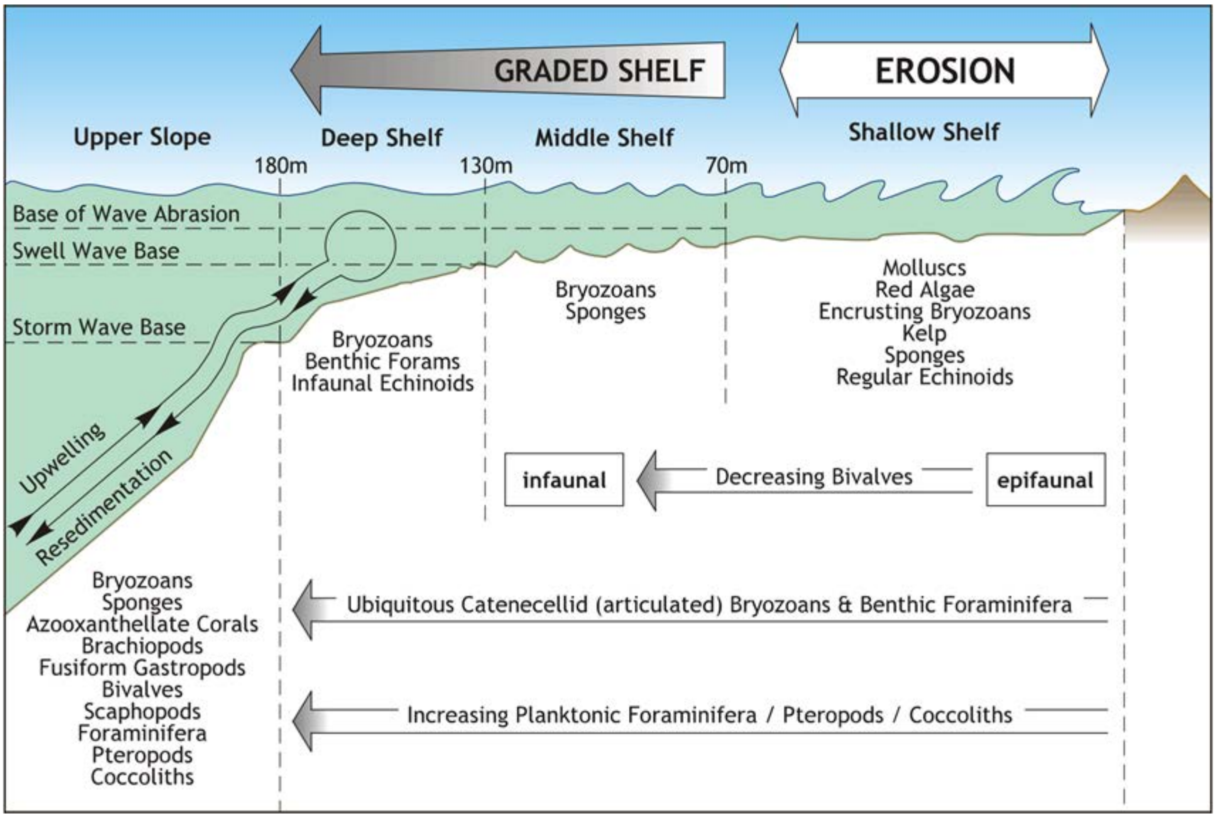


Figure 5-7: Model of the geomorphology of the Otway Shelf

A sampling survey of the surficial sediments, benthic invertebrates and demersal fishes of Bass Strait was undertaken by the Victorian Museum between 1979 and 1983 (Wilson and Poore, 1987) (Table 5-8, Figure 5-8).

Table 5-8: Nearshore seabed morphology and benthic assemblages

Depth (m)	Seabed morphology	Benthic assemblage
53	Sand	None observed
45		Only sea pens noted
16-30	Very high-profile/stone reef to sand	High density, sessile: sponge, macroalgae (Bull Kelp common)

More than 200 sites were sampled with sites 51 through 61, 118, 119, 120, 121, 183, 186 and 192 representatives of the area. Sediments were described in the field from a visual impression or according to the classification of Shepard (Shepard, 1954). Carbonate percentage of sediments was also assessed. These samples indicate that surficial sediments throughout the area are dominated by carbonate rich medium to coarse sands (Table 5-9). Data on benthic invertebrates and demersal fishers has not been summarised and published.

A video survey of the seabed at selected sites along proposed offshore pipeline routes for the Otway Gas Project was undertaken by BBG during 2003 (BBG, 2003) (Table 5-10, Figure 5-9).

BBG (2003) found that the substrate in water depths between 82 and 66 m were predominantly low-profile limestone with an incomplete sand veneer that supported a low to medium density, sponge dominated filter feeding community. Fish and other motile organisms were uncommon.

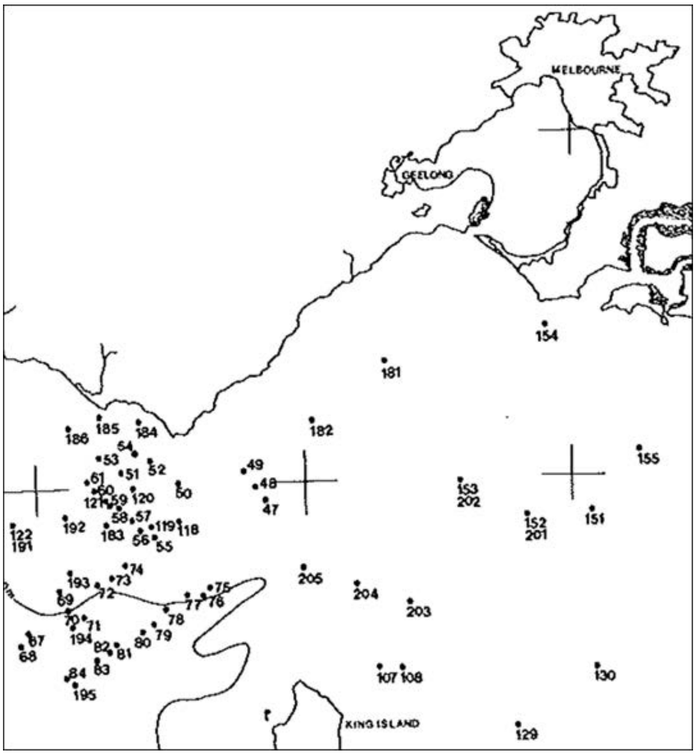


Figure 5-8: Sampling sites for the Bass Straight survey in the region of the spill EMBA (Wilson and Poore, 1987)

In shallower depths of between 63 and 30 m, the video surveys showed a rippled, sand or sand/pebble substrate with minor sponge dominated benthic communities. The epibenthic organisms were generally attached to outcropping or sub-outcropping limestone pavements. Only in waters shallower than approximately 20 m, was an area of significant, high profile reef and associated high density macroalgae dominated epibenthos encountered. Details of the seabed and benthic epifaunal assemblage are provided in Table 5-10.

The sampling data from the BSS survey and Otway projects broadly support the findings of Boreen et al., (1993) concerning the subsea features and biological communities likely to dominate the EMBA. In summary the seabed of the EMBA can be characterised as a carbonate mid shelf and deeper sections (60 – 70 m) of the shallow shelf with surficial sediments of carbonate rich coarse to medium sands with areas of exposed limestone substrate. The epifauna is dominated by low density, sessile sponge assemblages. Six basalt rises occur in the eastern and south-eastern section of the EMBA, the largest of which is the 'Big Reef'.

Table 5-9: Classification of surficial sediments sampled during the Bass Straight survey in the vicinity of the EMBA (Wilson and Poore, 1987)

Site No.	Depth (m)	Surficial sediments	Carbonate % by weight
51	67	Medium sand	ND
52	49	Coarse sand	72
53	67	Medium sand	45
54	70	Very coarse shelly sand	70
55	85	Coarse carbonate sand	93
56	77	Medium sand	ND
57	59	Coarse sand	97
58	47	Coarse sand	92

Site No.	Depth (m)	Surficial sediments	Carbonate % by weight
59	70	Coarse sand	89
60	79	Medium carbonate sand	100
61	68	Coarse sand	ND
118	95	Fine sand	96
119	92	Fine sand	99
120	84	Medium sand	90
121	84	Medium sand	ND
183	84	Coarse sand	99
186	69	Fine sand	ND
192	81	Medium sand	100

Table 5-10: Seabed characteristics and epifaunal assemblage at video survey sites (BBG, 2003)

Site No.	Depth (m)	Seabed type	Benthic Assemblage
3097	99	Bare rippled sand; minor limestone outcrops	Low density sessile; small sponge dominated
3118	99	Low profile limestone reef with sand veneer; isolated areas of raised l/stone	Low density sessile; sponge dominated
3084	99	Low profile limestone reef with incomplete sand veneer	Low density sessile; sponge dominated
3072	99	Low profile limestone reef with incomplete sand veneer	Low density sessile; sponge dominated
3054	98	Mix of low and high profile l/stone; shallow and deep sand	Low density sessile on low l/stone; high density sessile on high l/stone plus fish; sponge dominated
3185	95	Low profile limestone reef with incomplete sand veneer	Low density sessile; sponge dominated
3196	94	Low profile limestone reef with incomplete sand veneer	Low density sessile; sponge dominated
3232	92	High profile reef stone with deep sand gutters.	Diverse, high density sessile: sponge, coral dominated crinoids common and mobile species
3267	88	Low profile with areas of high profile limestone ridges; incomplete sand veneer.	Diverse, high density sessile: sponge, dominated and mobile species
2801	82	Low profile with areas of high profile limestone ridges; incomplete sand veneer	Very low density sessile; large sponge.
2720	79		Diverse, low – high density sessile
2590	75	Low profile with areas of high profile limestone ridges; incomplete sand veneer	Medium density, sessile: sponge, dominated. Motile: sea urchins dominated
2490	74		Medium density, sessile: sponge, dominated
2339	70		Low - Medium density, sessile: sponge, dominated
2291	67		Diverse, med density sessile, sponge dominated
2191	66	Low profile limestone with sand gutters	Medium density, sessile: sponge, dominated
2181	66	Low profile with areas of high profile limestone ridges; incomplete sand veneer	Diverse, med density sessile, sponge dominated

Site No.	Depth (m)	Seabed type	Benthic Assemblage
1191	63	Coarse gravel to find sand	High density sessile: micro algae dominated
1668	53	Sand	None observed

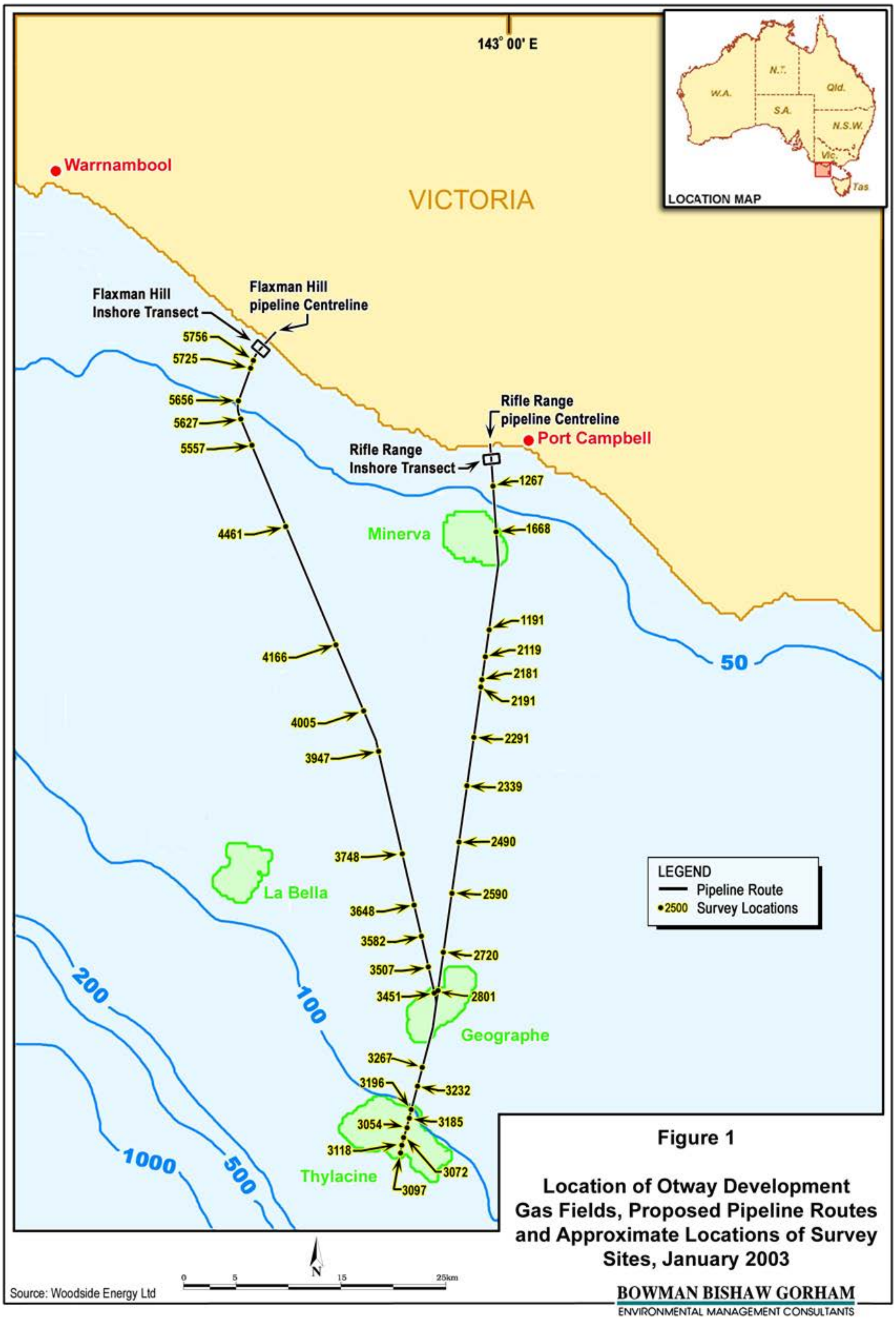


Figure 5-9: Seabed sites assessed by video survey during 2003 (BBG, 2003)

5.6.2 Otway assessments and surveys - operational area

Two seabed survey assessments occurred during November and December 2019 in the Thylacine and Geographe areas.

In November and December 2019, a 9.6 km x 9.6 km seabed survey was undertaken around the proposed Thylacine drilling location (Furgo, 2019).

The results to date from the Thylacine survey identified:

- The seabed depths vary ranging from 92 m to 115 m. LAT, with an overall southwestern slope.
- The seabed topography compromises of rocky outcrops of the regionally-dipping Port Campbell limestones.
- A local relief of up to 3 m is identified on the rocky scarp surfaces, which are separated by shallow depressions often with a transgressive sandy infill.
- A predominantly hard seabed with sessile epibiotic population of sponges, ascidians, bryozoans and soft corals.
- Sands are coarse (siliceous) calcareous medium sand.

Figure 5-10 and Figure 5-11 show images of the seabed around the existing Thylacine wells to provide an indication of what the seabed conditions may be like at TN-1 and TW-1. Figure 5-12 illustrates the locations of these drop locations images.

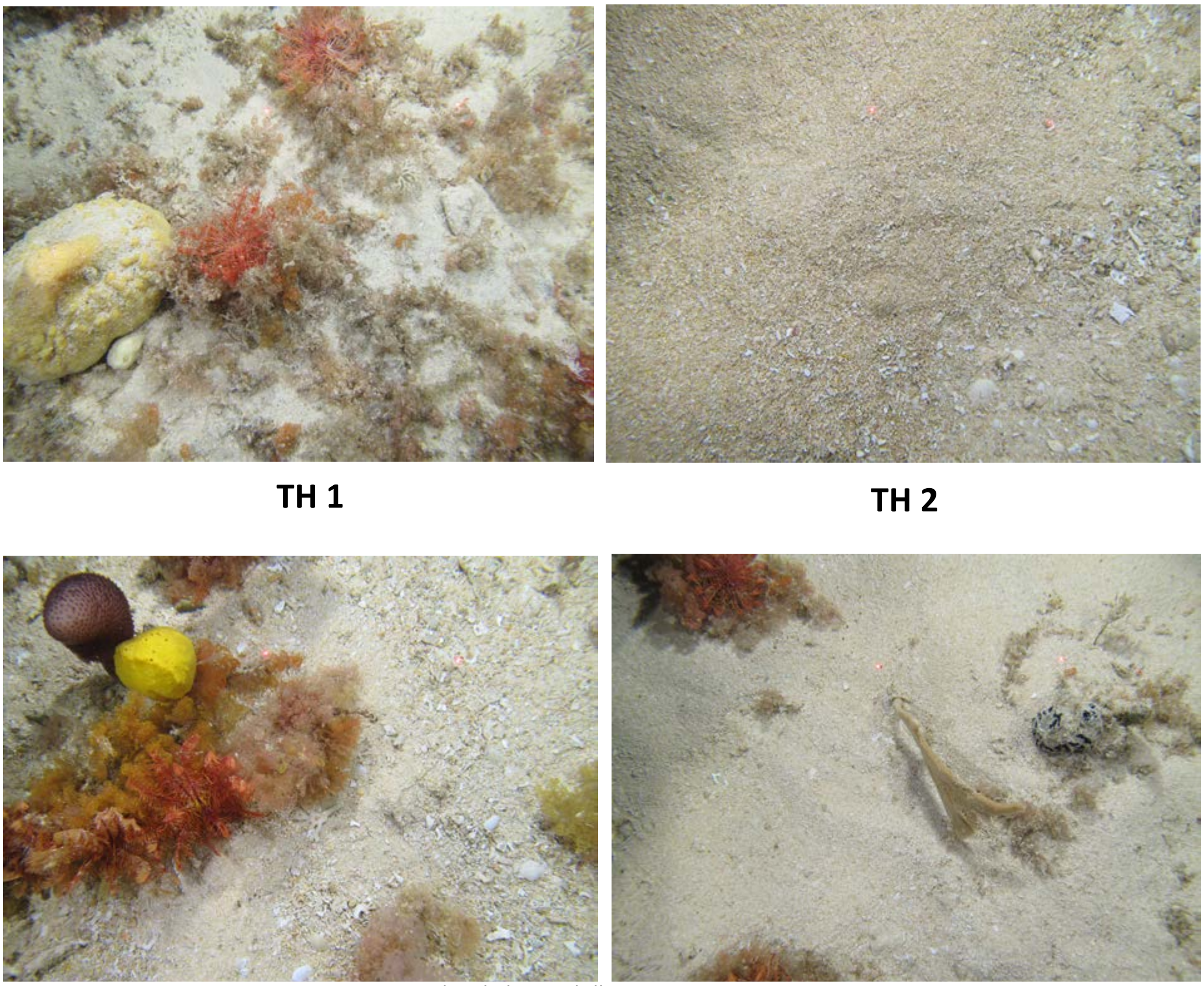
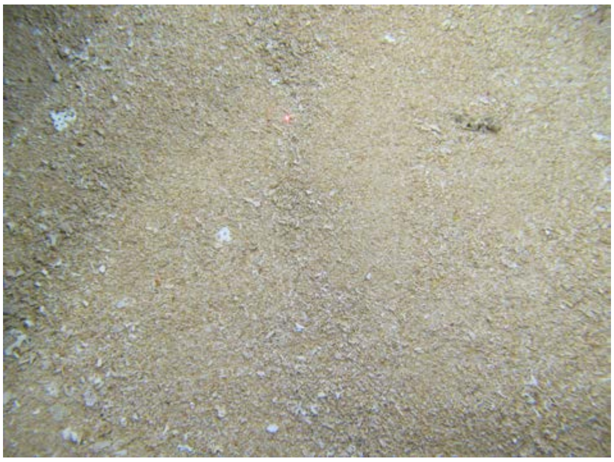


Figure 5-10: Drop camera images TH1-TH4 at the Thylacine drilling area

TH 5

TH 6



TH 7

TH 8

Figure 5-11: Drop camera images TH5-TH8 at the Thylacine drilling area

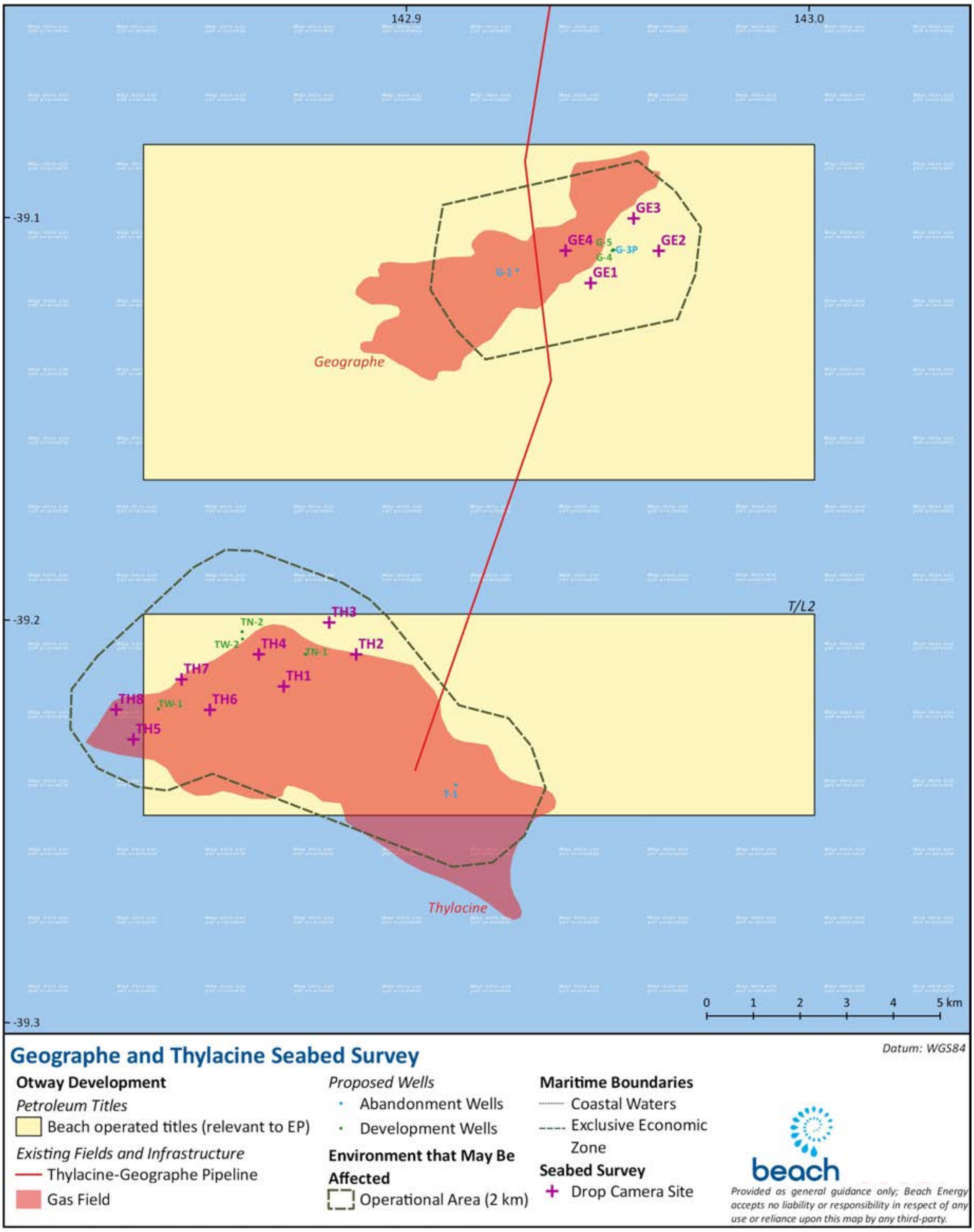


Figure 5-12: Drop camera locations within operational area

5.6.3 Metocean conditions

5.6.3.1 Climate

The area is typical of a cool temperate region with cold, wet winters and warm dry summers. The regional climate is dominated by sub-tropical high-pressure systems in summer and sub-polar low-pressure systems in winter. The conditions are primarily influenced by weather patterns originating in the Southern Ocean. The low-pressure systems are accompanied by strong westerly winds and rain-bearing cold fronts that move from south-west to north-east across the region, producing strong winds from the west, north-west and south-west.

The day-to-day variation in weather conditions is caused by the continual movement of the highs from west to east across the Australian continent roughly once every 10 days.

5.6.3.2 Winds

Bass Strait is located on the northern edge of the westerly wind belt known as the Roaring Forties. In winter, when the subtropical ridge moves northwards over the Australian continent, cold fronts generally create sustained west to south-westerly winds and frequent rainfall in the region (McInnes and Hubbert, 2003). In summer, frontal systems are often shallower and occur between two ridges of high pressure, bringing more variable winds and rainfall.

Winds in this section of the Otway basin and western Bass Strait generally exceed 13 knots (23.4 km/h) for 50% of the time. Winds contribute to the predominant moderate to high wave-energy environment of area and are predominantly south-westerly cycling to north-westerly. September is the windiest month, with average wind speeds of 29 km/h (Figure 5-13).

5.6.3.3 Tides

Tides are semi-diurnal with some diurnal inequalities (Jones and Padman, 1983), generating tidal currents along a north-east/south-west axis, with speeds generally ranging from 0.1 to 2.5 m/s (Fandry, 1983). The maximum range of spring tides in western Bass Strait is approximately 1.2 m. Sea level variation in the area can arise from storm surges and wave set up (Santos, 2004).

5.6.3.4 Ocean currents

The East Australian Current is one of the four major currents known to heavily influence on the conditions and biodiversity in Australian oceans and coastal environments. There are also a number of smaller and more complex current systems. All these ocean features can change from season to season, and may be more or less extensive and energetic, depending on climate factors.

Ocean currents in Bass Strait are primarily driven by tides, winds and density-driven flows (Figure 5-14).

During winter, the South Australian current moves dense, salty warmer water eastward from the Great Australian Bight into the western margin of the Bass Straight. In winter and spring, waters within the straight are well mixed with no obvious stratification, while during summer the central regions of the straight become stratified.

Furthermore, during winter, the Bass Strait cascade occurs, a wintertime downwelling caused by cooling of the shallow waters of Bass Strait in the Gippsland Basin. Downwelling currents that originate in the shallow eastern waters of Bass Strait flow down the continental slope to depths of several hundred meters or more into the Tasman Sea. Lateral flushing within the strait results from inflows from the South Australian Current, East Australian Current, and sub-Antarctic surface waters. The importance of this phenomenon is recognised through the designation of the seasonal Bass Cascade Key Ecological Feature.

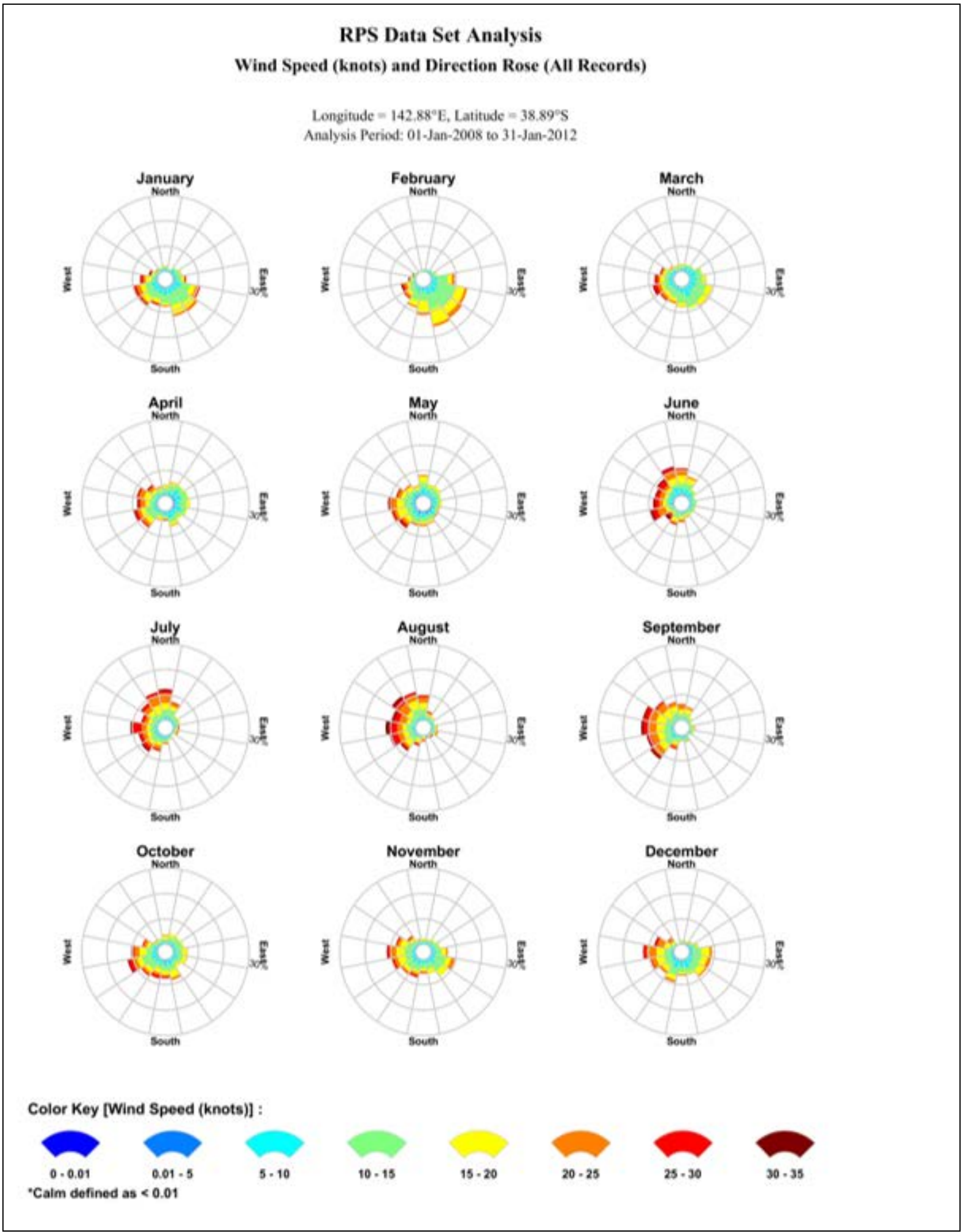


Figure 5-13. Modelled monthly wind rose distributions (RPS, 2019)

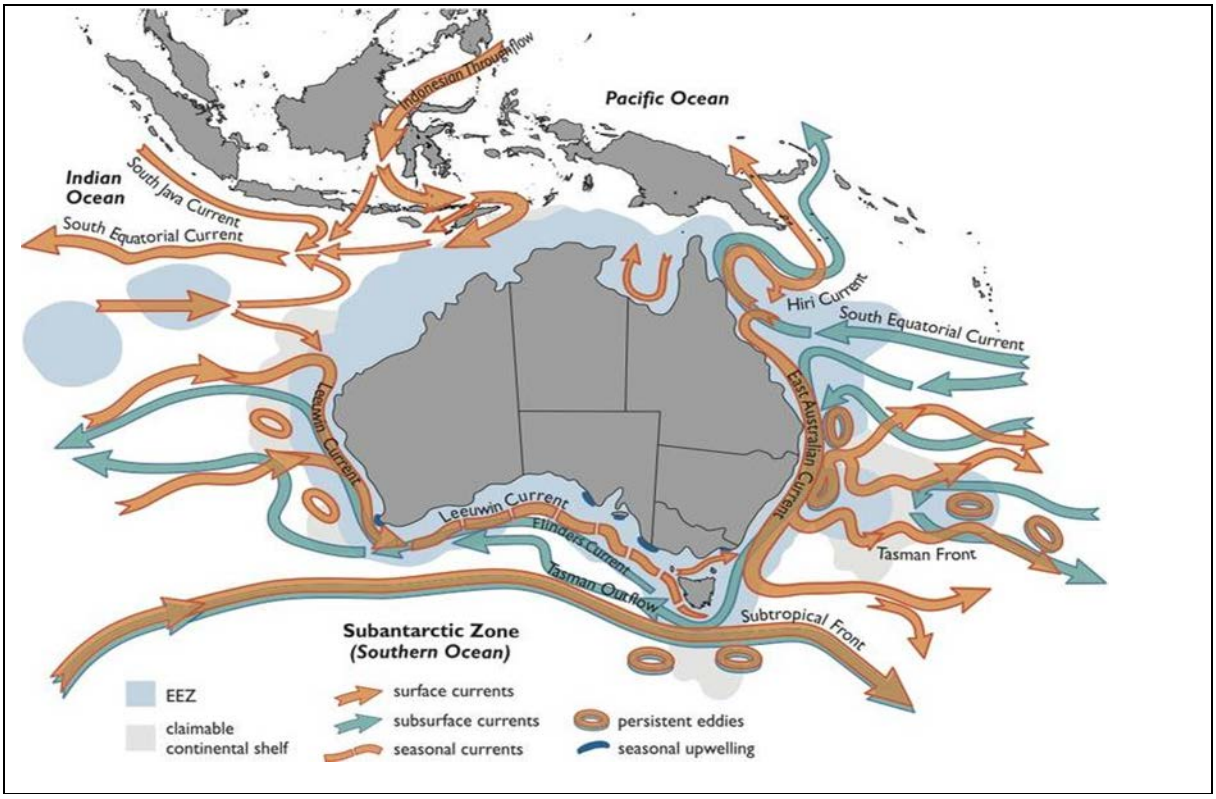


Figure 5-14: Australian ocean currents

Surface currents within the permit area have been modelled by combining the HYDROMAP tidal currents and HYCOM ocean currents for 2009 – 2013 inclusive to produce monthly surface currents. These show a rotational aspect because of inflow and outflow to Bass Strait. Although unimodal the currents are stronger from the west in all months excepting February when the currents from the east are the strongest. Minimum currents have been derived as 0.2-0.4 m/s and maximum currents as 0.8-2.0 m/s, with the strongest currents during the months July to October.

5.6.3.5 Waves

Bass Strait is a high-energy environment exposed to frequent storms and significant wave heights. The Otway coast has a predominantly south-westerly aspect and is highly exposed to swell from the Southern Ocean.

There are two principal sources of wave energy in the Otway Basin:

- From the westerly swell from the Great Australian Bight and Southern Ocean; and
- From locally generated winds, generally from the west and east.

The Otway area is fully exposed to long period 13 second average south-westerly swell from the Southern Ocean as well as periodic shorter 8 second average period waves from the east. Wave heights from these winds generally range from 1.5 m to 2 m, although waves heights to 10 m can occur during storm events and a combination of wind forcing against tidal currents can cause greater turbulence. The largest waves are associated with eastward-moving low pressure and frontal systems that cross the site every 4 to 6 days in winter.

5.6.3.6 Sea temperature

The waters have average surface temperatures ranging from 14°C in winter to 21°C in summer. However, subductions of cooler nutrient-rich water (upwellings) occur along the seafloor during mid to late summer, though this is usually masked in satellite images by a warmer surface layer.

The upwelled water is an extension of the regional Bonney Upwelling system, which affects southern Australia because of south-east winds forcing surface water offshore thus triggering a compensatory subduction along the bottom. If the wind is strong enough the water sometimes shoals against the coast. The water originates from a subsurface water flow called the Flinders current and has the characteristics of reheated Antarctic Intermediate Water (Levings and Gill, 2010).

During winter and spring onshore winds cycling from the southwest to northwest mound the surface layer against the land and cause a south-easterly flow along the coast that fills the shelf from the shore outwards to a depth of 500 m deep. Shelf water temperatures at these times range from between 18°C to 14°C with seafloor temperatures warmer in winter than in summer.

5.6.4 Ambient sound levels

McCauley and Duncan (2001) undertook a desktop review of natural and man-made sea sound sources likely to be encountered in the Otway Basin. They concluded that natural sea sound sources are dominated by wind noise, but also include rain noise, biological noise and the sporadic noise of earthquakes. Man-made underwater sound sources in the region comprise shipping and small vessel traffic, petroleum production and exploration drilling activities and sporadic petroleum seismic surveys.

Between 2009 and 2016 the Integrated Marine Observing System (IMOS) has been recording underwater sound south of Portland, Victoria (38° 32.5' S, 115° 0.1' E). Prominent sound sources identified in recordings include blue and fin whales at frequencies below 100 Hz, ship noise at 20 to 200 Hz and fish at 1 to 2 kHz (Erbe et al., 2016). In the broader region, primary contributors to background sound levels were wind, rain and currents-and waves-associated sound at low frequencies under 2 kHz (Przeslawski et al., 2016). Biological sound sources including dolphin vocalisations were also recorded (Przeslawski et al., 2016).

Ambient sound levels in the Otway Basin have been measured as part of impact assessment activities for the petroleum industry. Acoustic monitoring prior to the development of the Thylacine wells and platform, recorded broadband underwater sound of 93 to 97 dB re 1 μPa (Santos, 2004). An acoustic monitoring program was also undertaken during exploratory drilling of the Casino-3 well in the spill EMBA. A sound logger located 28.03 km from the drill site did not detect drilling noise and recorded ambient noise that ranged between 90 and 110 dB re 1 μPa (McCauley, 2004). Passive acoustic monitoring commissioned by Origin from April 2012 to January 2013, 5 km offshore from the coastline east of Warrnambool, identified that ambient underwater noise in coastal areas are generally higher than further offshore, with a mean of 110 dB re 1 μPa and maximum of 161 dB re 1 μPa (Duncan et al., 2013).

Recent work using ocean sound recordings stations has also shown that sound from iceberg calving, shoaling and disintegration in Antarctic waters is a major contributor to the overall sound budget of the Southern Ocean. Annually tens of thousands of icebergs drift out from Antarctica into the open waters of the Southern Ocean, creating a ubiquitous natural source of low frequency sound as they calve, shoal and disintegrate (Matsumoto et al., 2014).

For example, Dziak et al., (2013) measured the sounds from the iceberg A53a (~ 55 × 25 km) as it drifted out of the Weddell Sea and through Bransfield Strait during April–June 2007. Sound levels during disintegration of this iceberg were estimated to average ~ 220 dB re 1 μPa. Chapp et al. (2005) acoustically located iceberg B15d (215 km^2) within the Indian Ocean in 2005 and estimated a maximum source level of 245 dB re 1mPa for its tremor signals, generated when the icebergs shoal or collide with other icebergs.

Matsumoto et al., (2014) tracked the sound propagation of two large icebergs, B15a and C19a, which calved off the Ross Ice Shelf in the early 2000s and drifted eastward to the warmer South Pacific Ocean in late 2007. From 2008 to early 2009, the disintegration of B15a and C19a continuously projected loud, low-frequency sounds into the water column which propagated efficiently to lower latitudes, influencing the soundscape of the entire South Pacific basin. The icebergs' sounds were recorded at Juan Fernández Islands (34°S, 79°W) and by a deep-water hydrophone in the northern hemisphere (8°N, 110°W) approximately 10,000 km from the icebergs.

More broadly Matsumoto et al., (2014) concluded that seasonal variations in ocean noise, which are characterized by austral summer-highs and winter-lows, appear to be modulated by the annual cycle of Antarctic iceberg drift and subsequent disintegration. This seasonal pattern is observed in all three Oceans of the Southern Hemisphere.

Spectrogram plotting shows that icebergs' sounds dominate the frequency range below 100 Hz (Matsumoto et al., 2014). Notably this frequency range encompasses the dominant frequencies at which baleen whales vocalize.

5.6.5 Water Quality

Marine water quality considers chemical, physical and biological characteristics with respect to its suitability to support marine life, or for a purpose such as swimming or fishing. Marine water quality can be measured by several factors, such as the concentration of dissolved oxygen, the salinity, the amount of material suspended in the water (turbidity or total suspended solids) as well as the concentration of contaminants such as hydrocarbons and heavy metals.

The Otway Basin is characterised by high wave energy and cold temperature waters subject to upwelling events (Bonney upwelling) around the continental shelf margin (Origin, 2015). Significant upwelling of colder, nutrient rich deep-water during summer can cause sea surface temperatures to decrease by 3°C compared with offshore waters (Butler et al., 2002).

The Bass Strait and Otway Basin are known for a complex, high energy wave climate and strong ocean currents (Origin, 2015), and therefore water column turbidity on the Victorian coastline is subject to high natural variability. Weather conditions in the coastal environment around Port Campbell and Port Ferry are known to influence offshore hydrodynamic conditions and are a driver of sediment dynamics, impacting benthic and pelagic habitats and changing water column turbidity. Wave-driven sediment resuspension generates high turbidity levels within coastal zones, commonly exceeding 50 mg/L (Larcombe et al. 1995, Whinney 2007, Browne et al., 2013), but coastal communities appear generally well adapted to deal with these extrinsic stresses.

It is expected that water quality within the operational area, light, noise behaviour, waste water or spill EMBAs will be typical of the offshore marine environment of the Otway Basin, which is characterised by high water quality with low background concentrations of trace metals and organic chemicals.

5.6.6 Air quality

Historical air quality data for the region is available from the Environment Protection Authority (EPA) Victoria air quality monitoring stations, and Cape Grim Baseline Air Pollution Station on Tasmania's west coast, which is one of the three premier baseline air pollution stations in the World Meteorological Organisation-Global Atmosphere Watch (WMO-GAW) network, measuring greenhouse and ozone depleting gases and aerosols in clean air environments.

The Victorian air quality data is collected at 15 performance monitoring stations representing predominantly urban and industrial environments in the Port Phillip and Latrobe Valley regions of Victoria. Results are assessed against the requirements of the National Environment Protection (Ambient Air Quality) Measure for the pollutants carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), sulfur dioxide (SO_2), lead (Pb), particles less than 10 micrometres in diameter (PM_{10}) and particles less than 2.5 micrometres in diameter ($PM_{2.5}$). The most recent annual air monitoring report shows Victoria's air quality in 2015 was generally good with AAQ NEPM goals and standards being met for carbon monoxide (CO), nitrogen dioxide (NO_2), Ozone (O_3) and sulfur dioxide (SO_2). There were some exceedances for particles.

The Geelong monitoring station is the closest to the Thylacine wells; however, it is situated in an urban environment and is not representative of the clean air environment over the majority of the EMBA. The Cape Grim Baseline Air Pollution Station data is likely a more reliable point of reference for air quality in the EMBAs as the air sampled arrives at Cape Grim after long trajectories over the Southern Ocean and is representative of a large area unaffected by regional pollution sources (cities or industry) (CSIRO, 2017). The Cape Grim station monitors greenhouse gases (GHG), including carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O) and synthetic GHGs such as hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulfur hexafluoride (SF6).

Historical air quality data from Cape Grim show that most GHGs have shown continuous increases in concentration since the mid-to-late 1970s with carbon dioxide levels increasing by more than 15% since 1976, and concentrations of methane and nitrous oxide increasing by around 20% and 8% respectively since 1978. The increase in methane levels however has slowed recently and CFCs and halons are in decline. Increases have been attributed to anthropogenic causes, for example, fossil fuel consumption and agricultural practices (CSIRO, 2017).

5.7 Ecological environment

To characterise the ecological environment where the activity is to be conducted, a literature search and online resources and databases have been reviewed to identify and assess flora and fauna species known to be present or potentially present in the MDO spill EMBA. The following information sources were reviewed to assure consistency with previous assessments and to develop an up-to-date overview of the existing environment:

- Online government databases, publications, and interactive mapping tools, such as the SPRAT database provided by the DAWE;
- The DAWE PMST for Matters of National Environmental Significance (MNES) protected under the EPBC Act;
- Published observations, data and statistics on marine mammals;
- Reports from scientific experts and institutions, marine biologist and experts in blue whale and southern right whale populations in the Otway area;
- Woodside's Otway Gas Project Environmental Effects Statement/Environmental Impact Assessment (EES/EIS) (2003) (Woodside, 2003);
- Santos Casino Gas Field Development Environmental Report (2004) (Santos, 2004);
- BHP Billiton's Minerva Environmental Impact Statement and Environmental Effects Statement and Associated Supplemental Environmental Monitoring published research papers (BHP Billiton, 1999);
- Origin Energy's EPs for previous activities in the region;
- The National Conservation Values Atlas (Commonwealth of Australia, 2015);
- Relevant listings under the Victorian FFG Act 1988 (DELWP, 2017b);
- Relevant listings under the Tasmanian Threatened Species Conservation Act (1995) (TSC Act); and
- Relevant environmental guidelines and publicly available scientific literature on individual species.

5.7.1 Benthic habitats and species assemblages

Benthic communities are biological communities that live in or on the seabed. These communities typically contain light-dependent taxa such as algae, seagrass and corals, which obtain energy primarily from photosynthesis, and/or animals such as molluscs, sponges and worms. Benthic habitats are the seabed substrates that benthic communities grow on or in; these can range from unconsolidated sand to hard substrates (e.g. limestone) and occur either singly or in combination.

The Otway continental margin is a swell-dominated, open, cool-water carbonate platform which can be divided into depth-related zones (Boreen et al., 1993):

- Shallow shelf: consisting of exhumed limestone substrates that host encrusting mollusc, sponge, bryozoan and red algae assemblages.
- Middle shelf: a zone of swell wave shoaling and production of mega-rippled bryozoan sands.
- Deep shelf: accumulations of intensely bioturbated, fine bioclastic sands.

- Shelf edge/top of Slope: nutrient-rich upwelling currents support extensive, aphotic bryozoan/sponge/coral communities.

The dominant benthic habitat throughout the area, as indicated by the sampling and video studies outlined in Section 5.7.1 is medium to coarse carbonate sands with areas of low relief exposed limestone. A series of basaltic rises occur in the south eastern corner of the spill EMBA. The benthic species assemblages known or likely to be associated with these habitats are described in the following sections.

5.7.1.1 Soft Sediment

Unvegetated soft sediments are a widespread habitat in both intertidal and subtidal areas, particularly in areas beyond the photic zone. Factors such as depth, light, temperature and the type of sediment present can vary the biodiversity and productivity of soft sediment habitat.

The Middle Otway Shelf (70-130 m depth) is a zone of large tracts of open sand with little or no epifauna to characterise the area: infaunal communities and bivalves, polychaetes and crustaceans dominate in the open sand habitat. The Deep Otway Shelf (130 – 180 m) sediments consist of accumulations of intensely bioturbated, fine, bio clastic sands. The Upper Slope of Otway Shelf (>180 m) incorporates the edge/ top of the shelf which displays nutrient-rich upwelling currents support extensive, aphotic bryozoan/sponge/coral communities. The upper slope is dominated by bioturbated mixture of periplatform bioclastic debris and pelleted foraminiferal/nannofossil mud. Turbidites and re-sedimentation features are common. Bioturbation and shelf-derived skeletal content decrease progressively downslope and pelagic muds dominate below 500 m.

Scientific surveys have shown that some shallow Victorian sandy environments have the highest levels of animal diversity in the sea ever recorded (Parks Victoria, 2016a). Some of the larger animals found in these soft sediment environments in Victoria include smooth stingray (*Dasyatis brevicaudata*), pipi (*Plebidonax deltoids*), dumpling squid (*Euprymna tasmanica*), common stargazer (*Kathetostoma leave*) and heart urchin (*Echinocardium cordatum*) (Parks Victoria, 2016a).

5.7.1.2 Seagrass

Seagrasses are marine flowering plants, with around 30 species found in Australian waters (Huisman, 2000). While seagrass meadows are present throughout southern and eastern Australia, the proportion of seagrass habitat within the south-eastern sector is not high compared to the rest of Australia (in particular with parts of South Australia and Western Australia) (Kirkham, 1997).

Seagrass generally grows in soft sediments within intertidal and shallow subtidal waters where there is sufficient light and are common in sheltered coastal areas such as bays, lees of islands and fringing coastal reefs (McClatchie et al., 2006; McLeay et al., 2003). Known seagrass meadows within the spill EMBA include Port Phillip Bay and Western Port Bay. Seagrass meadows are important in stabilising seabed sediments, and providing nursery grounds for fish and crustaceans, and a protective habitat for the juvenile fish and invertebrates species (Huisman, 2000; Kirkham, 1997).

Within the spill EMBA seagrass is present along the South Australian (SA) and Victorian coastline (Figure 5-15).

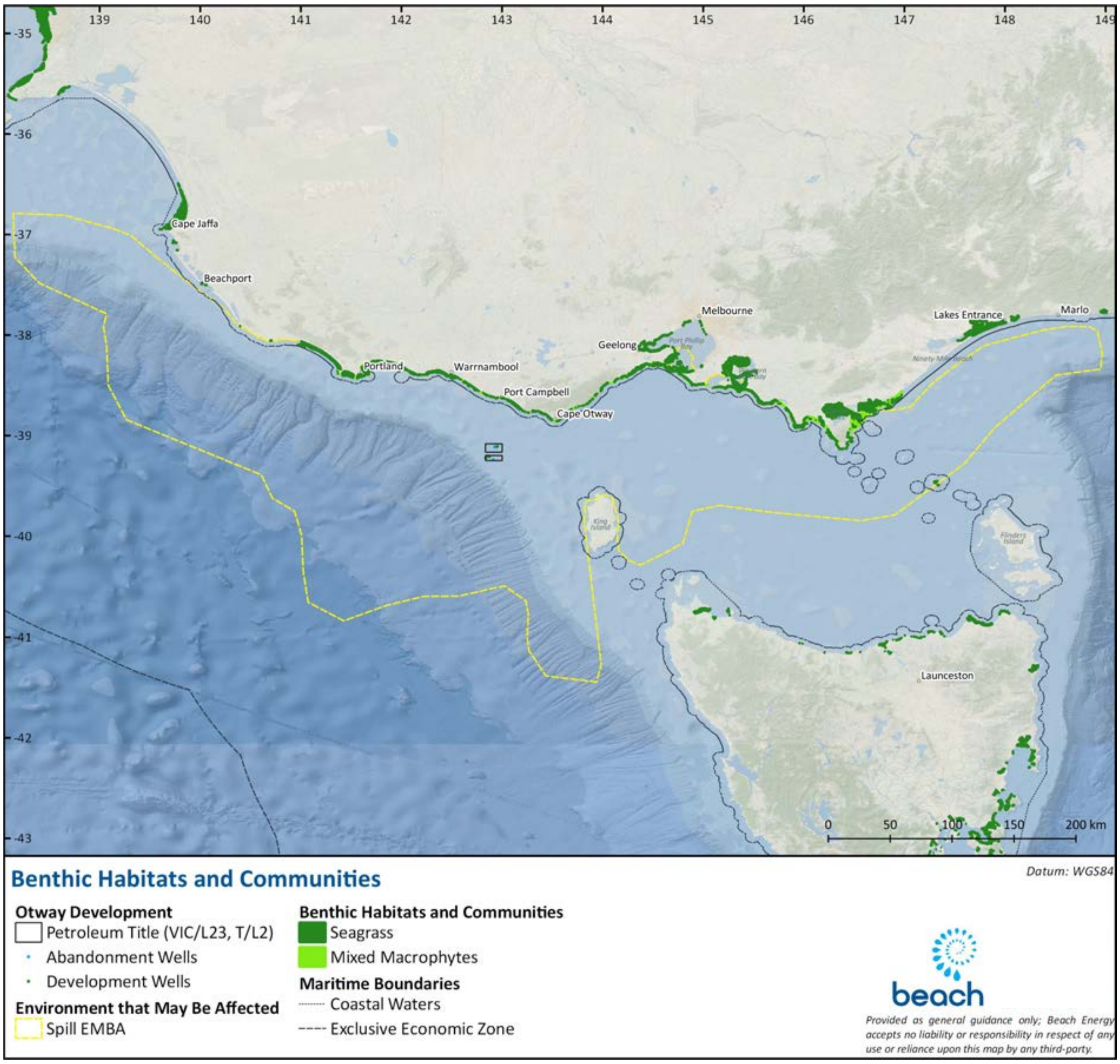


Figure 5-15: Presence of seagrass (and mixed macrophyte) habitat within the spill EMBA

5.7.1.3 Algae

Benthic microalgae are present in areas where sunlight reaches the sediment surface. Benthic microalgae are important in assisting with the exchange of nutrients across the sediment-water interface; and in sediment stabilisation due to the secretion of extracellular polymetric substances (Ansell *et al.*, 1999). Benthic microalgae can also provide a food source to grazers such as gastropod and amphipods (Ansell *et al.*, 1999).

Macroalgae communities occur throughout the Australian coast and are generally found on intertidal and shallow subtidal rocky substrates. Macroalgal systems are an important source of food and shelter for many ocean species; including in their unattached drift or wrack forms (McClatchie *et al.*, 2006). Macroalgae are divided into three groups: Phaeophyceae (brown algae), Rhodophyta (red algae), and Chlorophyta (green algae). Brown algae are typically the most visually dominant and form canopy layers (McClatchie *et al.*, 2006). The presence and growth of macroalgae are affected by the principal physical factors of temperature, nutrients, water motion, light, salinity, substratum, sedimentation and pollution (Sanderson, 1997). Macroalgae assemblages vary, but *Ecklonia radiata* and *Sargassum* sp. are typically common in deeper areas. Within the spill EMBA, macroalgae is present along the South Australian (SA) and Victorian coastline from Beachport in SA to Philip Island (Figure 5-16).

5.7.1.4 Coral

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

Corals do not occur as a dominant habitat type within the EMBAs, however their presence has been recorded around areas such as Wilsons Promontory National Park and Cape Otway. Reef development by hard corals does not occur further south than Queensland (Tzioumis and Keable, 2007). Soft corals are typically present in deeper waters throughout the continental shelf, slope and off-slope regions, to well below the limit of light penetration.

Reproduction methods for cold water corals are not as well understood as warm water corals such as those of the Great Barrier Reef, but it is likely that some are still broadcast spawners (like their tropical counterparts), while others brood and release formed larvae (Roberts *et al.*, 2009).

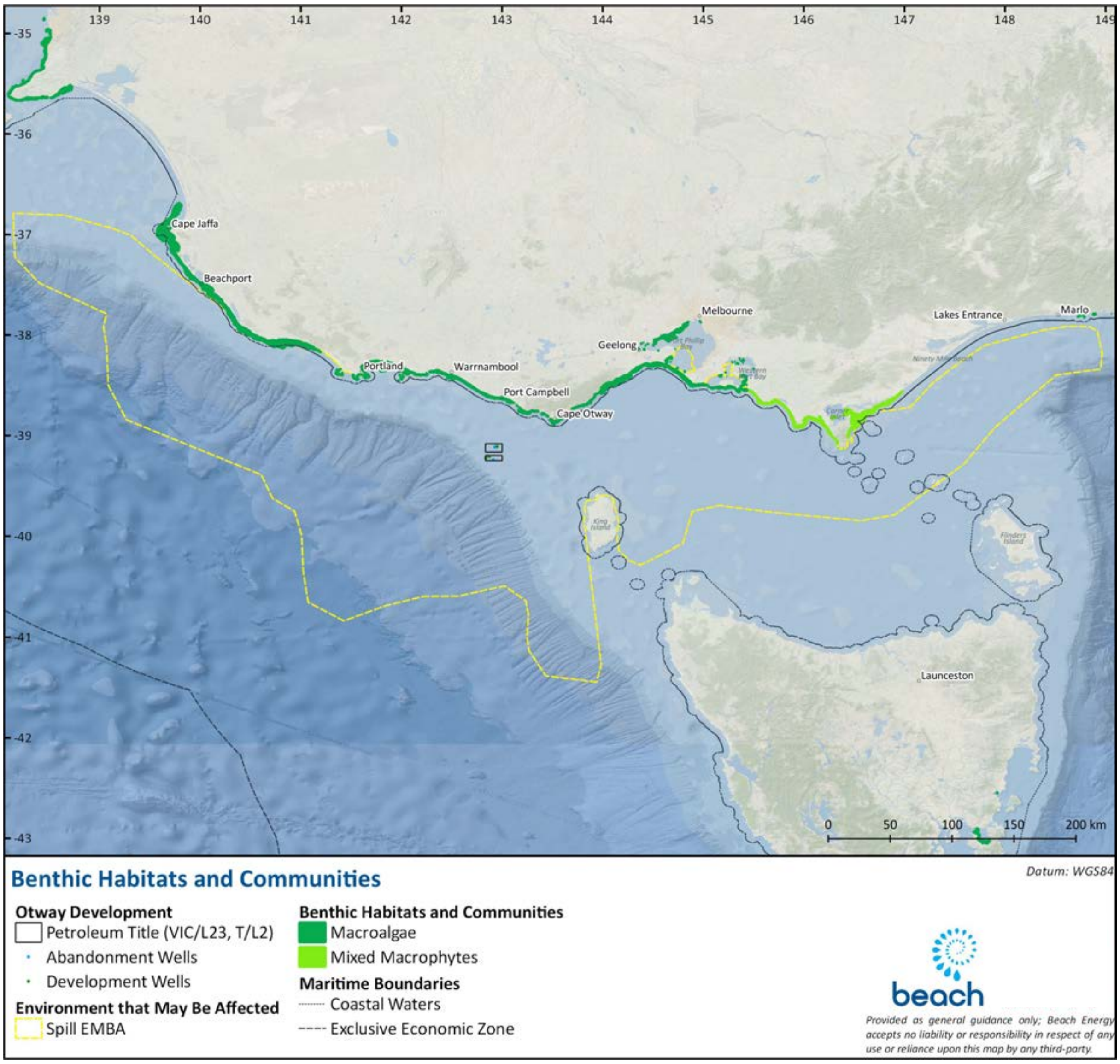


Figure 5-16: Presence of macroalgae (and mixed macrophyte) habitat within the spill EMBA

5.7.1.5 Carbonate sands and exposed limestone

Boreen et al., (1993) reported that carbonate sands in the Otway middle shelf support a benthic fauna dominated by bryozoans, infaunal echinoids and assemblages of sponges. Other components include bivalves (commonly *Mysella donaciformis* and *Legrandina bernadi*), *Chlamys* sp. scallops and small gastropods. The sand octopus (*Octopus kaurna*) also inhabits sandy sediments. This description is broadly supported by video footage of the Otway pipeline, which also indicates that hard substrates in mid shelf areas in the west of the operational support low to medium density sponge dominated communities.

Within the inner shelf, Boreen et al., (1993) reported that the benthic communities associated with hard limestone substrates were comprised of sponges, encrustlng and branching corailine algae, poysonellid algae, bryozoa, benthic forams, robust sarpullds, brachiopods, bivalves, gastropods, fleshy red algae and kelp.

A benthic survey of inner shelf sediments in the vicinity of the Minerva Gas Field development, directly inshore from the operational area, found the seafloor was composed of course, well-sorted sand (Currie and Jenkins, 1994). This survey identified 196 species and a total of 5,035 individuals comprised of 63% crustaceans, 15% polychaetes, 8% molluscs and 5% echinoderms. The most abundant species were the bivalve *Katlysia* sp. (12.4 individuals/m^2), the sarconid *Triloculina affinis* (8.9 individuals/m^2), the tanaid isopod *Apsuedes* sp. (8.3 individuals/m^2) and the spionid polychaete *Prionospio coorilla* (4.8 individuals/m^2) (Currie, 1995).

Demersal fishes likely to be associated with carbonate sands on the middle and inner shelf include (LCC, 1993) eastern stargazer (*Kathetostoma laeve*), elephant shark (*Callorhynchus milli*), greenback flounder (*Rhombosolea taoarina*), gummy shark (*Mustelus antarcticus*), long-snouted flounder (*Ammotretis rostraus*), saw shark (*Pristiophorus nudipinnis*), southern sand flathead (*Platycephalus bassensis*) and southern school whiting (*Sillago bassensis*).

5.7.1.6 Basalt rises

There is no published information on the species assemblages of the basalt rises in the south east and east of the spill EMBA, other than general information on their importance as a southern rock lobster fishing area. Following the classification system of Hutchinson et al., (2010) these rises can be classified as deep reefs, defined as rocky habitat at depths greater than 20 m.

In general, deep reef biota is typified by invertebrate animals rather than algae, usually in the form of sessile, filter feeding fauna. Organisms such as sponges, octocorals, bryozoans and ascidians usually dominate rock faces on deep reefs (Hutchison et al., 2010). This is partly due to the ability of species such as sponges to survive in low light conditions that algae are unable to survive in. The most common algae present on deep reefs are encrusting coralline red algae which is able to tolerate low levels of penetrating light (Hutchison et al., 2010).

The distribution of fish fauna is governed by biologically formed habitat structure as well as by food. Fish assemblages typically begin to change at depths greater than 20 m, with the loss of the kelp- associated wrasses and leatherjackets, and the appearance of deeper water fishes such as boarfishes (family Pentacerotidae), splendid perch (*Callanthias australis*) and banded seaperch (*Hypoplectrodes nigroruber*). Schools of barber perch (*Caesioperca razor*) are replaced by the related butterfly perch (*Caesioperca lepidoptera*) (O'Hara et al., 1999). While fish present on shallow subtidal reefs include algavores, omnivores and carnivores, those on deep reefs are typically carnivorous as algae are typically not abundant at depth.

Although common on rocky reefs, sponges, hydrozoans, anthozoans, bryozoans, and ascidians are thought to be largely unpalatable to reef fish. It is therefore likely that fish at these depths are feeding on associated mobile invertebrate fauna. Edmunds et al. (2006) suggests that mobile invertebrate organisms play an ecologically significant role, providing food for carnivorous fishes on deep reefs in Port Phillip Bay, and are likely to include a variety of crustaceans and molluscs.

Information from the few specific studies of specific deep reef habitats in Bass Strait can be assessed to draw broad conclusions about the species assemblages likely to occur on the basalt rises, noting that assemblages of reef species are likely to differ based on geology, habitat structure, exposure to tidal and wave motion and nutrient availability. These studies are generally limited to one off video surveys with little or no temporal replication. More generally little is known about deep reefs in the Bass Strait, or the biology and ecology of organisms that live on them, due in part to difficulties associated with conducting observational work or manipulative experiments in situ.

Beaman et al. (2005) undertook video surveys of the New Zealand Star Bank in the eastern Bass Strait, approximately 600 km east of the operational area. This feature is comprised of granite outcrops between approximately 30 to 40 m water depth, rising from the surrounding relatively flat seabed of mainly unconsolidated quartz sands with variable amounts of shell debris.

Underwater video footage revealed a structurally complex surface of crevices and steep slopes, which is densely covered in erect large and small sponges and encrusting calcareous red algae. Encrusting red algae are usually the greatest occupier of space due to tolerance of low light conditions (< 1% of surface) found at these depths (Andrew, 1999). Mobile benthos observed were crinoids within crevices and the black sea urchin (*Centrostephanus rodgersii*) in low numbers on high slope surfaces and dense encrustations on low relief lower slopes. Underwater video showed a draughtboard shark (*Cephaloscyllium laticeps*) cruising above the crevices of high-relief granite outcrop as well as schools of butterfly perch feeding on plankton in the water column above the bank.

This study demonstrated a significant difference between communities that live on hard-ground granite outcrops of the New Zealand Star Bank and those which exist on soft substrate surrounding the rocky bank. These granite outcrops support a diverse sessile fauna of large and small sponges, bryozoans, hydroids and ascidians which prefer stable attachment surfaces (Underwood et al., 1991; Andrew 1999; Andrew and O'Neill, 2000). It is likely that similar species assemblages occur within the spill EMBA between the flat carbonate sands of the seabed and the basalt rises.

Edmunds et al. (2006) investigated assemblages of benthic fauna at near shore deep reefs within Central Victoria (Point Addis and Wilsons Promontory) and Port Phillip Bay. The Port Phillip Bay deep reef assemblages were dominated by sponges, occupying 70 to 90% of the rocky substratum. The Point Addis assemblage was dominated by upright sponges (arborescent, massive and flabellate growth forms), but cnidarians including hydroids were entirely absent. Wilson's Promontory had a low coverage of encrusting sponges and hydroids, with high abundances of red and brown algae and the gorgonian fan *Pteronisis* sp. The Port Phillip Heads assemblage was dominated by encrusting sponges, hydroids, ascidians and bryozoans.

In summary, the species assemblages associated with the basalt rises in the south-east and east of the spill EMBA are likely to be significantly different to the species assemblages of the surrounding flat seabed supporting carbonate sands. The depth of the basalt rises is likely to preclude significantly algal growth, with red algae likely to be most abundant. Sponges, hydrozoans, anthozoans, bryozoans, and ascidians are likely to occur though the relative abundances of these groups are not known. Targeting of the rises for rock lobster fishing indicates presence of this species in relatively high densities. The trophic effects of long term targeting of this species at these rises is not known. Site attached fishes are not likely to include kelp-associated wrasses and leatherjackets. Further statements cannot be made with sufficient confidence as site specific data for these rises are not available.

5.7.2 Mangroves

Mangroves grow in intertidal mud and sand, with specially adapted aerial roots (pneumatophores) that provide for gas exchange during low tide (McClatchie et al., 2006). Mangrove forests are important in helping stabilise coastal sediments, providing a nursery ground for many species of fish and crustacean, and providing shelter or nesting areas for seabirds (McClatchie et al., 2006).

The mangroves in Victoria are the most southerly extent of mangroves found in the world and are located mostly along sheltered sections of the coast within inlets or bays (MESA, 2015). There is only one species of mangrove found in Victoria, the white mangrove (*Avicennia marina*), which is known to occur at Western Port Bay within the spill EMBA. (Figure 5-17).

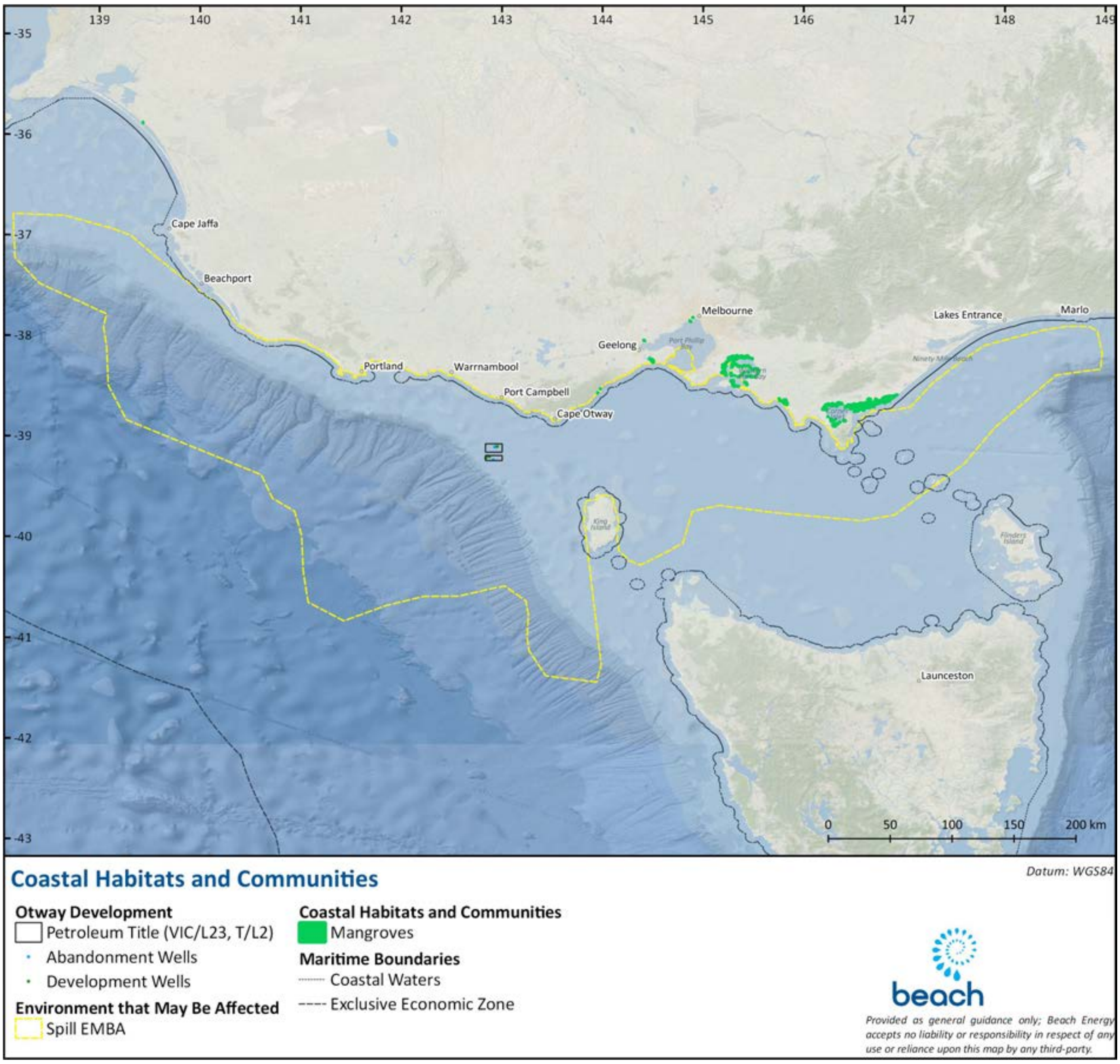


Figure 5-17: Presence of mangrove habitat within the spill EMBA.

5.7.3 Saltmarsh

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

Saltmarsh is found along many parts of the Victorian coast, although is most extensive in western Port Phillip Bay, northern Western Port, within the Corner Inlet-Nooramunga complex, and behind the sand dunes of Ninety Mile Beach in Gippsland (Figure 5-18) (Boon et al., 2011).

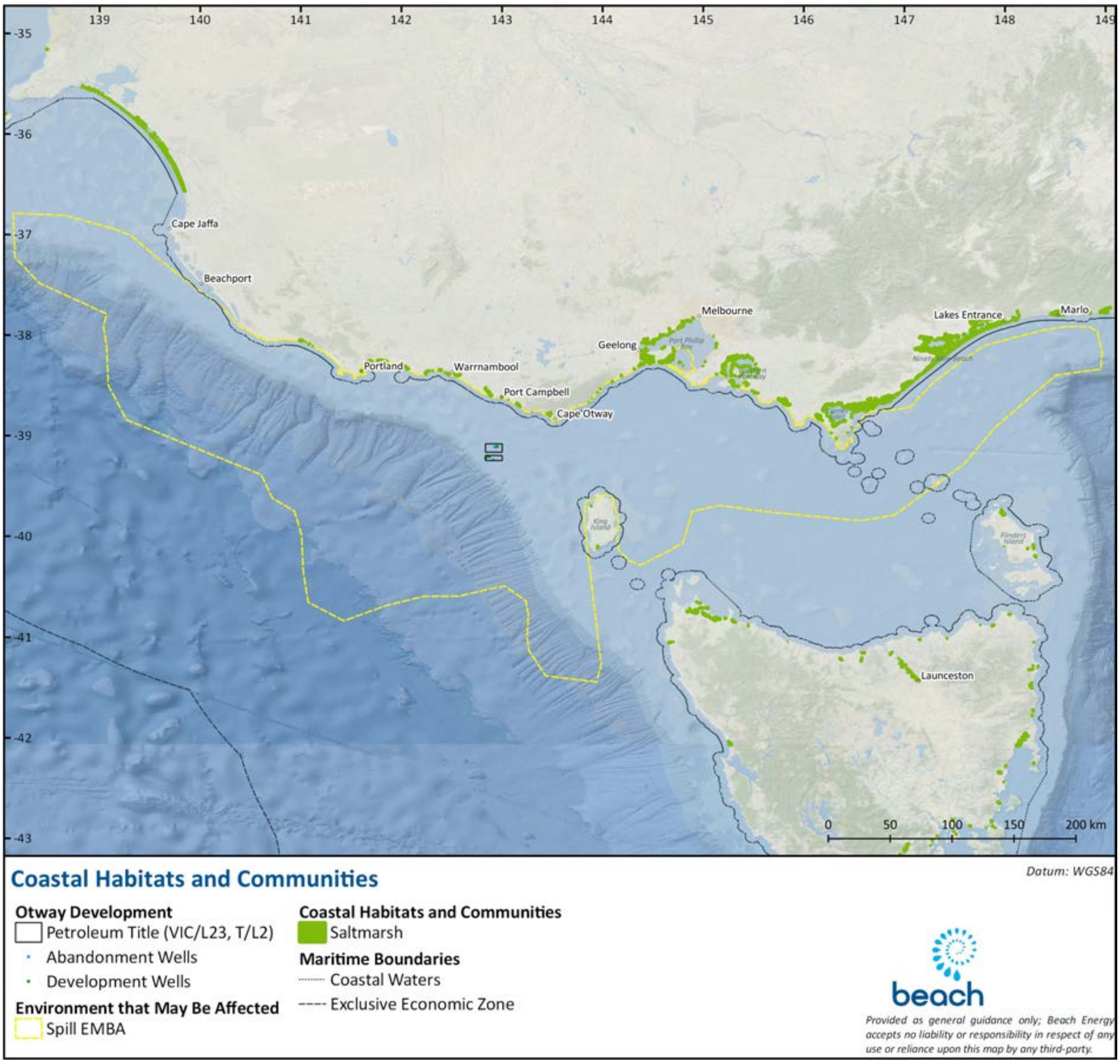


Figure 5-18: Presence of saltmarsh habitat within the spill EMBA

5.7.4 Plankton

Plankton species are the key component of the food web and support nearly all marine life. Copepods are the most common zooplankton and are some of the most abundant animals on earth. Plankton communities are highly diverse, with members from almost all phyla. Phytoplankton are photosynthetic organisms that drift with ocean currents and are mostly microscopic; however, some gelatinous plankton can be up to 2 m in diameter. Phytoplankton is grazed by zooplankton such as small protozoa, copepods, decapods, krill and gelatinous zooplankton.

The carrying capacity of marine ecosystems (the mass of fish resources) and recruitment of individual stocks is strongly related to plankton abundance, timing and composition. In the EMBA, the seasonal Bonney Coast Upwelling is a productivity hotspot, with high densities of zooplankton and are important for fish and whales. Of particular importance in the region is the coastal krill, *Nyctiphanes australis*, which swarms throughout the water column of continental shelf waters primarily in summer and autumn, feeding on microalgae and providing an important link in the blue whale food chain. The fisheries in this region account for half of Australia's total annual catch and the main fishery in the region is sardine, which feeds on plankton, which illustrates the interdependence of the fishing industry on plankton.

There have been relatively few studies of plankton populations in the Otway and Bass Strait regions, with most concentrating on zooplankton. Watson and Chaloupka (1982) reported a high diversity of zooplankton in eastern Bass Strait, with over 170 species recorded. However, Kimmerer and McKinnon (1984) reported only 80 species in their surveys of western and central Bass Strait.

Plankton distribution is dependent upon prevailing ocean currents including the East Australia Current, flows into and from Bass Strait and Southern Ocean water masses. Plankton distribution in the EMBA is expected to be highly variable both spatially and temporally and are likely to comprise characteristics of tropical, southern Australian, central Bass Strait and Tasman Sea distributions.

5.7.5 Invertebrates

There is a very large number of marine invertebrates in deep waters around Australia. Knowledge of the species in different habitats is extremely patchy; the number of deep-water benthic fauna is large but almost unknown. Throughout the region, a variety of seabed habits support a range of animal communities such as sparse sponges to extensive 'thickets" of lace corals and sponges, polychaete worms and filter feeders (Director of National Parks, 2013).

Characteristics of large species of crustacea, such as lobster, prawn and crab, which are significant commercial species in southern Australia, are well known. Mollusc species, such as oysters, scallops and abalone are also commercially fished, and their biology and abundance are well known. Major fisheries for the blacklip and to a lesser extent, greenlip abalone and scallops have been founded. The cooler waters of southern Australia also support the Maori octopus commercial fishery, which is one of the largest octopuses in Australia (with arm spans longer than 3 m and weighing more than 10 kg. Other molluscs are abundant in southern Australia and Tasmania such as the sea-slug with more than 500 species. Volutes and cowries represent a relic fauna in southern Australia, with several species being very rare and can be highly sought after by collectors.

Echinoderms, such as sea stars, sea urchins and sea cucumbers are also an important fauna species of the southern Australian and Tasmanian waters, with several species at risk of extinction (DPIPWE, 2016).

Studies by the Museum of Victoria found that invertebrate diversity was high in southern Australian waters although the distribution of species was patchy, with little evidence of any distinct biogeographic regions (Wilson and Poore, 1987). Results of sampling in shallower inshore sediments reported high diversity and patchy distribution (Parry et al., 1990). In these areas, crustaceans, polychaetes and molluscs were dominant.

5.7.6 Threatened ecological communities

Threatened Ecological Communities (TECs) provide wildlife corridors or refugia for many plant and animal species, and listing a TEC provides a form of landscape or systems-level conservation (including threatened species). The following marine TECs occur within the MDO spill EMBA (Figure 5-19):

- Assemblages of species associated with open-coast salt-wedge estuaries of western and central Victoria ecological community;
- Giant kelp marine forests of South East Australia; and
- Subtropical and temperate coastal saltmarsh;

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

This ecological community 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. 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).

5.7.6.2 Giant Kelp Marine Forests of South East Australia

Giant kelp (*Macrocystis pyrifera*) is a large brown algae that grows on rocky reefs in cold temperate waters off south east Australia. The kelp grows up from the sea floor 8 m below the sea surface and deeper, vertically toward the water surface. 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 (DSEWPaC, 2012).

Giant kelp is the largest and fastest growing marine plant. Their 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 stars (ophiuroids), sea urchins, sponges, blacklip abalone (*Tosia spp*) and southern rock lobsters (*Jasus edwardsii*). The large biomass and productivity of the giant kelp plants also provides a range of ecosystem services to the coastal environment.

Giant kelp requires clear, shallow water no deeper than approximately 35 m deep (Edyvane, 2003; Shepherd and Edgar, 2012; cited in DoE, 2012). They are photo-autotrophic organisms that depend on photosynthetic capacity to supply the necessary organic materials and energy for growth. O'Hara (in Andrew, 1999) reported that giant kelp communities in Tasmanian coastal waters occur at depths of 5-25 m.

Figure 5-19 shows that the largest extent of giant kelp marine forests are along the SA coastline with patches around the Victorian coastline.

James et al (2013) undertook extensive surveys of macroalgal communities along the Otway Shelf from Warrnambool to Portland in south-west Victoria. Sites were adjacent to shore or on offshore rocky reefs covering a depth range of 0 to 36 meters water depth. These surveys did not locate giant kelp at any site but identified that other brown algae species (*Durvillaea, Ecklonia, Phyllospora, Cystophora, and Sargassum*) are prolific to around 20 m water depth. Brown algae tend to be replaced by red algae in deeper waters.

Surveys of the Arches Marine Sanctuary (Edmunds et al. 2010) and Twelve Apostles MNP (Holmes et al. 2007 cited in Barton et al., 2012) have not located giant kelp. The species has been recorded in Discovery Bay National Park forming part of a mixed brown algae community (Ball and Blake, 2007) (not part of the TEC), on basalt rocky reefs. An assemblage dominated by the species has been recorded from Merri Marine Sanctuary occupying a very small area (0.2 ha) of rocky reef (Barton et al., 2012).

5.7.6.3 Subtropical and Temperate Coastal Saltmarsh

The Subtropical and Temperate Coastal Saltmarsh 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 (Threatened Species Scientific Committee, 2013). The community is found in coastal areas which have an intermittent or regular tidal influence. Figure 5-19 shows that from Corner Inlet to Marlo there is a substantial amount of subtropical and temperate coastal saltmarsh along the Victorian coastline.

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 important nursery habitat for fish and prawn species. Insects are also abundance 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.

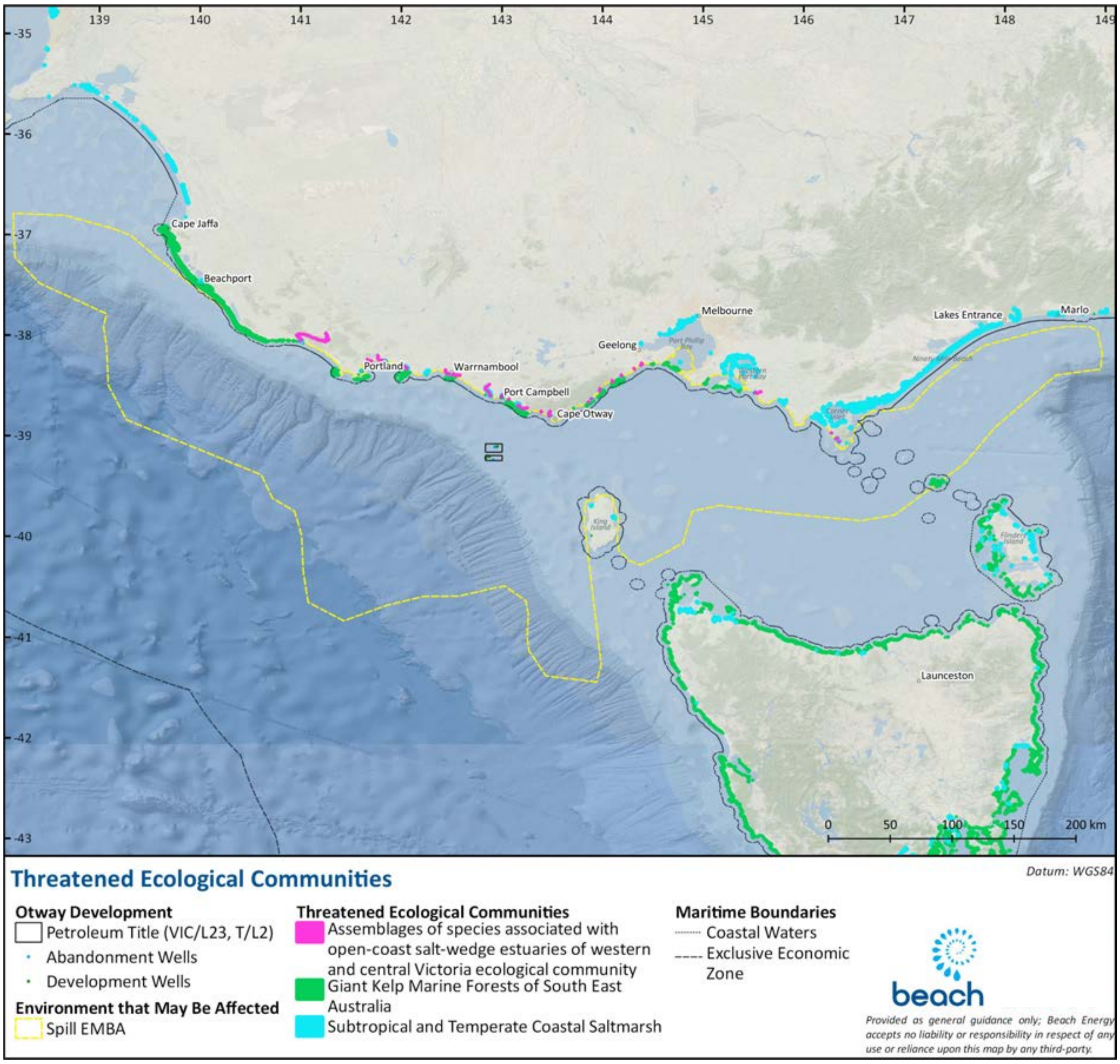


Figure 5-19: Threatened ecological communities within the spill EMBA

5.7.7 Threatened and Migratory species

A total of 112 Threatened species and 79 Migratory species were identified as potentially occurring within the MDO spill EMBA. There were also 132 marine species and 32 cetaceans identified as potentially occurring within the spill EMBA.

5.7.7.1 Marine Fauna of Conservation Significance

Under Part 13 of the EPBC Act, species can be listed as one, or a combination, of the following protection designations:

- Threatened (further divided into categories; extinct, extinct in the wild, critically endangered, endangered, vulnerable, conservation-dependent)
- Migratory
- Whale or other cetaceans
- Marine.

Details of listed fauna and their likely presence in the operational area or MDO spill EMBA are provided in the following sections.

For the purpose of the EP, only species listed as threatened or migratory under the EPBC Act likely to occur in the operational area or MDO spill EMBA are considered to have conservation significance warranting further discussion. Likely occurrence was determined by the PMST report or through designation of important habitat (e.g. BIA).

5.7.7.2 Biologically Important Areas and Critical Habitat to the survival of the species

Biologically Important Areas (BIAs) are areas that are particularly important for the conservation of protected species and where aggregations of individuals display biologically important behaviour such as breeding, foraging, resting or migration. Their designation is based on expert scientific knowledge about species' distribution, abundance and behaviour. The presence of the observed behaviour is assumed to indicate that the habitat required for the behaviour is also present.

There is no habitat critical to the survival of listed species within the operational area or MDO spill EMBA. BIAs within the operational area and MDO spill EMBA are summarised in Table 5-11 with further details in the relevant species sections.

Table 5-11: BIAs identified within the operational area and MDO spill EMBA

Receptor	*Operational area*	*Spill EMBA*	*Type of BIA*
Birds			
Antipodean albatross	Overlap	Overlap	Foraging
Australasian gannet	>95 km	Overlap	Foraging
	>125 km	Overlap	Aggregation
Black-browed albatross	Overlap	Overlap	Foraging
Black-faced Cormorant	>85 km	Overlap	Breeding
	>75 km	Overlap	Foraging
Buller's albatross	Overlap	Overlap	Foraging

Receptor	*Operational area*	*Spill EMBA*	*Type of BIA*
Campbell albatross	Overlap	Overlap	Foraging
Common diving-petrel	Overlap	Overlap	Foraging
	>100 km	Overlap	Breeding
Indian yellow-nosed albatross	Overlap	Overlap	Foraging
Little penguin	>80 km	Overlap	Foraging
	>85 km	Overlap	Breeding
Shy albatross	Overlap	Overlap	Foraging
Wandering albatross	Overlap	Overlap	Foraging
Wedge-tailed shearwater	Overlap	Overlap	Foraging
	>45 km	Overlap	Breeding
White-faced storm petrel	>60 km	Overlap	Foraging
Fish			
White shark	Overlap	Overlap	Distribution
Pinnipeds			
Australian sea lion	>295 km	Overlap	Foraging
Cetaceans			
Southern right whale	>50 km	Overlap	Aggregation
	>35 km	Overlap	Migration
	Overlap	Overlap	Distribution
	>85 km	Overlap	Connecting habitat
Pygmy blue whale	Overlap	Overlap	Foraging

5.7.7.3 Fish

Fish species present in the operational area or MDO spill EMBA are either pelagic (living in the water column), or demersal (benthic). Fish species inhabiting the region are largely cool temperate species, common within the SEMR. Thirty (30) listed fish species potentially occur in the EMBA.

Table 5-12 details the listed fish species identified in the spill EMBA and they are described herein.

White shark

The white shark (*Carcharodon carcharias*) is widely distributed and located throughout temperate and sub-tropical waters with their known range in Australian waters including all coastal areas except the Northern Territory (DotEE, 2010). Studies of white sharks indicate that they are largely transient. However, individuals are known to return to feeding grounds on a seasonal basis (Klimley and Anderson, 1996). In the Australasian region, white sharks differ genetically from other populations and data suggest there are two populations in southern Australia east and west by

Bass Strait (Blower et al., 2012). A recent long-term electronic tagging study of juvenile white sharks off eastern Australia, indicated complex movement patterns over thousands of kilometres, including annual fidelity to spatially restricted nursery areas, directed seasonal coastal movements, intermittent areas of temporary nearshore residency and offshore movement into the Tasman Sea (Bruce et al., 2019). This study also supported the two-population model for the species in Australian waters with restricted east to west movements through Bass Strait. Bruce et al., (2019) observed seasonal movements of juvenile white sharks being in the northern region during winter– spring (June–November) and southern region during summer–autumn (December–May).

Observations of adult sharks are more frequent around fur-seal and sea lion colonies, including Wilsons Promontory and the Skerries. Juveniles are known to congregate in certain key areas including the Ninety Mile Beach area (including Corner Inlet and Lakes Entrance) in eastern Victoria and the Portland area of western Victoria).

The distribution BIA for the white shark intersects the EMBA and operational area (Figure 5-20). The known distribution is on the coastal shelf/upper slope waters out to 1,000 m and the broader area where they are likely to occur extends from Barrow Island in WA to Yeppoon in NSW. They are more likely to be found between the 60–120 m depth contours than in the deeper waters. There is a known nursery area at Corner Inlet, and they are known to forage in waters off pinniped colonies throughout the SEMR. It is likely that white sharks are present in the EMBAs.

Table 5-4: Listed fish species identified in the PMST report

Common name	Species name	EPBC Act status			Type of presence (within the spill EMBA)	Spill EMBA	Operational area (2 km)
		Listed Threatened	Listed Migratory	Listed marine			
Australian grayling	*Prototroctes maraena*	V	-	-	SHK		
Whale shark	*Rhincodon typus*	V	M	-	SHM		
Sharks and rays							
Porbeagle, mackerel shark	*Lamna nasus*	-	M	-	SHL		
Shortfin mako	*Isurus oxyrinchus*	-	M	-	SHL		
White shark	*Carcharodon carcharias*	V	M	-	BK		
Pipefish, seahorse, seadragons							
Australian long-snout pipefish	*Vanacampus poecilolaemus*	-	-	L	SHM		
Australian smooth pipefish	*Lissocampus caudalis*	-	-	L	SHM		
Bigbelly seahorse	*Hippocampus abdominalis*	-	-	L	SHM		
Black pipefish	*Stigmatopora nigra*	-	-	L	SHM		
Briggs' crested pipefish	*Histiogamphelus briggsii*	-	-	L	SHM		
Brushtail pipefish	*Leptoichthys fistularius*	-	-	L	SHM		
Bullneck Seahorse	*Hippocampus minotaur*	-	-	L	SHM		

Common name	Species name	EPBC Act status			Type of presence (within the spill EMBA)	Spill EMBA	Operational area (2 km)
		Listed Threatened	Listed Migratory	Listed marine			
Common seadragon	*Phyllopteryx taeniolatus*	-	-	L	SHM		
Deep-bodied pipefish	*Kaupus costatus*	-	-	L	SHM		
Double-end pipehorse	*Syngnathoides biaculeatus*	-	-	L	SHM		
Hairy pipefish	*Urocampus carinirostris*	-	-	L	SHM		
Half-banded pipefish	*Mitotichthys semistriatus*	-	-	L	SHM		
Javelin pipefish	*Lissocampus runa*	-	-	L	SHM		
Knife-snouted pipefish	*Hypselognathus rostratus*	-	-	L	SHM		
Leafy seadragon	*Phycodurus eques*	-	-	L	SHM		
Mollison's pipefish	*Mitotichthys mollisoni*	-	-	L	SHM		
Mother-of-pearl pipefish	*Vanacampus margaritifer*	-	-	L	SHM		
Port Phillip pipefish	*Vanacampus phillipi*	-	-	L	SHM		
Pug-nosed pipefish	*Pugnaso curtirostris*	-	-	L	SHM		
Red pipefish	*Notiocampus ruber*	-	-	L	SHM		
Rhino pipefish	*Histiogamphelus cristatus*	-	-	L	SHM		
Ring-backed pipefish	*Stipecampus cristatus*	-	-	L	SHM		
Robust pipehorse	*Solegnathus robustus*	-	-	L	SHM		

Common name	Species name	EPBC Act status			Type of presence (within the spill EMBA)	Spill EMBA	Operational area (2 km)
		Listed Threatened	Listed Migratory	Listed marine			
Sawtooth pipefish	*Maroubra perserrata*	-	-	L	SHM		
Short-head seahorse	*Hippocampus breviceps*	-	-	L	SHM		
Southern pygmy pipehorse	*Acentronura austral*	-	-	L	SHM		
Spiny pipehorse,	*Solegnathus spinosissimus*	-	-	L	SHM		
Spotted pipefish	*Stigmatopora argus*	-	-	L	SHM		
Trawl pipefish	*Kimblaeus bassensis*	-	-	L	SHM		
Tryon's pipefish	*Campichthys tryoni*	-	-	L	SHM		
Tucker's pipefish	*Mitotichthys tuckeri*	-	-	L	SHM		
Upside-down pipefish	*Heraldia nocturna*	-	-	L	SHM		
Verco's pipefish	*Vanacampus vercoi*	-	-	L	SHM		

Listed Threatened
V: Vulnerable
Listed Migratory
M: Migratory
Listed Marine
L: Listed

Likely Presence
SHM: Species or species habitat may occur within area.
SHL: Species or species habitat likely to occur within area.
SHK: Species or species habitat known to occur within area.
BK: Breeding known to occur within area.

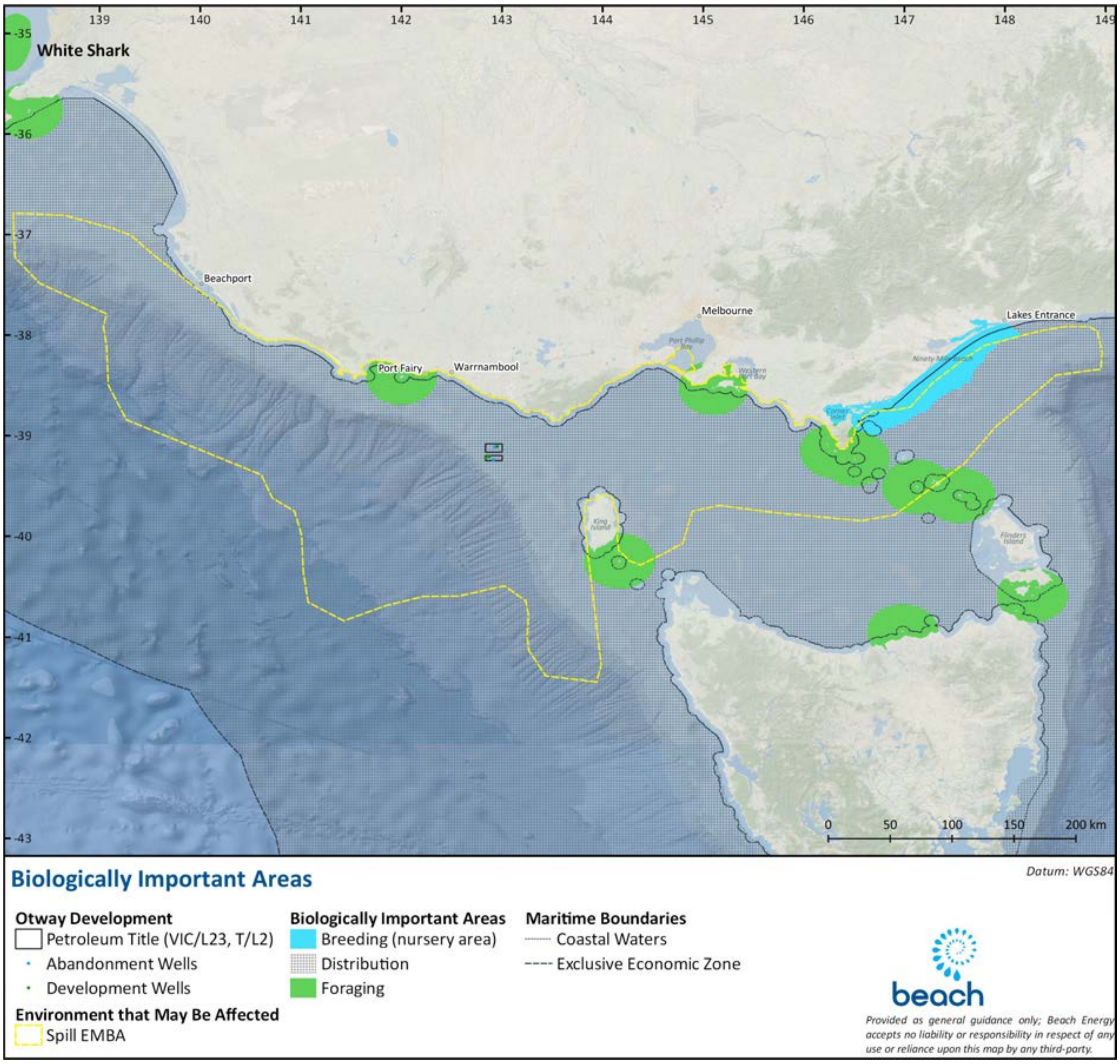


Figure 5-20: BIAs for the white shark within the spill EMBA

Shortfin mako shark

The shortfin mako shark (*Isurus oxyrinchus*) is a pelagic species with a circum-global 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. Populations of the shortfin mako are considered to have undergone a substantial decline globally. These sharks are a common by-catch species of commercial fisheries (Mollet et al., 2000).

The use of dorsal satellite tags on 10 juvenile shortfin mako sharks captured in the Great Australian Bight between 2008 and 2011 investigated habitat and migration patterns. It revealed GAB and south east of Kangaroo Island near the norther extent of the Bonney Upwelling Region, to be areas of highest fidelity and indicating critical habitats for juvenile shortfin mako (Rogers, 2011). The tagged sharks also showed migration to south west Western Australia, Victoria, Bass Strait and south west of Tasmania. Stomachs of shortfin mako sharks were also analysed from specimens collected by game fishing competitors in Port Mac Donnell, South Australia and Portland, Victoria from 2008 and 2010 found they specialise in larger prey including pelagic teleosts and cephalopods (Rogers, 2011). Due to their widespread distribution in Australian waters, shortfin mako sharks are likely to migrate through the operational area and spill EMBA in low numbers.

Porbeagle shark

The porbeagle shark (*Lamna nasus*) is widely distributed in the southern waters of Australia including Victorian and Tasmanian waters. 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, but does make 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). The porbeagle shark is likely to pass through the EMBA in low numbers.

Australian grayling

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 NSW, Victoria and Tasmania, migrating between streams and the ocean. Spawning occurs in freshwater, with timing dependant on many variables including latitude and temperature regimes. Most of its life is spent in fresh water, with parts of the larval or juvenile stages spent in coastal marine waters (Department of Sustainability and Environment, 2008a), though its precise marine habitat requirements remain unknown (Department of Sustainability and Environment, 2008b). They are a short-lived species, usually dying after their second year soon after spawning (a small proportion may reach four or five years) (DSE, 2008a).

The Australian grayling has been recorded from the Gellibrand River (DSE, 2008b), making it likely that it occurs in coastal waters. As marine waters are not part of the species' spawning grounds, the EMBA is not likely to represent critical habitat for the species.

Whale shark

The whale shark is most commonly seen in waters off Western Australia, Northern Territory and Queensland however is occasionally seen off Victoria and South Australia (DoE, 2017w). It is generally found in areas where the surface temperature is 21–25 °C, preferably with cold water of 17 °C or less upwelling into it. It is generally observed singularly at the surface but can occasionally be in schools or aggregations of up to hundreds of sharks (Compagno, 1984). The whale shark is a suction filter feeder and feeds on a variety of planktonic and nektonic prey, including small crustaceans, small schooling fishes and, to a lesser extent, on small tuna and squid. The whale shark (Rhincodon typus) is listed as Vulnerable and Migratory under the EPBC Act (TSSC, 2015b) and is not likely to occur in the operational area and spill EMBA.

Syngnathids

All of the marine ray-finned fish species identified in the EPBC PMST Report are syngnathids, which includes seahorses and their relatives (sea dragon, pipehorse and pipefish). 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 (Fishes of Australia, 2015). They are sometimes recorded in deeper offshore waters, where they depend on the protection of sponges and rafts of floating seaweed such as sargassum.

Of the 26 species of syngnathids identified in the EPBC PMST Report, only one (*Hippocampus abdominalis*, big-belly seahorse) has a documented species profile and threats profile, indicating how little published information exists in general regarding syngnathids. Syngnathid species are widely distributed throughout southern, south-eastern and south-western Australian waters. Therefore, it is unlikely that these species will be present in the operational area, as water depths are greater than 50 m. However, they are likely to be present in the shallow coastal waters of the MDO spill EMBA.

5.7.7.4 Birds

A diverse array of seabirds and terrestrial birds utilise the Otway region and may potentially forage within or fly over the operational area and EMBA, resting on islands during their migration. Infrequently and often associated with storm events, birds that do not normally cross the ocean are sometimes observed over the Otway shelf, suggesting the birds have been blown off their normal course or are migrating.

Bird species listed in the PMST report are shown in Table 5-13. Threatened or migratory species that are likely or known to occur in the area or have an intercepting BIA with the operational area and spill EMBA are discussed in more detail.

Table 5-13: Listed bird species identified in the PMST report

Common name	Species name	EPBC Act status			Type of presence (within the spill EMBA)	Spill EMBA	Operational area (2 km)
		Listed Threatened	Listed Migratory	Listed marine			
Albatrosses							
Antipodean albatross*	*Diomedea antipodensis*	V	M	L	FL		
Black-browed albatross*	*Thalassarche melanophris*	V	M	L	FL		
Buller's albatross*	*Thalassarche bulleri*	V	M	L	FL		
Campbell albatross*	*Thalassarche impavida*	V	M	L	FL		
Chatham albatross	*Thalassarche eremita*	E	M	L	FL		
Gibson's albatross	*Diomedea antipodensis gibsoni*	V	-	L	FL		
Grey-headed albatross	*Thalassarche chrysostoma*	E	M	L	SHM		
Indian yellow-nosed albatross*	*Thalassarche carteri*	V	M	L	FL		
Northern buller's albatross	*Thalassarche bulleri platei*	V	-	-	FL		
Northern royal albatross	*Diomedea sanfordi*	E	M	L	FL		
Pacific albatross	*Thalassarche sp. nov.*	V		L	FL		
Salvin's albatross	*Thalassarche salvini*	V	M	L	FL		
Shy albatross*	*Thalassarche cauta cauta*	V	M	L	FL		

Common name	Species name	EPBC Act status			Type of presence (within the spill EMBA)	Spill EMBA	Operational area (2 km)
		Listed Threatened	Listed Migratory	Listed marine			
Sooty albatross	*Phoebetris fusca*	V	M	L	SHL		
Southern royal albatross	*Diomedea epomophora*	V	M	L	FL		
Tasmanian shy albatross	*Thalassarche cauta*	V	M	L	FL		
Wandering albatross*	*Diomedea exulans*	V	M	L	FL		
White-capped albatross	*Thalassarche steadi*	V	M	L	FL		
Shearwaters							
Flesh-footed shearwater	*Ardenna carneipes*	-	M	L	SHK		
Short-tailed shearwater*	*Ardenna tenuirostris*	-	M	L	BK		
Sooty shearwater	*Ardenna grisea*	-	M	L	SHM		
Wedge-tailed shearwater*	*Ardenna pacifica*		M	L	BK		
Petrels							
Blue petrel	*Halobaena caerulea*	V	-	L	SHM		
Common diving petrel*	*Pelecanoides urinatrix*			L	BK		
Gould's petrel	*Pterodroma leucoptera*	E	-	-	SHM		
Great-winged petrel	*Pterodroma macroptera*	-	-	L	FK		

Common name	Species name	EPBC Act status			Type of presence (within the spill EMBA)	Spill EMBA	Operational area (2 km)
		Listed Threatened	Listed Migratory	Listed marine			
Northern giant-petrel	*Macronectes halli*	V	M	L	SHM		
Soft-plumaged petrel	*Pterodroma mollis*	V	-	L	FL		
Southern giant-petrel	*Macronectes giganteus*	E	M	L	SHL		
White-bellied storm-petrel	*Fregetta grallaria grallaria*	V	-	-	BK		
White-faced storm petrel*	*Pelagodroma marina*	-	-	L	BK		
Other							
Australasian bittern	*Botaurus poiciloptilus*	E	-	-	SHK		
Australasian gannet*	*Morus serrator*	-	-	L	BK		
Australian fairy tern	*Sternula nereis*	V	-	-	BK		
Australian painted-snipe	*Rostratula australis*	E	-	-	SHL		
Bar-tailed godwit	*Limosa lapponica bauera*	V	W	L	SHK		
Black currawong	*Strepera fuliginosa colei*	V	-	-	BL		
Black-eared cuckoo	*Chrysococcyx osculans*	-	-	L	SHK		
Black-faced cormorant*	*Phalacrocorax fuscescens*	-	-	L	BK		

Common name	Species name	EPBC Act status			Type of presence (within the spill EMBA)	Spill EMBA	Operational area (2 km)
		Listed Threatened	Listed Migratory	Listed marine			
Black-faced monarch	*Monarcha melanopsis*	-	T	L	SHK	✓	
Black-tailed godwit	*Limosa limosa*	-	W	L	RK	✓	
Broad-billed sandpiper	*Limicola falcinellus*	-	W	L	RK	✓	
Cape gannet	*Morus capensis*	-	-	L	BK	✓	
Caspian tern	*Hydroprogne caspia*	-	M	L	BK	✓	
Caspian tern	*Sterna caspia*	-	-	L	BK	✓	
Cattle egret	*Ardea ibis*	-	-	L	SHM	✓	
Common diving-petrel	*Pelecanoides urinatrix*	-	-	L	BK	✓	
Common greenshank	*Tringa nebularia*	-	W	L	SHK	✓	
Common noddy	*Anous stolidus*	-	M	L	SHL	✓	
Common sandpiper	*Actitius hypoleucos*	-	W	L	SHK	✓	✓
Crested tern	*Thalasseus bergii*	-	W	L	BK	✓	
Curlew sandpiper	*Calidris ferruginea*	CE	W	L	SHK	✓	✓
Double-banded plover	*Charadrius bicinctus*	-	W	L	RK	✓	
Eastern curlew	*Numenius madagacariensis*	CE	W	L	SHK	✓	✓
Fairy prion	*Pachyptila turtur*	-	-	L	SHM	✓	✓

Common name	Species name	EPBC Act status			Type of presence (within the spill EMBA)	Spill EMBA	Operational area (2 km)
		Listed Threatened	Listed Migratory	Listed marine			
Fairy prion (southern)	*Pachyptila turtur subantarctica*	V	-	-	SHK		
Fork-tailed swift	*Apus pacificus*	-	M	L	SHL		
Great egret	*Ardea alba*	-	-	L	BK		
Great knot	*Calidris tenuirostris*	CE	W	L	RK		
Great skua	*Catharacta skua*	-	-	L	SHM		
Greater sand plover	*Charadrius leschenaultia*	V	W	L	RK		
Green rosella	*Platycercus caledonicus brownie*	V	-	-	SHL		
Grey plover	*Pluvialis squatarola*	-	W	L	RK		
Grey-tailed tattler	*Heteroscelus brevipes*	-	W	-	RK		
Hooded plover	*Thinornis rubricollis rubricollis*	V	-	L	SHK		
Kelp gull	*Larus dominicanus*	-	-	L	BK		
King Island brown thornbill	*Acanthiza pusilla archibaldi*	E	-	-	SHL		
King Island scrubtit	*Acanthornis magna greeniana*	CE	-	-	SHK		
Latham's snipe	*Gallinago hardwickii*	-	W	L	RK		
Lesser sand plover	*Charadrius mongolus*	E	W	L	RK		
Little curlew	*Numenius minutus*	-	W	L	RL		

Common name	Species name	EPBC Act status			Type of presence (within the spill EMBA)	Spill EMBA	Operational area (2 km)
		Listed Threatened	Listed Migratory	Listed marine			
Little penguin*	*Eudyptula minor*	-	-	L	BK		
Little tern	*Sternula albifrons*	-	M	L	BK		
Magpie Goose	*Anseranas semipalmata*	-	-	L	SHM		
Marsh sandpiper	*Tringa stagnatilis*	-	W	L	RK		
Northern siberian bar-tailed godwit	*Limosa lapponica menzbieri*	CE	-	-	SHM		
Orange-bellied parrot	*Neophema chrysogaster*	CE	-	L	MK		
Osprey	*Pandion haliaetus*	-	W	L	SHK		
Pacific golden plover	*Pluvialis fulva*	-	W	L	RK		
Pacific gull	*Larus pacificus*	-	-	L	BK		
Painted honeyeater	*Grantiella picta*	V	-	-	SHL		
Painted snipe	*Rostratula benghalensis (sensu lato)*	E	-	L	SHL		
Pectoral sandpiper	*Calidris melanotos*	-	W	L	SHK		
Pied stilt	*Himantopus himantopus*	-	-	L	RK		
Pin-tailed snipe	*Gallinago stenura*	-	W	L	RL		
Plains-wanderer	*Pedionomus torquatus*	CE	-	-	SHL		
Rainbow bee-eater	*Merops ornatus*	-	-	L	SHM		

Common name	Species name	EPBC Act status			Type of presence (within the spill EMBA)	Spill EMBA	Operational area (2 km)
		Listed Threatened	Listed Migratory	Listed marine			
Red knot	*Calidris canutus*	E	W	L	SHK		
Red-capped plover	*Charadrius ruficapillus*	-	-	L	RK		
Red-necked avocet	*Recurvirostra novaehollandiae*	-	-	L	RK		
Red-necked phalarope	*Phalaropus lobatus*	-	W	L	RK		
Red-necked stint	*Calidris ruficollis*	-	W	L	RK		
Regent honeyeater	*Anthochaera Phrygia*	CE	-	-	FL		
Ruddy turnstone	*Arenaria interpres*	-	W	L	RK		
Ruff (Reeve)	*Philomachus pugnax*	-	M	L	SHL		
Rufous fantail	*Rhipidura rufifrons*	-	T	L	SHK		
Sanderling	*Calidris alba*	-	W	L	RK		
Satin flycatcher	*Myiagra cyanoleuca*	-	T	L	BK		
Sharp-tailed sandpiper	*Calidris acuminata*	-	W	L	RK		
Silver gull	*Larus novaehollandiae*	-	-	L	BK		
Sooty tern	*Sterna fuscata*	-	-	L	BK		
South-eastern red-tailed black-cockatoo	*Calyptorhynchus banksii graptogyne*	E	-	-	SHK		
Swift parrot	*Lathamus discolour*	CE	-	-	SHK		
Swinhoe's snipe	*Gallinago megala*	-	W	L	RL		

Common name	Species name	EPBC Act status			Type of presence (within the spill EMBA)	Spill EMBA	Operational area (2 km)
		Listed Threatened	Listed Migratory	Listed marine			
Tasmanian azure kingfisher	*Ceyx azureus diemenensis*	E	-	-	SHM		
Tasmanian wedge-tailed eagle	*Aquila audax fleayi*	E	-	-	SHL		
Terek sandpiper	*Xenus cinereus*	-	W	L	RK		
Wandering tattler	*Heteroscelus incana*	-	W	-	RK		
Whimbrel	*Numenius phaeopus*	-	W	L	RK		
White-bellied sea-eagle	*Haliaeetus leucogaster*	-	-	L	BK		
White-faced storm-petrel	*Pelagodroma marina*	-	-	L	BK		
White-throated needletail	*Hirundapus caudacutus*	V-	T	L	SHK		
Wood sandpiper	*Tringa glareola*	-	W	L	RK		
Yellow wagtail	*Motacilla flava*	-	T	L	SHM		

**Green highlighting denotes presence of species.*

Listed Threatened
- CE: Critically Endangered
- E: Endangered
- V: Vulnerable

Listed Migratory
- M: Migratory

Listed Marine
- L: Listed

Likely Presence

SHM: Species or species habitat may occur within area.
SHL: Species or species habitat likely to occur within area.
SHK: Species or species habitat known to occur within area.
FL: Foraging, feeding or related behaviour likely to occur within area.
RK: Roosting known to occur within area.
ML: Migratory route likely to occur in area.
BK: Breeding known to occur within area.

Albatross and petrels

Albatrosses and giant-petrels are among the most dispersive and oceanic of all birds, spending more than 95% of their time foraging at sea in search of prey and usually only returning to land (remote islands) to breed. The National Recovery Plan for threatened albatross and giant petrels (DSEWPaC, 2011a). Only seven species of albatross and the southern and northern giant petrel are known to breed within Australia, which are protected under The National Recovery Plan for threatened albatross and giant petrels (DSEWPaC, 2011a). Breeding within Australian territory occurs on the isolated islands of Antarctica (Giganteus Island, Hawker Island and Frazier islands) and the Southern Ocean (Heard Island, McDonald Island, Macquarie Island, Bishop and Clerk Islands), as well as islands off the south coast of Tasmania and Albatross Island off the north-west coast of Tasmania in Bass Strait (DSEWPaC, 2011b). There are no islands with colonies of threatened marine seabirds within the EMBAs. Albatross Island, supporting a breeding population of approximately 5,000 shy albatross (*Thallassarche cauta*), is the closest breeding colony of threatened seabirds to the spill EMBA.

Albatross and giant petrel species exhibit a broad range of diets and foraging behaviours, hence their at-sea distributions are diverse. Combined with their ability to cover vast oceanic distances, all waters within Australian jurisdiction can be considered foraging habitat, however the most critical foraging habitat is those waters south of 25 degrees where most species spend most of their foraging time. The Antipodean albatross, black-browed albatross, Buller's albatross, Campbell albatross, Indian yellow-nosed albatross, shy albatross and wandering albatross, have BIAs for foraging that overlap the operational area or spill EMBA. These BIAs cover either most or all the SEMR (Commonwealth of Australia, 2015). Therefore, it is likely that these will be present and forage in the EMBA.

Both the common diving-petrel and the white-faced storm petrel are not listed as threatened species under the EPBC Act, and have large populations within Australia, accounting for 5% and 25% respectively of the global population (DoE, 2015b). The common diving-petrel breeds on islands off south-east Australia and Tasmania; there are 30 sites with significant breeding colonies (defined as more than 1,000 breeding pairs) known in Tasmania, and 12 sites in Victoria (including Seal Island, Wilson's Promontory and Lady Julia Percy Island) (DoE, 2015e). There are 15 sites with significant breeding colonies in Tasmania, and three sites with Victoria, for the white-faced storm petrel (DoE, 2015e). A BIA for foraging has been identified for the common diving-petrel that overlaps with the operational area or spill EMBA. The common-diving petrel also has a breeding BIA that overlaps the spill EMBA. The white-faced storm petrel foraging BIA also overlaps the spill EMBA.

Southern royal albatross forage from 36° to 63°. They range over the waters off southern Australia at all times of the year but especially from July to October (DSEWPaC, 2011b). The northern royal albatross is regularly recorded throughout the year around Tasmania and South Australia at the continental shelf edge and feeds frequently in these waters. Despite breeding colonies in New Zealand, the white capped and the Chatham albatross are common off the coast of south-east Australia throughout the year. During the non-breeding season, the Salvin's albatross occur over continental shelves around continents with a small number of non-breeding adults flying regularly across the Tasman Sea to south-east Australian waters (DSEWPaC, 2011b). Sooty albatrosses although rare are likely regular migrants to Australian waters mostly in the autumn to winter months and have been observed foraging in southern Australia (Thiele, 1977; Pizzey & Knight, 1999). The Pacific albatross (equivalent to the northern Buller's albatross) is a non-breeding visitor to Australian waters mostly limited to the Tasman Sea and Pacific Ocean, occurring over inshore, offshore and pelagic waters and off the east-coast of Tasmania (DSEWPaC, 2011b). Gibson's albatross has breeding colonies in New Zealand but has been known to forage in the Tasman Sea and South Pacific Ocean with individuals occurring offshore from Coffs harbour in the north to Wilson's Promontory in the south (EA, 2001; Marchant & Higgins 1990). Therefore, it is likely that these along with the Tasmanian shy albatross will be present and forage in the spill EMBA and potentially the operational area.

The white-bellied storm petrel breed on small offshore islets and rocks in Lord Howe Island and has been recorded over near-shore waters off Tasmania (Baker et al. 2002). The great-winged petrel breeds in the Southern Hemisphere between 30° and 50° south, outside of the breeding season they are widely dispersed (Birdlife International, 2019)

Terns and shearwaters

The flesh-footed shearwater is a trans-equatorial migrant widely distributed across the south-western Pacific during breeding season (early September to early May) and is a common visitor to the waters of the continental shelf/slope and occasionally inshore waters. The species breeds in burrows on sloping ground in coastal forest, scrubland, shrubland or grassland. Thirty-nine of the 41 islands on which the species breeds lie off the coast of southern Western Australia, with the remaining two islands being Smith Island (SA) and Lord Howe Island. The flesh-footed shearwater feeds on small fish, cephalopod molluscs (squid, cuttlefish, nautilus and argonauts), crustaceans (barnacles and shrimp), other soft-bodied invertebrates (such as Velella) and offal. The species forages almost entirely at sea and very rarely on land. It obtains most of its food by surface plunging or pursuit plunging. It also regularly forages by settling on the surface of the ocean and snatching prey from the surface ('surface seizing'), momentarily submerging onto prey beneath the surface ('surface diving') or diving and pursuing prey beneath the surface by swimming ('pursuit diving'). Birds have also been observed flying low over the ocean and pattering the water with their feet while picking food items from the surface (termed 'pattering') (DoEE, 2014). This species is likely to be an uncommon visitor to the operational area and spill EMBA.

The short-tailed shearwater has foraging and breeding BIAs within the spill EMBA and the foraging BIA is within the light EMBA. The short-tailed shearwater is migratory, and breeding is restricted to southern Australia being most abundant in Victoria and Tasmania (Skira et al., 1996). Huge numbers arrive along the south and south-east coast of Australia from wintering grounds in the North Pacific and are observed in large numbers foraging the surrounding coastal and offshore waters (Marchant & Higgins, 1990). Short-tailed shearwaters have been identified as a conservation value in the temperate east and south-west marine areas.

The wedge-tailed shearwater has a foraging and breeding BIA within the operational area and spill EMBAs. A review of the DoEE Species Profile and Threats Database (SPRAT), Atlas of Living Australia and South-east Marine Region Profile did not provide any information on the Victorian Muttonbird Island wedge-tailed shearwater colony. The DoEE SPRAT profile does not show any locations for the wedge-tailed shearwater in Victoria and Beaver (2018) details Montague Island in NSW was the southernmost known colony, however, in 2017 breeding individuals of Wedge-tail shearwaters were discovered a couple of hundred kilometres further south on Gabo Island Lighthouse Reserve, Victoria near the NSW border.

Caspian tern is the largest turn in Australia, they inhabit both coastal and inland regions and breeding occurs widespread throughout Australia. In Victoria breeding sites are mostly along coastal regions with three significant regular breeding colonies, Corner Inlet, Mud Island and Mallacoota (Minton & Deleyev, 2001). Breeding occurs between September to December are resident and occur throughout the year at breeding sites. The Caspian tern usually forages in open wetlands and prefers shallow waters but is also found in open coastal waters, title channels and mud flaps. They can forage 60 km from their nesting site (Higgins & Davis, 1996). The little tern species is also widespread in Australia with three major sub populations, the northern population that breeds from Broome to Northern Territory. The eastern subpopulation breeds on the eastern and south eastern coast extending as far as western Victoria and the south-eastern parts of South Australia, to the northern and eastern coast of Tasmania. The third population migrate from breeding grounds in Asia to spend the spring and summer in Australia. The little tern has a naturally high rate of breeding failure due to the ground nets being exposed to adverse weather conditions, and native predators. The Australian fairy tern occurs along the coastline of Victoria, South Australia, Western Australia and Tasmania. Breeding habitat for the Caspian, little tern and Australian fairy tern vary from terrestrial wetlands, rocky islets or banks, low islands, beaches, cays and spits. Nest are present in the open sparse vegetation such as tussocks and other sand binding plants to sometimes near bushes and driftwood. Their diet also consists primarily of fish along with aquatic invertebrates, insects and eggs and the young of other birds (Higgins & Davis, 1996; Taylor & Roe, 2004; Van de Kam et al., 2004).

The sooty tern has a much larger foraging range, encompassing open shelf waters, shelf edge and deep water (DSEWPaC, 2012b). Main breeding colonies occur off Australia's west and east coast. Like the crested tern where distribution is widespread in Australia, but breeding occurs off islands in large colonies off Queensland and New South Wales (Higgins & Davis, 1996). Foraging diet consists of pelagic fish, cephalopods, crustaceans and insects.

Osprey and white bellied sea eagle

The white-bellied sea eagle is a large raptor generally seen singly or in pairs, distributed along the coastline of mainland Australia and Tasmania. Breeding records are patchily distributed mainly along the coastline especially the eastern coast extending from Victoria and Tasmania to Queensland. There are recorded breeding sites as far inland as the Murray, Murrumbidgee and Lachlan River in norther Victoria (Marchant & Higgins, 1993). There is no quantitative data available on area of occupancy, but it is believed that there could be a decline due to increased development of coastal areas. Estimations of 500 or more pairs in Australia account for 10-20% of the global population (Marchant & Higgins, 1993). Recorded decline in numbers have been recorded across Australia, with a decline numbers in Victoria recorded in Gippsland Lakes, Phillip Island and the Sunraysia district (Bilney & Emison, 1983; Quinn, 1969). White-bellied sea eagles feed on a variety of fish, birds, reptiles, mammals and crustaceans. They hunt from a perch and while in flight (circling slowly). Described as a breeding resident throughout much of its range in Australia, breeding is generally sedentary, and the home range can be up to 100 km^2 (Marchant & Higgins, 1993). White-bellied sea eagles are sensitive to disturbance particularly in the early stages of nesting, human activity may cause nests and young to be abandoned (Debus et al, 2014). Breeding is known to occur within the spill EMBA, so they are likely to be common visitor.

The osprey is a medium sized raptor extending around the northern coast of Australia from Albany, Western Australia to Lake Macquarie in New South Wales with an isolated breeding population on the coast of South Australia. Listed as migratory under the EPBC Act they are resident around breeding territories. They are found along coastal habitats and terrestrial wetlands and require open fresh or saltwater for foraging (Marchant & Higgins, 1993). Osprey feed mainly on fish, occasionally molluscs, crustaceans, mammals, birds, reptiles and insects. Generally, they search or prey by soaring, circling and quartering above water and dive directly into the water at their target prey (Clancy, 2005). This species is likely to be an uncommon visitor to the operational area and spill EMBA.

Orange-bellied parrot

The orange-bellied parrot (*Neophema chrysogaster*) (listed as critically endangered under the EPBC Act) breeds in Tasmania during summer, migrates north across Bass Strait in autumn and spends winters on the mainland. The migration route includes the west coast of Tasmania and King Island. Birds depart the mainland for Tasmania from September to November (Green, 1969). The southward migration is rapid (Stephenson, 1991), so there are few migration records. The northward migration across western Bass Strait is more prolonged (Higgins & Davies, 1996). The orange-bellied parrot is protected under the National Recovery Plan for the orange-bellied parrot (DELWP, 2016a). The parrot's breeding habitat is restricted to south-west Tasmania, where breeding occurs from November to mid-January mainly within 30 km of the coast. The species forage on the ground or in low vegetation (Loyn et al., 1986). During winter, on mainland Australia, orange-bellied parrots are found mostly within 3 km of the coast. In Victoria, they mostly occur in sheltered coastal habitats, such as bays, lagoons and estuaries. 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*) (DoEE, 2019a). There are also non-breeding orange-bellied parrots on mainland Australia, between Goolwa in Australia and Corner Inlet in Victoria. The orange bellied parrot may overfly the coastal waters of the spill EMBA, with the west coast of King Islands and coastal Victoria has been identified as resting and feeding areas. Parrots rarely land or forage out at sea.

Little penguin

The little penguin is the smallest species of penguin in the world and are permanent residents on a number of inshore and offshore islands. The Australian population is large but not thought to exceed one million birds (DoE, 2015a). Bass Strait has the largest proportion (approximately 60%) of the known breeding colonies in Australia; however, breeding populations are also found on the New South Wales coast. Individuals exhibit strong site fidelity, returning to the same breeding colony each year to breed in the winter and spring months (Gillanders *et al.*, 2013). The diet of a Little Penguin includes small school fish, squid and krill. Prey is typically caught with rapid jabs of the beak and swallowed whole. A BIA for breeding and foraging, has been identified for breeding and foraging of the Little Penguin within the EMBA. Their main breeding site within the spill EMBA is in Western Port Bay. Little penguins are also an important component of the Australian and New Zealand fur-seals' diet (Parliament of South Australia, 2011).

Australasian gannet

The Australasian gannet generally feeds over the continental shelf or inshore waters. Their diet is comprised mainly of pelagic fish, but also squid and garfish. Prey is caught mainly by plunge-diving, but it is also seen regularly attending trawlers. Breeding is highly seasonal (October–May), nesting on the ground in small but dense colonies (DoE, 2015a). Important breeding locations for the Australasian gannet within the Environment Sectors include Pedra Branca, Eddystone Rocks, Sidmouth Rocks, and Black Pyramid (Tasmania) and Lawrence Rocks (Victoria). A foraging BIA occurs in the spill EMBA with substantial foraging sites within port Philip Bay and Port Fairy.

Other shorebirds

A number of species listed in Table 5-13 use coastal shoreline habitats such as Australian fairy tern, fairy prion, red knot, pectoral sandpiper, fork-tailed swift, sharp-tailed sandpiper, curlew sandpiper, eastern curlew, little curlew, yellow wagtail, Australasian bittern and species of plover. These species are commonly found on coastal shores including beaches and rocky shores and either feed at low tide on worms, crustaceans and molluscs or fish species or feed on aquatic biota (Parks Victoria, 2016). These species are unlikely to be present in the operational due to the distance offshore, but are likely to be present in the coastal part of the MDO spill EMBA.

Many sandpipers including the common, marsh, terek, wood and the broad-billed sandpiper are widespread through Australia’s coastline inhabiting saltwater and freshwater ecosystems. They migrate from the Northern Hemisphere in non-breeding months, favouring estuaries, saltmarshes, intertidal mudflats, swamps and lagoons and foraging on worms, molluscs, crustaceans, insects, seeds and occasionally rootlets and other vegetation (Marchant & Higgins, 1993; Higgins & Davies, 1996).

The Australian painted snipe is a stocky wading bird most commonly in eastern Australian wetlands. Feeding on vegetation, insects, worms, molluscs, crustaceans and other invertebrates. Latham’s, Swinhoe’s and pin-tailed snipe is a non-breeding visitor to Australia occurring at the edges of wetlands, shallow swamps, ponds and lakes (Marchant & Higgins, 1993). The wandering tattler and grey-tailed tattler migrate from the Northern hemisphere and inhabit rocky coasts with reefs and platforms, offshore islands and intertidal mudflats. Foraging on polychaete worms, molluscs and crustaceans and roosting on branches of mangroves and rocks and boulders close to water. The bar-tailed godwit and black-tailed godwit are large waders, migrating from the Northern hemisphere in the noon-breeding months to coastal habitat in Australia. The large waders are commonly found in sheltered bays, estuaries, intertidal mudflats, and occasionally on rocky coasts (Higgins & Davies, 1996).

Hooded and eastern hooded plovers are small beach nesting birds. They predominantly occur on wide beaches and are easily disturbed by human activity. The lesser sand and greater sand plover are migratory and inhabits intertidal sand and mudflats, forage on invertebrates and breed in areas characterised by high elevation. Breeding occurs outside Australia, but roosting occurs near foraging areas on beaches, banks, spits and banks (Pegler, 1983). The pacific golden and grey plover are widespread in coastal regions foraging on sandy beaches, spits, rocky points, exposed reef and occasional low saltmarsh and mangroves. Roosting usually occurs near foraging areas while breeding occurs in dry tundra areas away from the coast (Bransbury, 1985; Pegler, 1983; Marchant & Higgins, 1993). The double-banded plover is found in both coastal and inland areas with greatest numbers in Tasmania and Victoria. It breeds only in New Zealand and migrates to Australia.

Other waders including common noddy, ruddy turnstone, sanderling, red-necked stint, whimbrel, common greenshank, pied stilt, white-throated needletail, red-necked phalarope, ruff, red-necked avocet, rufous fantail and black-faced cormorant are common along Australia’s coastline. The black-faced cormorant has a breeding and foraging BIA off King Island within the spill EMBA. Many of these waders are migratory travelling from the Northern Hemisphere in non-breeding months. Most inhabit intertidal mudflats, rocky islets, sand beaches, mangroves, rocky coastline and coral reefs. Roosting occurs in similar habitats and species are found feeding on fish, crustaceans, aquatic insects, as well as plants and seeds (Higgins & Davies, 1996). These species are unlikely to be present in the operational area and light, noise behaviour and wastewater EMBAs due to the distance offshore. The plains wanderer is a unique bird that lives predominantly in grasslands in Victoria, South Australia, New South Wales and Queensland. The swift parrot is a small parrot breeding in colonies in Tasmania. The entire population migrates to the mainland during winter. The great knot is critically endangered migratory arriving in large numbers in Australia occurring in sheltered coastal habitats with large intertidal mudflats. Typically, they roost in large open areas at the water's edge to in shallow water close to foraging grounds (Higgins & Davies 1996). These species are critically endangered and may occur within the spill EMBA.

5.7.7.5 Marine reptiles

Four marine turtle species may occur within the EMBA, all of which are protected by the Recovery Plan for Marine Turtles in Australia (Commonwealth of Australia, 2017b) (Table 5-14). The spill EMBA PMST report identifies that feeding is known to occur in the spill EMBA for all species. There are no identified BIAs for these reptiles in the EMBA.

Table 5-14: Listed turtle species identified in the PMST

Common name	Species name	EPBC Act status			Type of presence (within the spill EMBA)	Spill EMBA	Operational area (2 km)
		Listed threatened	Listed migratory	Listed marine			
Green turtle	*Chelonia mydas*	V	M	L	FK		
Hawksbill turtle	*Eretmochelys imbricate*	V	M	L	SHL		
Leatherback turtle	*Dermochelys coriacea*	E	M	L	FK		
Loggerhead turtle	*Caretta caretta*	E	M	L	FK		

**Green highlighting denotes presence of species.*

Listed Threatened
- E: Endangered
- V: Vulnerable

Listed Migratory
- M: Migratory

Listed Marine
- L: Listed

Likely Presence
- FK: Foraging, feeding or related behaviour likely to occur within area

Loggerhead turtle

The loggerhead turtle (*Caretta caretta*) is globally distributed in tropical, sub-tropical waters and temperate waters. The loggerhead is a carnivorous turtle, feeding primarily on benthic invertebrates in habitat ranging from nearshore to 55 m depth (Plotkin et al., 1993).

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 but show a strong fidelity to their feeding and breeding areas (Limpus, 2008). Loggerhead turtles forage in all coastal states and the Northern Territory, but are uncommon in South Australia, Victoria and Tasmania (Commonwealth of Australia, 2017b). As such, it is unlikely to be present in the operational area or MDO spill EMBA.

Green turtle

Green turtles (*Chelonia mydas*) nest, forage and migrate across tropical northern Australia. They usually occur between the 20°C isotherms, although individuals can stray into temperate waters as vagrant visitors. Green turtles spend their first 5-10 years drifting on ocean currents. During this pelagic (ocean-going) phase, they are often found in association with drift lines and floating rafts of sargassum. Green turtles are predominantly found in Australian waters off the Northern Territory, Queensland and Western Australian coastlines, with limited numbers in NSW, Victoria and South Australia. There are no known nesting or foraging grounds for green turtles offshore Victoria; they occur only as rare vagrants in these waters (DoEE, 2019m), therefore it is expected they would only be occasional visitors in the operational area and MDO spill EMBA.

Leatherback turtle

The leatherback turtle (*Dermochelys coriacea*) is a pelagic feeder found in tropical, sub-tropical and temperate waters throughout the world. Unlike other marine turtles, the leatherback turtle utilises cold water foraging areas, with the species most commonly reported foraging in coastal waters between southern Queensland and central NSW, southeast Australia (Tasmania, Victoria and eastern SA), and southern WA (Commonwealth of Australia, 2017b). This species is an occasional visitor to the Otway shelf and has been sighted on a number of occasions during aerial surveys undertaken by the Blue Whale Study Group, particularly to the southwest of Cape Otway. It is mostly a pelagic species, and away from its feeding grounds is rarely found inshore (Commonwealth of Australia, 2017b). Adults feed mainly on soft-bodied organisms such as jellyfish, which occur in concentrations at the surface in areas of convergence and upwelling (Bone, 1998; Cogger, 1992). Bass Strait is one of three of the largest concentrations of feeding leatherbacks (DSE, 2009). The major threat to leatherback turtles is by-catch and habitat pollution. In the Bass Strait, leatherbacks are at risk of entanglement from crayfish and pot float lines, ingestion of marine debris as ocean currents and wind can accumulate floating debris where turtles feed (DSE, 2009).

No major nesting has been recorded in Australia, with isolated nesting recorded in Queensland and the Northern Territory. The leatherback turtle is expected to be only an occasional visitor in the operational area or MDO spill EMBA.

Hawksbill turtle

Hawksbill turtles typically occur in tidal and sub-tidal coral and rocky reef habitats throughout tropical waters, extending into warm temperate areas as far south as northern New South Wales. In Australia the main feeding area extends along the east coast, including the Great Barrier Reef. Other feeding areas include Torres Strait and the archipelagos of the Northern Territory and Western Australia, possibly as far south as Shark Bay or beyond. Hawksbill turtles also feed at Christmas Island and the Cocos (Keeling) Islands.

5.7.7.6 Cetaceans

Several cetaceans potentially migrate through the operational area and MDO spill EMBA (Table 5-15). Threatened or migratory species that are likely or known to occur in the area are discussed in more detail in the sections below.

Gill et al., (2015) summarised cetacean sightings from 123 systematic aerial surveys undertaken over western Bass Strait and the eastern Great Australian Bight between 2002 and 2013. This paper does not include sighting data for blue whales, which has previously been reported in Gill et al., (2011) (Figure 5-21 and Figure 5-22).

These surveys recorded 133 sightings of 15 identified cetacean species consisting of seven mysticete (baleen) whale species, eight odontocete (toothed) species and 384 sightings of dolphins (Table 5-16 and Table 5-17). Survey effort was biased toward coverage of upwelling seasons, corresponding with pygmy blue whales' seasonal occurrence (November to April; 103 of 123 surveys), and relatively little survey effort occurred during 2008–2011. Cetacean species sighted within the region are described in the following sections.

Gill et al., (2015) encountered southern right and humpback whales most often from May to September, despite low survey effort in those months. Southern right whales were not recorded between October and May. Fin, sei, and pilot whales were sighted only from November to May (upwelling season), although this may be an artefact of their relative scarcity overall and low survey effort at other times of year. Dolphins were sighted most consistently across years. The authors caution that few conclusions about temporal occurrence can be drawn because of unequal effort distribution across seasons and the rarity of most species.

Species of cetacean sighted in the period 31 October to 19 December 2010 during the Speculant 3D Transition Zone Seismic Survey (3DTZSS) undertaken by Origin Energy recorded species of common dolphin (*Delphinus spp*.), bottlenose dolphin (*Tursiops spp*.), unidentified small cetaceans and fur-seals.

The Bass Strait and the Otway Basin is considered an important migratory path for humpback, blue, southern right, and to some extent the fin and sei whales. The whales use the Otway region to migrate to and from the north-eastern Australian coast and the sub-Antarctic. Of environmental importance in the Otway is the Bonney Upwelling, the eastward flow of cool nutrient rich water across the continental shelf of the southern coast of Australia that promotes blooms of krill and attracts baleen whales during the summer months.

Origin Energy conducted a survey for cetaceans focused on Origin operations and permit in the Otway basin from June 2012 through to March of 2013. Table 5-18 lists the species present in the area Origin surveyed.

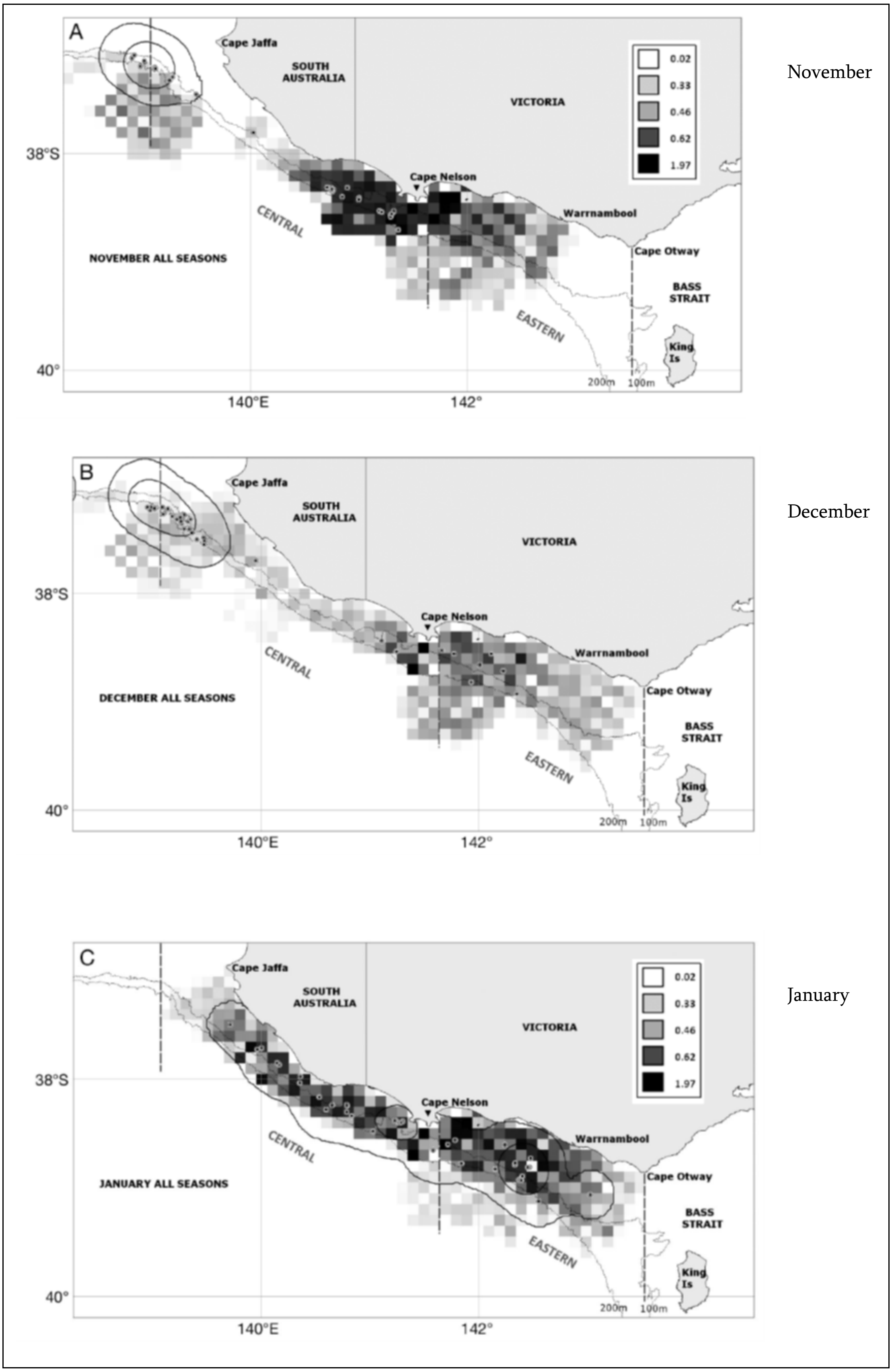


Figure 5-21: Blue whale sightings in the Otway Basin (Nov, Dec, Jan) (Gill et al., 2011)

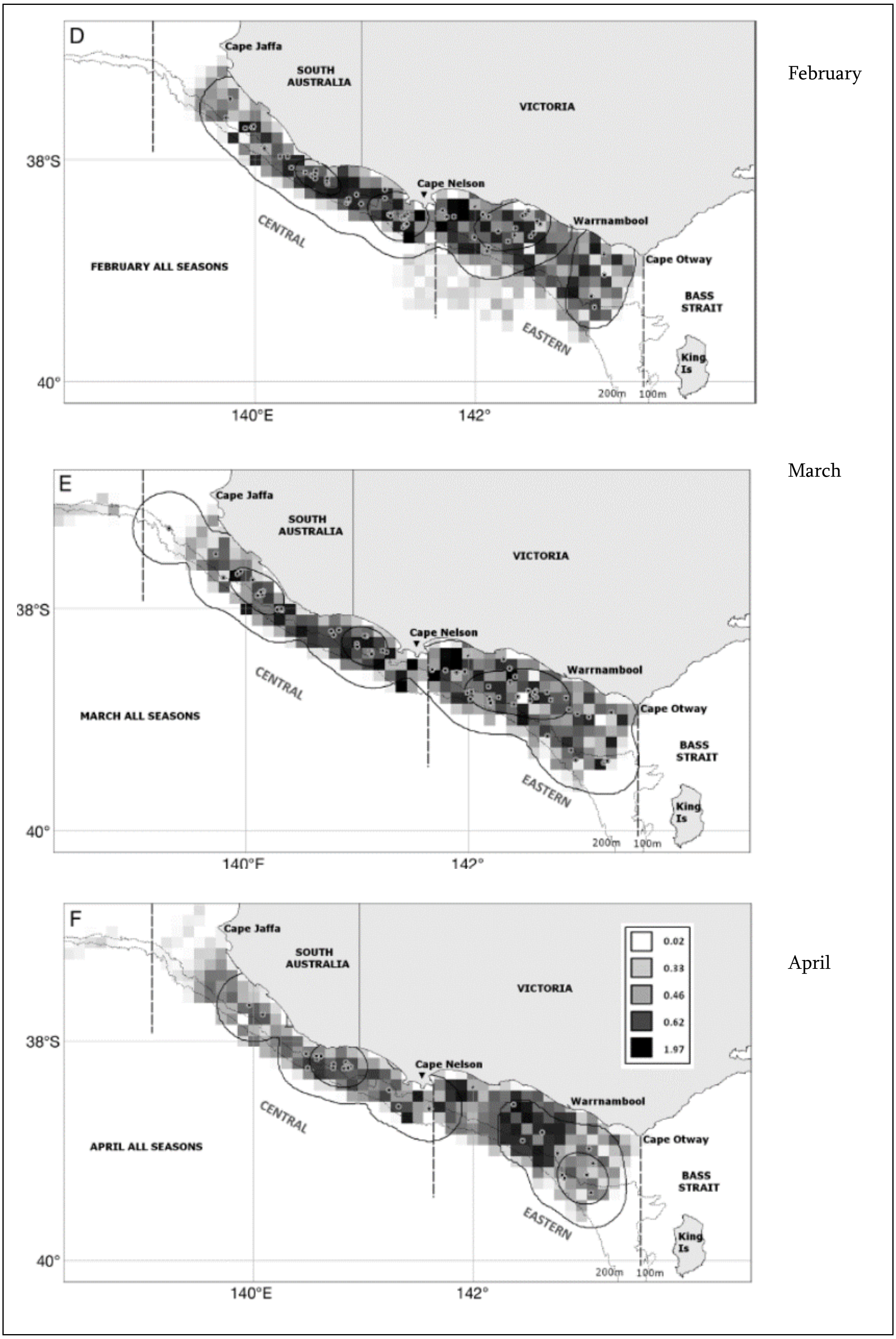


Figure 5-22: Blue whale sightings in the Otway Basin (Feb, Mar, Apr) (Gill et al., 2011)

Table 5-5: Listed cetacean species identified in the PMST report

Common name	Species name	EPBC Act status			Type of presence (within the spill EMBA)	Spill EMBA	Operational area
		Listed threatened	Listed migratory	Listed marine			
Whales							
Andrew's beaked whale	*Mesoplodon bowdoini*	-	-	L	SHM		
Antarctic minke whale	*Balaenoptera bonaerensis*	-	M	L	SHL		
Arnoux's beaked whale	*Berardius arnuxii*	-	-	L	SHM		
Blainville's beaked whale	*Mesoplodon desirostris*	-	-	L	SHM		
Blue whale	*Balaenoptera musculus*	E	M	L	FK		
Bryde's whale	*Balaenoptera edeni*	-	M	L	SHM		
Curvier's beaked whale	*Ziphius cavirostris*	-	-	L	SHM		
Dwarf sperm whale	*Kogia simus*	-	-	L	SHM		
False killer whale	*Pseudorca crassidens*	-	-	L	SHL		
Fin whale	*Balaenoptera physalus*	V	M	L	FK		
Gray's beaked whale	*Mesoplodon grayi*	-	-	L	SHM		
Hector's beaked whale	*Mesoplodon hectori*	-	-	L	SHM		
Humpback whale	*Megaptera novaeangliae*	V	M	L	SHK		
Killer whale, orca	*Orcinus orca*	-	M	L	SHL		
Long-finned pilot whale	*Globicephala melas*	-	-	L	SHM		

Common name	Species name	EPBC Act status			Type of presence (within the spill EMBA)	Spill EMBA	Operational area
		Listed threatened	Listed migratory	Listed marine			
Minke whale	*Balaenoptera acutorostrata*	-	-	L	SHM		
Pygmy right whale	*Caperea marginata*	-	M	L	FL		
Pygmy sperm whale	*Kogia breviceps*	-	-	L	SHM		
Sei whale	*Balaenoptera borealis*	V	M	L	FK		
Shepherd's beaked whale	*Tasmacetus shepherdi*	-	-	L	SHM		
Short-finned pilot whale	*Globicephala macrorhynchus*	-	-	L	SHM		
Southern bottlenose whale	*Hyperoodon planifrons*	-	-	L	SHM		
Southern right whale	*Eubalaena australis*	E	M	L	BK		
Sperm whale	*Physeter macrocephalus*	-	M	L	SHM		
Strap-toothed beaked whale	*Mesoplodon layardii*	-	-	L	SHM		
True's beaked whale	*Mesoplodon mirus*	-	-	L	SHM		
Dolphins							
Bottlenose dolphin	*Tursiops truncates*	-	-	L	SHM		
Common dolphin	*Delphinus delphis*	-	-	L	SHM		
Dusky dolphin	*Lagenorhynchus obscures*	-	M	L	SHL		
Indian ocean bottlenose dolphin	*Tursiops aduncus*	-	-	L	SHL		
Risso's dolphin	*Grampus griseus*	-	-	L	SHM		

Common name	Species name	EPBC Act status			Type of presence (within the spill EMBA)	Spill EMBA	Operational area
		Listed threatened	Listed migratory	Listed marine			
Southern right whale dolphin	*Lissodelphis peronii*	-	-	L	SHM		

**Green highlighting denotes presence of species.*

Listed Threatened
- E: Endangered
- V: Vulnerable

Listed Migratory
- M: Migratory

Listed Marine
- L: Listed

Likely Presence
- SHM: Species or species habitat may occur within area.
- SHL: Species or species habitat likely to occur within area.
- SHK: Species or species habitat known to occur within area.
- FK: Foraging, feeding or related behaviour known to occur within area.
- FL: Foraging, feeding or related behaviour likely to occur within area.
- FM: Foraging, feeding or related behaviour may to occur within area.

Table 5-16: Cetacean species recorded during aerial surveys 2002–2013 in southern Australia

Taxon	Common name	Species group*	Sightings	Individual	Mean group size (+/- SD)
Baleen whales					
Eubalaena australis	Southern right whale	SRW	12	52	4.2 +/- 4.2
Caperea marginata	Pygmy right whale		1	100	100
Balaenoptera physalus	Fin and like fin whale	ROR	7	8	1.1 +/- 0.4
B. borealis	Sei and like sei whale	ROR	12	14	1.3 +/- 0.5
B. acutorostrata	Dwarf minke whale	ROR	1	1	1
B. bonaerensis	like Antarctic minke whale	ROR	1	1	1
Megaptera novaeangliae	Humpback whale	ROR	10	18	1.8 +/- 1.0
Toothed whales					
Physeter macrocephalus	Sperm whale	ODO	34	66	1.9 +/- 2.2
Mesoplodon spp.	Unidentified beaked whales	ODO	1	20	20
Orcinus orca	Killer whale	ODO	6	21	3.5 +/- 2.8
Globicephala melas	Long-finned pilot	ODO	40	1853	46.3 +/- 46.7
Grampus griseus	Risso's dolphin	ODO	1	40	40
Lissodelphis peronii	Southern right whale dolphin	ODO	1	120	120
Tursiops spp.	Bottlenose dolphin	DOL	4	363	90.8 +/- 140.1
	Dolphins	DOL	384	22169	58 +/- 129.6
Unidentified large whales			3	3	1
Unidentified small whales			2	2	1

SRW = southern right whales; ROR = rorquals; ODO = other odontocetes; DOL = dolphins.

Table 5-17: Temporal occurrence across months of cetaceans sighted during aerial surveys from November 2002 to March 2013 in southern Australia

Species	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Southern right whale	0	0	0	0	0	0	0	0	0.8	3.1	6.8	8.8
Pygmy right whale*	0	0	0	0	0	0	0	0	19.8	0	0	0
Fin whale	0	0.10	0.14	0.07	0.08	0	0	0	0	0	0	0
Sei whale	0	0.25	0.07	0.04	0.08	0.19	0	0.21	0	0	0	0
Minke whale*	0	0	0.02	0	0	0	0.12	0	0	0	0	0
Humpback whale	0	0.05	0.07	0	0	0	0	0.11	0.99	1.0	0	0.35
Sperm whale	1.7	1.2	0.23	0.53	0.08	0.13	0.75	0.85	0	0	0	0
Unidentified beaked whale*	0	0	0.47	0	0	0	0	0	0	0	0	0
Killer whale	0	0	0.19	0	0	5.0	0	6.0	0	0.68	0	0
Pilot whale	0	59.6	7.0	19.3	4.0	39.5	0	26.3	0	0	0	0
Southern right whale dolphin*	0	59.6	0	0	0	0	0	0	0	0	0	0
Risso's dolphin*	0	0	0	0	1.7	0	0	0	0	0	0	0
Bottlenose dolphin	0	1.5	7.7	0	0	0	0	0	0	0	0	1.1
Dolphins	545.1	120.3	105.0	151.8	105.6	233.4	26.9	257.6	155.8	2.7	0	0

**Species sighted 2 or fewer times.*

Note: Numbers denote animals sighted per 1,000 km survey distance for each month, pooled for all years (i.e. the 12-month period from Oct–Sep).

Table 5-18: Observed cetaceans in the Otway Basin

Species	Jun	Jul	Aug	Sep *	Oct	Nov	Dec	Jan	Feb	Mar	Total
Blue whale	0	0	0	0	0	23	70	17	8	2	120
Southern right whale	2	0	12	13	0	0	0	0	0	0	39*
Humpback whale	3	2	0	1	0	1	0	0	0	0	7
Sperm whale	2	0	0	0	4	0	0	3	1	0	10
Pilot whale	0	0	0	0	0	70	0	0	55	0	125
Dolphins	13	298	0	33	54	620	80	672	1526	21	3317
Southern right whale	0	0	0	0	0	120	0	0	0	0	120

**September values averaged over two surveys on 1 and 11 September 2012. Totals include individuals from both September surveys*

Blue whale

The blue whale (*Balaenoptera musculus*) is listed as an endangered species under the Australian Government EPBC Act (1999) and the IUCN Red List. There are two subspecies of blue whales that use Australian waters (including Australian Antarctic waters), the pygmy blue whale (*B. m. brevicauda*) and the Antarctic blue whale (*B. m. intermedia*). The pygmy blue whale has a foraging BIA within the operational area or spill EMBA. Reference to blue whale unless otherwise specified is generally synonymous to both species. The blue whale has a recovery plan that identifies threats and establishes actions for assisting the recovery of blue whale populations using Australian waters (Commonwealth of Australia, 2015b).

Antarctic blue whale

The Antarctic blue whale was extremely abundant until the early 20th century when they were hunted to near extinction. Approximately 341,830 blue whale takes were recorded by commercial whaling in the Antarctic and sub-Antarctic in the 20th century, of which 12,618 were identified as pygmy blue whales (Branch et al., 2004). The current global population of blue whales is uncertain but is plausibly in the range of 10,000 to 25,000, corresponding to about 3-11% of the 1911 estimated population size (Reilly et al., 2008). The Antarctic blue whale subspecies remains severely depleted from historic whaling and its numbers are recovering slowly. The Antarctic blue whale population is growing at an estimated rate of 7.3% per year, but it was hunted to such a low level that it remains at a tiny fraction of pre-whaling numbers (Branch et al., 2004). Recent studies suggest an updated rate of increase in population growth of 12.6 %, consistent with growth rates in waters off the south of Australia (McCauley et al., 2018). The updated abundance estimate uses acoustic chorus squared pressure levels to estimate growth rate off Portland (McCauley et al., 2018). This growth rate considers the number of whales calling assuming the range distribution of whales, source levels, sound propagation and calling behaviour were all similar between years.

Antarctic blue whales are mainly sighted south of 60°S in Antarctic waters. Little is known about mating behaviour or breeding grounds. The Otway region is an important migratory and foraging area for blue whales, as shown by passive acoustic monitoring and aerial surveys (Gavrilov, 2012; McCauley et al., 2018; Gill et al., 2011).

Underwater acoustic monitoring programs have detected Antarctic and pygmy blue whale calls in the Otway Region. Acoustic detection of Antarctic blue whales indicates that they occur along the entire southern coastline of Australia (McCauley et al., 2018). Pygmy and Antarctic blue whales were acoustically detected by Origin Energy between February and October 2011 in the Otway Basin, east of the Thylacine platform. The presence of Antarctic blue whales in the area is considered rare (Gavrilov, 2012). However, recent acoustic studies have estimated an increase in the abundance of blue whales off Portland, Victoria (McCauley et al., 2018). From 2009-2016 Antarctic blue whale calls were received via deep sound channel propagation south of Portland and the maximum chorus levels occurred from late February to late June with yearly increases in chorus levels (McCauley et al., 2018).

Important foraging grounds for blue whales include the Great Australian Bight, South Australia and off Portland Victoria where blue whales visit between December and June to forage on the inshore shelf break. Sighting data indicates that blue whales are seasonally distributed. Gill et al., (2011) undertook 69 seasonal aerial surveys for blue whales between Cape Jaffa and Cape Otway over six seasons (2001-02 to 2006-07). This study found that the general pattern of seasonal movement of blue whales is from west to east, with whales foraging in between the Great Australian Bight and Cape Nelson in November and spreading further east in December. Whales are typically widely distributed throughout Otway shelf waters from January through to April (Gill et al., 2011) (Figure 5-23).

There had been fewer than 50 sightings of blue whales in Bass Strait up to the year 1999, but since that time feeding blue whales have been more regularly observed in the Discovery Bay area and more generally along the Bonney coast from Robe to Cape Otway. Gill et al., (2011) found that across the eastern zone (Cape Nelson to Cape Otway), there were no blue whale sightings in November (2001-2007) despite significant effort. However, aerial surveys commissioned by Origin undertaken during 2011 and 2012 by the Blue Whale Study found that blue whales were common in the eastern upwelling zone during November-December 2012. In November, an estimated 21 individual blue whales were sighted, with most sightings near the 100 m isobath or deeper. December 2012 surveys identified 70 blue whales foraging along the edge of the continental shelf west of King Island. This was the largest recorded aggregation of blue whales during any aerial surveys of the Bonney Upwelling since 1999. During five aerial surveys between 8 and 25 February 2011, 56 blue whales were sighted (Figure 5-24). Most of the sightings were at inshore areas between Moonlight Head to Port Fairy with whales apparently aggregating along and offshore of the boundary between the runoff plume from major flooding prevalent at the time and adjacent seawater.

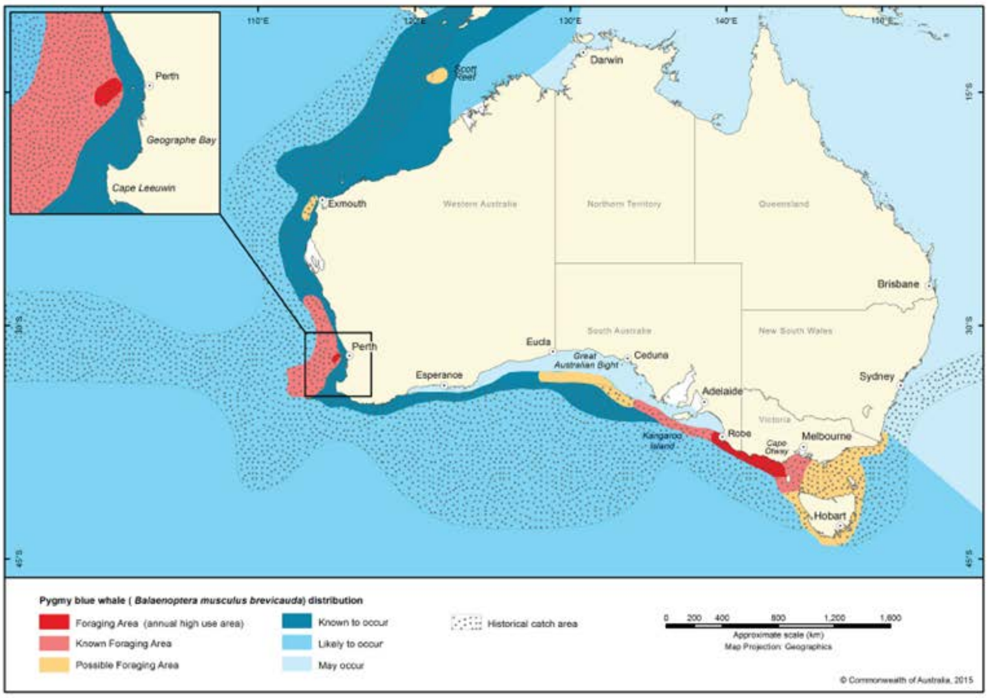
Based on the pooled aerial survey data (2001-2007), encounter rates increased from 1.6 whales per 1,000 km in December, to 9.8 whales per 1,000 km in February, decreased slightly to 8.8 whales per 1,000 km in March, then declined sharply to a single sighting for May (0.4 whales per 1,000 km) (Gill et al., 2011). A mean blue whale group size of 1.3±0.6 was observed per sighting with cow-calf pairs observed in 2.5% of the sightings. Gill et al. (2011) also identified that 80% of blue whale sightings are encountered in water depths between 50 and 150 m; 93% of sightings occurred in water depths <200 m and 10% of sightings occurred within 5 km of the 200 m isobath in the eastern and central zones.

There were no confirmed sightings of blue whales during Origin's Speculant 3D Transition Zone seismic survey in November and December 2010, the Astrolabe 3D seismic survey undertaken in early November 2013 (RPS, 2014) or during the Enterprise 3D seismic survey undertaken in late October and early November 2014 (RPS, 2014).

The seasonal distribution and abundance of blue whales are variable across years and influenced by climate variables. The time and location of the appearance of blue whales in the east generally coincides with the upwelling of cold water in summer and autumn along the coast (the Bonney Upwelling) and the associated aggregations of krill that they feed on (Gill and Morrice, 2003). 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 subtropical high-pressure cell creates upwelling favourable winds.

Pygmy blue whale

There is no current population estimate for the pygmy blue whale and abundance pre-exploitation is uncertain. The pygmy blue whale is primarily distributed north of 55°S. They are most abundant in the southern Indian Ocean on the Madagascar plateau, and off South Australia and Western Australia in the Southern and Indian Oceans, where they are distributed between Tasmania and Indonesia.



Foraging Area (Annual high use area)	Blue whales are regularly observed feeding on a seasonal basis
Known Foraging Area	Known foraging occurs in these areas but is highly variable both between and within seasons
Possible Foraging Area	Evidence for feeding is based on limited direct observations or through indirect evidence, such as occurrence of krill in close proximity of whales, or satellite tagged whales showing circling tracks. Blue whales travel through on a seasonal basis, possibly as part of their migratory route

Known to occur	Blue whales are known to occur based on direct observations, satellite tagged whales or based on acoustic detections
Likely to occur	Blue whales are likely to occur based on occasional observations in the area and nearby areas
May occur	Evidence for the presence of blue whales through strandings or rare observations
Historical catch area	Blue whales were caught during the whaling period based on whaling data

Figure 5-23: Pygmy blue whale foraging areas around Australia (Commonwealth of Australia, 2015b)

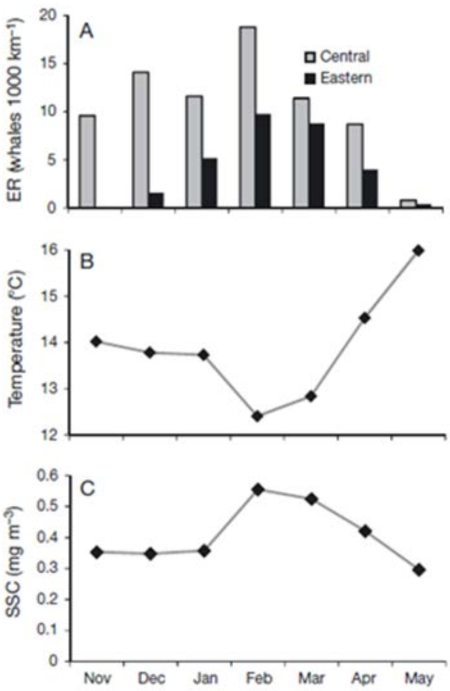


Figure 5-24: Blue whale encounter rates in the central and eastern study (Cape Nelson to Cape Otway) area by month (Gill et al., 2011)

There are two known seasonal feeding aggregations areas in Australia, one adjacent to the Bonney Upwelling of South Australia and Victoria, and the other off the Perth Canyon in Western Australia. The abundance of pygmy blue whales varies within and between seasons, but they typically forage in the Otway region between January and April. Foraging of pygmy blue whales is known to occur in Bass Strait and the west coast of Tasmania where they have been recorded diving at depth presumably feeding (Commonwealth of Australia. 2015). McCauley et al. (2018) suggests that acoustic detection of pygmy blue whales indicate they predominantly occur west of Bass Strait. Acoustic detections of pygmy blue whales off Portland Victoria correlated with upwelling indicators in the Bonney Upwelling in late summer to autumn (February-April) (McCauley et al., 2018). The two pygmy blue whale call types and the Antarctic blue whale call have been detected in central Bass Strait. One occasion all three types were detected between April and June with more commonly two calls present over this period during other years.

Pygmy blue whales have three migratory stages around Australia; the “southbound migration stage” where predominantly between October to December (sometimes into January) whales travel from Indonesian waters down to the WA coast, the “southern Australian stage” where between January and June whales spread across the southern Australian waters, and the “northbound migration stage” where whales travel back up to Indonesia between April and August. The “southern stage” involves animals searching for prey. The Bonney Upwelling is a strong predicator of pygmy blue whale presence at Portland where whale presence in the area is linked to prey availability (McCauley et al., 2018). Passive acoustic monitoring in southern Australia during 2000-2017 focused on the distribution and population parameters of both subspecies of blue whales in southern and western Australia. In Portland sea noise data was available from 2009 to early 2017. In 2009 and 2011 pygmy blue whales arrived in November or December whereas in the other years, calls were not detected until January or February. There was substantial variation in presence within a season, with some whales remaining in the Portland detection area until mid-June each year. Acoustic loggers located east of the Thylacine platform from February to October 2011 detected pygmy blue whales between February and early June, with the greatest abundance from March to mid-May.

It is difficult to predict numbers within a season but when correlated across seasons the strength and persistence of the Bonney Upwelling, given by time integrated water temperature, significantly correlates with time integrated number of individual whales calling from the same site. The upwelling index explains 83% of the variability in blue whale calling presence across seasons when using seasonal whale counts (not corrected for population growth). When a growth rate of 4.3% is applied a correlation of 90% of the variance in seasonal occurrence is predicted by the upwelling index. The number of pygmy blue whale calling in Portland could be expected in increase yearly with whale population growth (McCauley et al., 2018).

Photo identification, genetics and telemetry studies provide information on whale movements and connectivity. Photo identification and genomic studies suggest population exchange between the two feeding grounds of the Bonney Upwelling and the Perth Canyon (Attard et al., 2018). A pygmy blue whale was tagged in 2014 north of the Perth Canyon and travelled a total distance of 506.3 km in 7.6 days, indicating the vast distances that the large marine mammals can travel in a short amount of time (Owen et al., 2016). While migrating the whale made dives at depths just below the surface which likely reduces energy expenditure but also increases the risk of ship strike greatly for longer periods than previously thought.

BIAs for pygmy blue whales have been identified around Australia with the foraging BIA intersecting the operational area and spill EMBA (Figure 5-25). Encounters with blue whales and drilling activities is possible during December to May. Surveys data suggests that blue whales are most likely to first appear during December/January and reach peak number during February/March. The likelihood and extent of the interaction is dependent on broad scale environmental factors affecting the abundance and distribution of blue whale feeding resources.

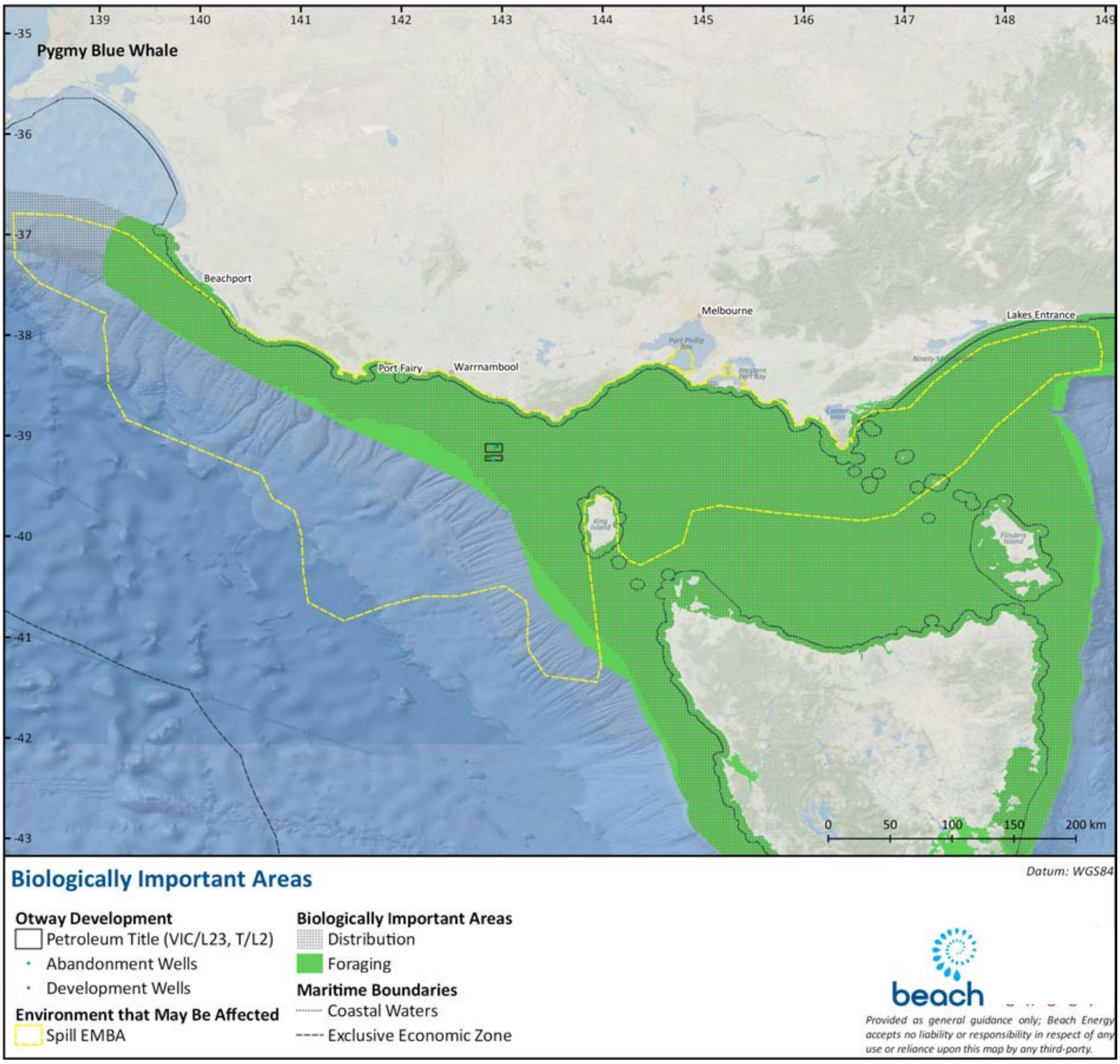


Figure 5-25: BIA for the pygmy blue whale within the spill EMBA.

Southern right whale

The spill EMBA overlaps the southern right whale (*Eubalaena australis*) aggregation, connecting habitat, migration and distribution BIA (Figure 5-26). The operational area is ~54 km from the aggregation BIA, ~40 km from the migration BIA and ~90 km from the connecting habitat BIA (Figure 5-27).

The southern right whale is listed as endangered under the EPBC Act in Australia and as critically endangered on the Victorian Threatened Species Advisory List. Southern right whales were depleted to less than 300 individuals globally due to commercial whaling in the 19th and 20th centuries (Tormosov et al., 1998). They were protected from whaling in 1935 however, due to illegal whaling in the 1970s and because southern right whales have a slow rate of increase (7% per annum (p.a.)) compared to other marine mammals, their numbers remain low (IWC, 2013). Global abundance estimates are 13,000 for the species, across key wintering grounds in South Africa, Argentina, Australia and New Zealand.

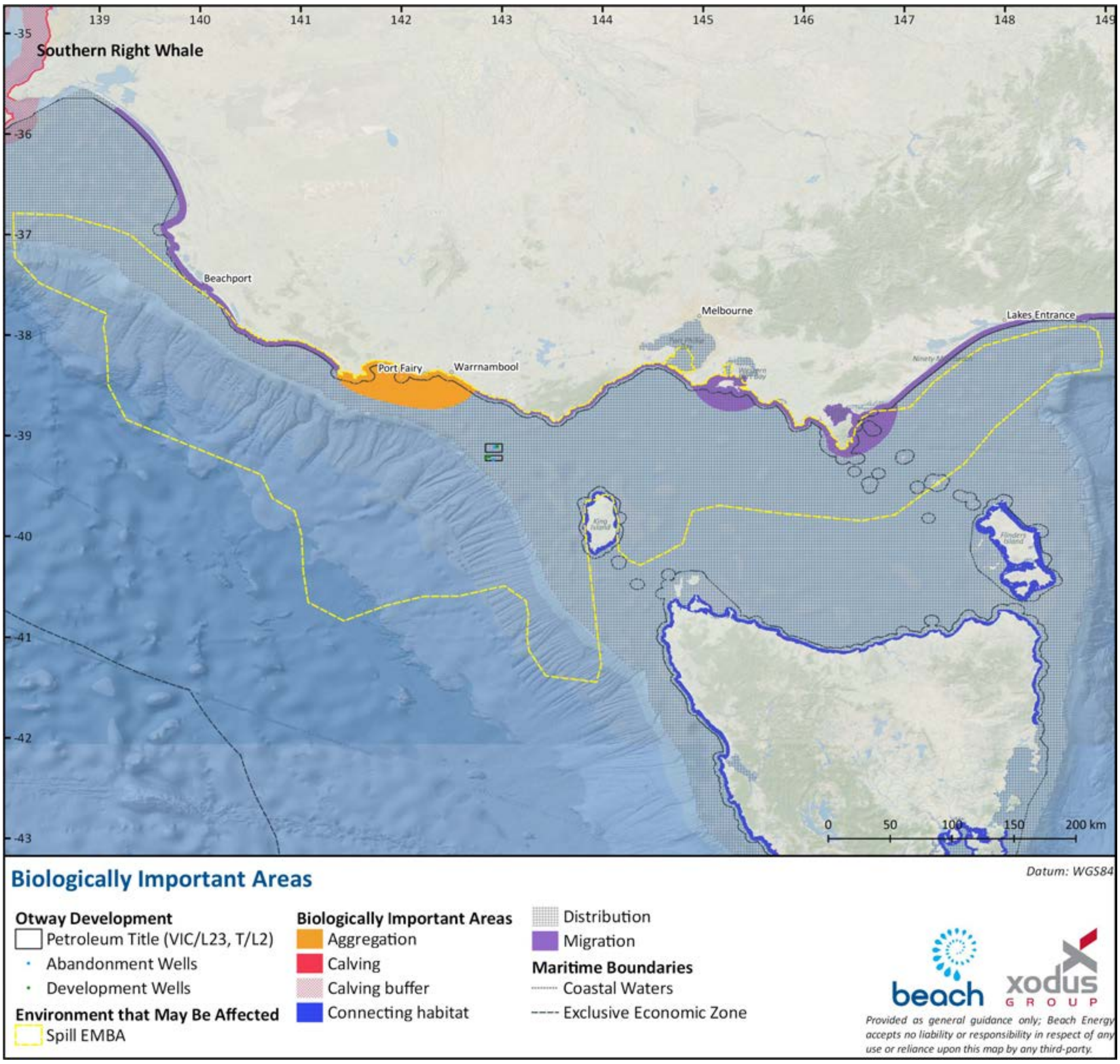


Figure 5-26: Southern right whale BIAs within the spill EMBA

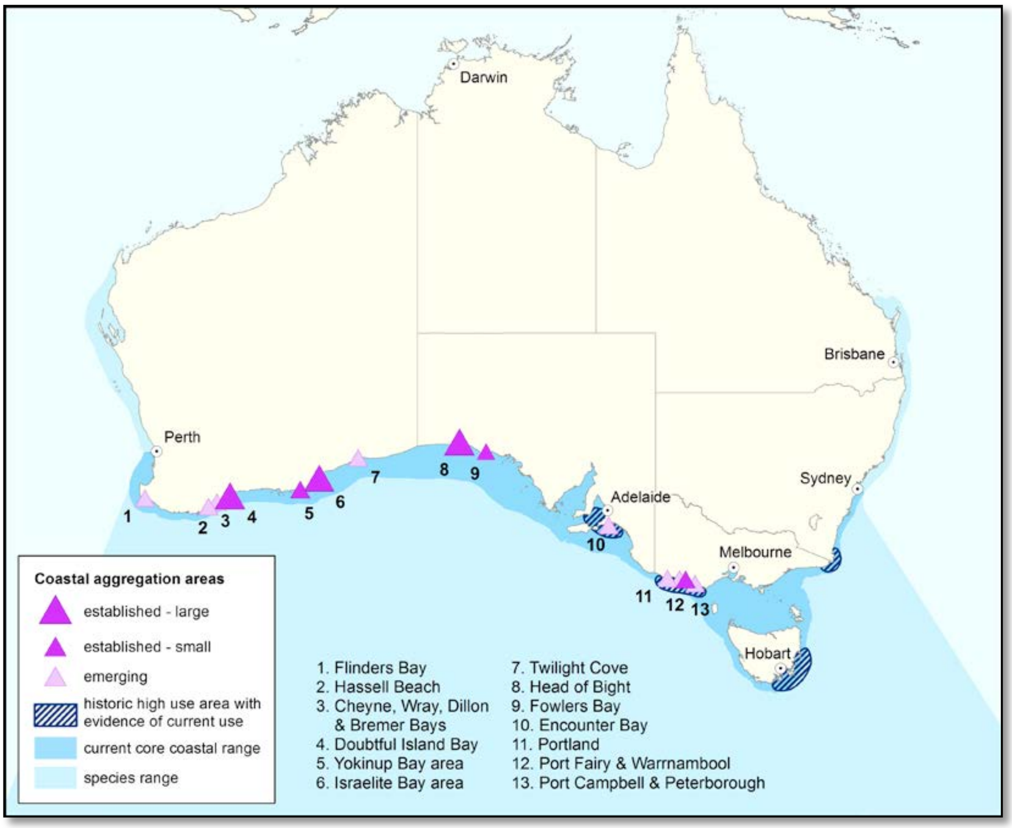


Figure 5-27: Aggregation areas for southern right whales (DSEWPaC, 2012)

The Australian population of southern right whales is divided into two sub-populations due to genetic diversity (Carroll et al., 2011; Baker et al., 1999) and different rates of increase (DSEWPaC, 2012a). The western sub-population occurs predominantly between Cape Leeuwin, Western Australia (WA) and Ceduna, South Australia (SA) This sub-population comprises most of the Australian population and is estimated at 3,200 individuals increasing at an annual rate of approximately 6% p.a. (Smith et al., 2019). The eastern sub-population can be found along the south-eastern coast, including the region from Tasmania to Sydney, with key aggregation areas in Portland and Warrnambool in Victoria. The eastern sub-population is estimated at less than 300 individuals and is showing no signs of increase (Bannister, 2017). A rate of around 7% p.a. is considered the maximum biological rate of increase for southern right whales (IWC, 2013). Connectivity between the two populations is unknown however, some limited movement between the two areas has been recorded (Burnell, 2001; Charlton, 2017; Pirzl et al., 2009).

Southern right whales are distributed in the Southern Hemisphere with a circumpolar distribution between latitudes of 16°S and at least 65°S. They migrate from southern feeding grounds in sub-Antarctic waters to Australia in between May and November to calve, mate and rest (Bannister et al., 1996). They are distributed across thirteen primary aggregation areas along the southern coast of Australia (DSEWPaC, 2012a). In Australian coastal waters, they occur along the southern coastline of the mainland and Tasmania and generally extend as far north as Sydney on the east coast and Perth on the west coast (DSEWPaC, 2012a). There are occasional sightings further north, with the extremities of their range recorded at Hervey Bay and Exmouth (DSEWPaC, 2012a).

The largest established calving areas in Australia include Head of Bight in SA, and Doubtful Island Bay and Israelite Bay in WA. Smaller but established aggregation areas regularly occupied by southern right whales include Yokinup Bay in WA, Fowlers Bay in SA and the Warrnambool and Portland in Victoria. Emerging aggregation areas include Flinders Bay, Hassell Beach, Cheyne/Wray Bays, and Twilight Cove in WA, and sporadically occupied areas include Encounter Bay in SA (DSEWPaC, 2012a). Southern right whales generally occupy shallow sheltered bays within 2 km of shore and within water depths of less than 20 m (Charlton et al., 2019). A number of additional 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 (DSEWPaC, 2012a).

Coastal connecting habitat, which may also serve a migratory function or encompass locations that will emerge as calving habitat as recovery progresses (some locations within connecting habitat are occupied intermittently but do not yet meet criteria for aggregation areas) (DSEWPaC, 2012a). A portion of the King Island connecting habitat BIA is within the spill EMBA.

There is variation in annual abundance on the coast of Australia due to the 3-year calving cycles (Charlton 2017). Female and calf pairs generally stay within the calving ground for 2–3 months (Burnell, 2001). Peak periods for mating in Australian coastal waters are from mid-July through August (DSEWPaC, 2012a). Pregnant females generally arrive during late May/early June and calving/nursery grounds are generally occupied until October (occasionally as early as April and as late as December) (Charlton et al., 2019).

There is variation in annual abundance on the coast of Australia due to the 3-year calving cycles (Charlton 2017). Female and calf pairs generally stay within the calving ground for 2–3 months (Burnell, 2001). Peak periods for mating in Australian coastal waters are from mid-July through August (DSEWPaC, 2012a). Pregnant females generally arrive during late May/early June and calving/nursery grounds are generally occupied until October (occasionally as early as April and as late as December) (Charlton et al., 2019).

As a highly mobile migratory species, southern right whales travel thousands of kilometres between habitats used for essential life functions. Movements along the Australian coast are reasonably well understood, but little is known of migration travel, non-coastal movements and offshore habitat use. Exactly where southern right whales approach and leave the Australian coast from, and to, offshore areas remain unknown (DSEWPaC, 2012a). A defined near-shore coastal migration corridor is unlikely given the absence of any predictable directional movement of southern right whales such as that observed for humpback whales. A predominance of westward movements amongst long-range photo-identification re-sightings may indicate a seasonal westward movement in coastal habitat (Burnell, 2001). Direct approaches and departures to the coast have also been recorded through satellite telemetry studies (Mackay et al. 2015).

Aerial surveys of western Bass Strait and eastern Great Australian Bight undertaken by Gill et al., (2015) detected southern right whales between May and September. A survey in early November 2010 did not observe any whales in the Warrnambool area and it was assumed that cows and calves had already left the calving and aggregation areas (M. Watson, pers. comm., 2010). No southern right whales were encountered during Origin's Enterprise 3D seismic survey undertaken during November 2014 (RPS, 2014), or during spotter flights of the coastline undertaken prior to the survey in late October 2014. Aerial surveys between Ceduna, SA and Sydney NSW (and included Tasmania) were undertaken in August of 2013 and 2014 and recorded a total of 34 southern right whale individuals (17 breeding females) in 2013 and 39 (11 breeding females) in 2014, respectively (Watson et al., 2015).

The conservation management plan for the southern right whale (DSEWPaC, 2012a) reports that known and potential threats that may have individual or population level impacts to southern right whales include entanglement in fishing gear, vessel disturbance, climate variability and change, noise interference, habitat modification and overharvesting of prey.

Humpback whale

Humpback whales (*Megaptera novaeangliae*) are present around the Australian coast in winter and spring. Humpbacks undertake an annual migration between the summer feeding grounds in Antarctica to their winter breeding and calving grounds in northern tropical waters. Along the southeast coast of Australia, the northern migration starts in April and May while the southern migration peaks around November and December (TSSC, 2015a). A discrete population of humpback whales have been observed to migrate along the west coast of Tasmania and through Bass Strait, and these animals may pass through the operational area. The exact timing of the migration period varies between years in accordance with variations in water temperature, extent of sea ice, abundance of prey, and location of feeding grounds

(TSSC, 2015a). Feeding occurs where there is a high krill density, and during the migration this primarily occurs in Southern Ocean waters south of 55°S (TSSC, 2015a).

Humpback whales satellite-tagged off Australia's east coast were tracked during three austral summers in 2008/2009, 2009/2010 and 2010/2011 (Andrews-Goff et al., 2018). Of the thirty tagged humpbacks, 21 migrated south along the coastline across into Bass Strait during October. In November the whales then migrated along the east coast (12 whales) and west coast (1 whale) of Tasmania to Antarctic feeding grounds. The state space model used shows both search and transit behaviour revealing new temperate feeding grounds in Bass Strait, the east coast of Tasmania and in the eastern Tasman Sea.

There are no known feeding, resting or calving grounds for humpback whales in the EMBAs, although feeding may occur opportunistically where sufficient krill density is present (Commonwealth of Australia, 2015). The nearest BIA which is important habitat for migrating humpback whales is Twofold Bay, a resting area off the NSW coast (Commonwealth of Australia, 2015a).

During Origin's Enterprise 3D seismic survey undertaken during early November 2014, 16 humpback whales were sighted (RPS, 2014).

The recovery of humpback whale populations following whaling has been rapid. The Australian east coast humpback whale population, which was hunted to near-extinction in the 1950s and early 1960s, had increased to 7,090±660 (95% CI) whales by 2004 with an annual rate of increase of 10.6±0.5% (95% CI) between 1987–2004 (Noad et al., 2011). The available estimates for the global population total more than 60,000 animals, and global population is categorised on the IUCN Red List as Least Concern.

Sei whale

Sei whales are considered a cosmopolitan species, ranging from polar to tropical waters, but tend to be found more offshore than other species of large whales. They show well defined migratory movements between polar, temperate and tropical waters. Migratory movements are essentially north-south with little longitudinal dispersion. Sei whales do not penetrate the polar waters as far as the blue, fin, humpback and minke whales (Horwood, 1987), although they have been observed very close to the Antarctic continent.

Sei whales move between Australian waters and Antarctic feeding areas; subantarctic feeding areas (e.g. Subtropical Front); and tropical and subtropical breeding areas. The proportion of the global population in Australian waters is unknown as there are no estimates for sei whales in Australian waters.

Sei whales feed intensively between the Antarctic and subtropical convergences and mature animals may also feed in higher latitudes. Sei whales feed on planktonic crustaceans, in particular copepods and amphipods. Below the Antarctic convergence sei whales feed exclusively upon Antarctic krill (*Euphausia superba*).

In the Australian region, sei whales occur within Australian Antarctic Territory waters and Commonwealth waters, and have been infrequently recorded off Tasmania, NSW, Queensland, the Great Australian Bight, Northern Territory and Western Australia (Parker 1978; Bannister et al., 1996; Thiele et al., 2000; Chatto and Warneke 2000; Bannister 2008a).

Sightings of sei whales within Australian waters includes areas such as the Bonney Upwelling off South Australia (Miller et al., 2012), where opportunistic feeding has been observed between November and May (Gill et al., 2015).

There are no known mating or calving areas in Australian waters. The sei whale is likely to be an uncommon visitor to the EMBA.

Fin whale

Fin whales are considered a cosmopolitan species and occur from polar to tropical waters and are rarely in inshore waters. They show well defined migratory movements between polar, temperate and tropical waters. Migratory movements are essentially north–south with little longitudinal dispersion. Fin whales regularly enter polar waters. Unlike blue whales and minke whales, fin whales are rarely seen close to ice, although recent sightings have occurred near the ice edge of Antarctica.

There are stranding records of this species from most Australian states, but they are considered rare in Australian waters (Bannister et al., 1996). The fin whale has been infrequently recorded between November and February during aerial surveys in the region (Gill et al., 2015). Fin whales have been sighted inshore in the proximity of the Bonney Upwelling, Victoria, along the continental shelf in summer and autumn months (Gill, 2002). Fin whales in the Bonney Upwelling are sometimes seen in the vicinity of blue whales and sei whales.

Fin whales were sighted, and feeding was observed between November-May (upwelling season) during aerial surveys conducted between 2002-2013 in South Australia (Gill et al., 2015). This is one of the first documented records these whales feeding in Australian waters, suggesting that the region may be used for opportunistic baleen whale feeding (Gill et al., 2015). Fin whales have also been acoustically detected south of Portland, Victoria (Erbe et al., 2016). Aulich et al. (2019) recorded infrequent presence of fin whales in Portland between 2009 to 2016. This suggests that the area may not be a define migratory route however, calls recorded in July may be from whales migrating northward towards the east coast of NSW. Calls detected in late August and September may be indication of the presence of whales on their migration route back to Antarctica waters.

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 (Morrice et al., 2004). However, there are no defined mating or calving areas in Australia waters.

As there are no BIAs for the fin whale in the EMBA, they are likely to be uncommon visitors to the EMBA.

Pygmy right whale

The pygmy right whale (*Caperea marginata*) is a little-studied baleen whale species that is 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) and staying north of the Antarctic Convergence. There are few confirmed sightings of pygmy right whales at sea (Reilly et al., 2008). The largest reported group was sighted (100+) just south-west of Portland in June 2007 (Gill et al., 2008).

Species distribution in Australia is found close to coastal upwellings and further offshore it appears that the Subtropical Convergence may be important for regulating distribution (Bannister et al., 1996). Key locations include south-east Tasmania, Kangaroo Island (SA) and southern Eyre Peninsula (SA) close to upwelling habitats rich in marine life and zooplankton upon which it feeds (Bannister et al., 1996).

The pygmy right whale has been observed in surveys in the region however Origin Energy did not observe it during the 2010 Speculant MSS and 2014 Enterprise MSS. Also, there are no BIAs identified in the EMBA. Therefore, it is likely to be an uncommon visitor in the EMBA.

Killer whale

Killer whales (*Orcinus orca*) are thought to be the most cosmopolitan of all cetaceans and appear to be more common in cold, deep waters; however, they 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. The only recognised key locality in Australia is Macquarie Island and Heard Island in the Southern Ocean (Bannister et al., 1996). The habitat of killer whales includes oceanic, pelagic and neritic (relatively shallow waters over the continental shelf) regions, in both warm and cold waters (DotEE, 2019d).

Killer whales are top-level carnivores. Their diet varies seasonally and regionally. The specific diet of Australian killer whales is not known, but there are reports of attacks on dolphins, young humpback whales, blue whales, sperm whales, dugongs and Australian sea lions (Bannister et al., 1996). In Victoria, sightings peak in June/July, where they have been observed feeding on sharks, sunfish, and Australian fur seals (Morrice et al., 2004; 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). Killer whales are frequently present in Victorian waters with sightings recorded along most of Victoria's coastline. Mustoe (2008) describes between 2002 and 2008 web-based casual sightings had an average of 13 killer whales sighted per year in Victoria and NSW, more than half in Victorian waters. This combined with the Atlas of Victorian Wildlife indicates a peak in killer whale sightings in June to July and September to November (Mustoe, 2008).

The killer whale has been observed within the region however there are no BIAs in the EMBA. Therefore, it is likely that they would be uncommon visitors in the EMBA.

Minke whale

The minke whale (*Balaenoptera acutorostrata*) is a widely distributed baleen whale that has been recorded in all Australian waters except the Northern Territory. The whales can be found inshore although they generally prefer deeper waters. In summer they are abundant feeding throughout the Antarctic south of 60°S but appear to migrate to tropical breeding grounds between 10°S and 20°S during the Southern Hemisphere winter (Kasamatru, 1998; Reilly et al., 2008). Although the exact location of breeding grounds is unknown, mating occurs between August to September with calving between May and July (Bannister et al., 1996). A few animals have been sighted during aerial surveys of the Bonney upwelling. The minke whale has been observed within the region however there are no BIAs in the EMBA. Therefore, it is likely that they would be uncommon visitors in the EMBA.

Antarctic minke whale

The Antarctic minke whale (*Balaenoptera bonaerensis*) has been found in all Australian states except the Northern Territory and occupies cold temperate to Antarctic offshore and pelagic habitats between 21°S and 65°S (Bannister et al., 1996). In summer the species is found in pelagic waters from 55°S to the Antarctic ice edge. During winter the species retreat to breeding grounds between 10-30°S, occupying oceanic waters exceeding 600 m depth and beyond the continental shelf break (DoEE, 2019e). Mating occurs from June through December, with a peak in August and September and calving occurs during late May and early June in warmer waters north of the Antarctic Convergence (DoEE, 2019e). The species primarily feeds in the Antarctic during summer on Antarctic krill and does not appear to feed much while in the breeding grounds of lower latitudes (DoEE, 2019e).

The Antarctic minke whale has been observed within the region however there are no BIAs in the EMBA. Therefore, it is likely that they would be uncommon visitors in the EMBA.

Long-finned pilot whale

The long-finned pilot whale (*Globicephala melas*) is distributed throughout the northern and southern hemispheres in circumpolar oceanic temperate and subantarctic waters containing zones of higher productivity along the continental slope. They sometimes venture into the shallower waters of the shelf (<200 m) in pursuit of prey species. Stomach contents confirm that squid are the main prey of long-finned pilot whales in Australian waters, although some fish are also taken (DoEE, 2019f). No key localities have been identified in Australia (Bannister et al., 1996) however they are considered reasonably abundant (DoEE, 2019f).

There is some (inconclusive) evidence that suggests the species moves along the edge of the continental shelf in southern Australian waters (Bannister et al., 1996) in response to prey abundance at bathymetric upper slopes and canyons (DoE, 2016g). Records from Tasmania indicate mating occurs in spring and summer with 85% of calves born between September and March although births do occur throughout the year.

No calving areas are known in Australian waters (DotEE, 2019f).

The long-finned pilot whale has been identified in surveys over the Bass Strait and eastern Great Australian Bight; however, there are no BIAs in the EMBAs. During works undertaken by Origin Energy, long-finned pilot whales have been seen sporadically, such as a sighting of approximately 30 whales during the 2014 Enterprise MSS. It is likely that they would be uncommon visitors in to the EMBA.

Sperm whale

The sperm whale (*Physeter macrocephalus*) has a worldwide distribution and has been recorded in waters all around Australia. Sperm whales tend to inhabit offshore areas with a water depth of 600 m or greater and are uncommon in waters less than 300 m deep (DoEE, 2019f). Key locations for the species include the area between Cape Leeuwin to Esperance (WA); southwest of Kangaroo Island (SA), deep waters of the Tasmanian west and south coasts, areas off southern NSW (e.g., Wollongong) and Stradbroke Island (Qld) (DoEE, 2019f). Concentrations of sperm whales are generally found where seabeds rise steeply from a great depth (i.e., submarine canyons at the edge of the continental shelf) associated with concentrations of food such as cephalopods (DoEE, 2019f).

Females and young males are restricted to warmer waters (i.e., north of 45oS) and are likely to be resident in tropical and sub-tropical waters year-round. Adult males are found in colder waters and to the edge of the Antarctic pack ice. In southern Western Australian waters sperm whales move westward during the year. For species in oceanic waters, there is a more generalised movement of sperm whales' southwards in summer and northwards in winter (DoEE, 2019f).

Sperm whales are prolonged and deep divers often diving for over 60 minutes (Bannister et al., 1996) however studies have observed sperm whales do rest at, or just below, surface for extended periods (>1 hr) (Gannier et al., 2002). In addition, female and juvenile sperm whales in temperate waters have been observed to spend several hours a day at surface resting or socialising (Hastie et al., 2003).

The sperm whale has been observed in the region, however the closest recognised BIA for foraging is further east near Kangaroo Island in South Australia. Therefore, it is likely they would be uncommon visitors in the EMBA.

Southern right whale dolphin

The southern right whale dolphin (*Lissodelphis peronnii*) is a pelagic species found in Southern Australian waters but generally well offshore in deep water or on the outer edges of the continental shelf between the subtropical and subantarctic convergence (DotEE, 2019h). No key localities have been identified in Australian waters however preferred water temperatures range from approximately 2-20°C (DoEE, 2019h). Of the limited southern right whale dolphin stomachs examined, myctophids and other mesopelagic fish, squid and crustaceans have been recorded, and euphausiids are also thought to be potential prey (DoEE, 2019h). It is unknown whether the southern right whale dolphin is a surface or deep-layer feeder (Bannister et al., 1996).

Calving areas are not known, however there is evidence that the calving season occurs between November to April (DoEE, 2019h).

The southern right whale dolphin has been observed in the region; however, no BIAs have been identified in the EMBAs. Therefore, it is likely they would be uncommon visitors in the EMBA.

Dusky dolphin

The dusky dolphin (*Lagenorhynchus obscures*) is rare in Australian waters and has been primarily reported across southern Australia from Western Australia to Tasmania with a handful of confirmed sightings near Kangaroo Island and off Tasmania (DotEE, 2019i). Only 13 reports of the dusky dolphin have been made in Australia since 1828, and key locations are yet to be identified (Bannister et al., 1996). The species is primarily found from approximately 55°S to 26°S, though sometimes further north associated with cold currents. They are considered to be primarily an inshore species but can also be oceanic when cold currents are present (DoEE, 2019i).

Bottlenose dolphin

The bottlenose dolphin (*Tursiops truncates*) has a worldwide distribution from tropical to temperate waters. While the species is primarily coastal, they are also found inshore, on the shelf and open oceans.

They are associated with many types of substrate and habitats, including mud, sand, seagrasses, mangroves and reefs (DoEE, 2019j). Bottlenose dolphins are known to associate with several cetacean species such as pilot whales, white-sided, spotted, rough-toothed and Risso's dolphins, and humpback and right whales (DoEE, 2019j).

There are two forms of bottlenose dolphin, a nearshore form and an offshore form. The nearshore form occurs in Southern Australia including the Otway Basin area, while the offshore form is found north of Perth and Port Macquarie in NSW. Most populations are relatively discrete and reside in particular areas, such as individual resident populations in Port Phillip Bay, Westernport Bay, Spencer Gulf, Jervis Bay and Moreton Bay. There may be some migration and exchange between the populations, but it is likely that most encountered near the Victorian coasts are local residents.

The bottlenose dolphin has been observed in the region; however, no BIAs have been identified in the EMBA. Therefore, it is likely they would be uncommon visitors in the EMBA.

Common dolphin

The common dolphin (*Delphinus delphis*) is an abundant species, widely distributed from tropical to cool temperate waters, and generally further offshore than the bottlenose dolphin, although small groups may venture close to the coast and enter bays and inlets. They have been recorded in waters off all Australian states and territories. Stranding statistics indicate that common dolphins are active in Bass Strait at all times of the year, though less so in winter (DotEE, 2019k).

Common dolphins are usually found in areas where surface water temperatures are between 10°C and 20°C, and in habitats also inhabited by small epipelagic fishes such as anchovies and sardines.

In many areas around the world common dolphins show shifts in distribution and abundance, suggesting seasonal migration. The reason for this seasonal migration is unknown however in New Zealand the shift appears to be correlated with sea surface temperature and in South Africa, the species occurrence appears to be correlated with the annual sardine run (DoEE, 2019k). They are abundant in the Bonney Upwelling during the upwelling season, and very scarce outside the season.

Risso’s dolphin

The Risso’s dolphin (*Grampus griseus*) is a widely distributed species found in deep waters of the continental slop and outer shelf from the tropics to temperate regions. The species prefer warm temperate to tropical waters with depths greater than 1,000 m, although they do sometimes extend their range into cooler latitudes in summer (Bannister et al., 1996). They are thought to feed on cephalopods, molluscs and fish. The Risso’s dolphin has been observed in the region, however no BIAs have been identified in the EMBA. Therefore, it is likely they would be uncommon visitors in the EMBA.

Indian Ocean bottlenose dolphin

The Indian Ocean bottlenose dolphins are found in tropical and sub-tropical coastal and shallow offshore waters of the Indian Ocean, Indo-Pacific Region and the western Pacific Ocean bottlenose dolphins are distributed continuously around the Australian mainland, but the taxonomic status of many populations is unknown. Indian Ocean bottlenose dolphins have been confirmed to occur in estuarine and coastal waters of eastern, western and northern Australia and it has also been suggested that the species occurs in southern Australia (Kemper, 2004).

In south-eastern Australia, inshore Indian Ocean bottlenose dolphins show a high degree of site fidelity to some local areas and appear to belong to relatively small communities or populations (Möller et al., 2002).

5.7.7.7 Pinnipeds

Three pinniped species may occur in the operational area and MDO spill EMBA (Table 5-19).

Australian sea lion

The Australian sea lion is the only endemic, and least abundant, pinniped that breeds in Australia (DoE, 2013b). All current breeding populations are outside of the EMBAs and are located from the Abrolhos Islands (Western Australia) to the Pages Islands (South Australia). The Australian sea lion uses a variety of shoreline types but prefer the more sheltered side of islands and typically avoid rocky exposed coasts (Shaughnessy, 1999).

The spill EMBA overlaps an Australian sea lion foraging BIA (Figure 5-28). The Australian sea lion is a specialised benthic forager (DSEWPaC, 2013). The Australian sea lion feeds on the continental shelf, most commonly in depths of 20–100 m, with adult males foraging further and into deeper waters (DSEWPaC, 2013). They typically feed on a range of prey including fish, cephalopods (squid, cuttlefish and octopus), sharks, rays, rock lobster and penguins (DSEWPC, 2013) They typically forage up to 60 km from their colony but can travel up to 190 km when over shelf waters (Shaughnessy, 1999).

New Zealand fur-seal

New Zealand fur-seal (*Arctocephalus forsteri*) are found in the coastal waters and offshore islands of South and Western Australia, Victoria, NSW and New Zealand. Population studies for New Zealand fur-seal in Australia carried out in 1990 estimated an increasing population of about 35,000. The species breeds in southern Australia at the Pages Islands and Kangaroo Island, which produces about 75% of the total pups in Australia. Small populations are established in Victorian coastal waters including at Cape Bridgewater near Portland, Lady Julia Percy Island near Port Fairy, Kanowna Island (near Wilsons Promontory) and The Skerries in eastern Victoria.

Figure 5-29 illustrates the known breeding colonies of New Zealand fur-seal (Kirkwood et al., 2009). These colonies are typically found in rocky habitat with jumbled boulders. Colonies are typically occupied year-round, with greater activity during breeding seasons. Pups are born from mid-November to January, with most pups born in December (Goldsworthy, 2008). Known sites for New Zealand Fur-seal breeding colonies within the spill EMBA include Seal Rocks (off King Island) and Judge Rocks (Kent Group Islands).

Table 5-6: Listed pinniped species identified in the PMST search

Common name	Species name	EPBC Act status			Type of presence (within the spill EMBA)	Spill EMBA	Operational area (2 km)
		Listed threatened	Listed migratory	Listed marine			
New Zealand fur-seal	*Arctocephalus forsteri*	-	-	L	SHM		
Australian fur-seal	*Arctocephalus pusillus*	-	-	L	BK		
Australian sea lion	*Neophoca cinereal*	V	-	L	SHK		

**Green highlighting denotes species presence.*

Listed Threatened
V: Vulnerable
Listed Marine
L: Listed
Likely Presence
SHM: Species or species habitat may occur within area.
SHK: Species or species habitat known to occur within area.
BK: Breeding known to occur within area

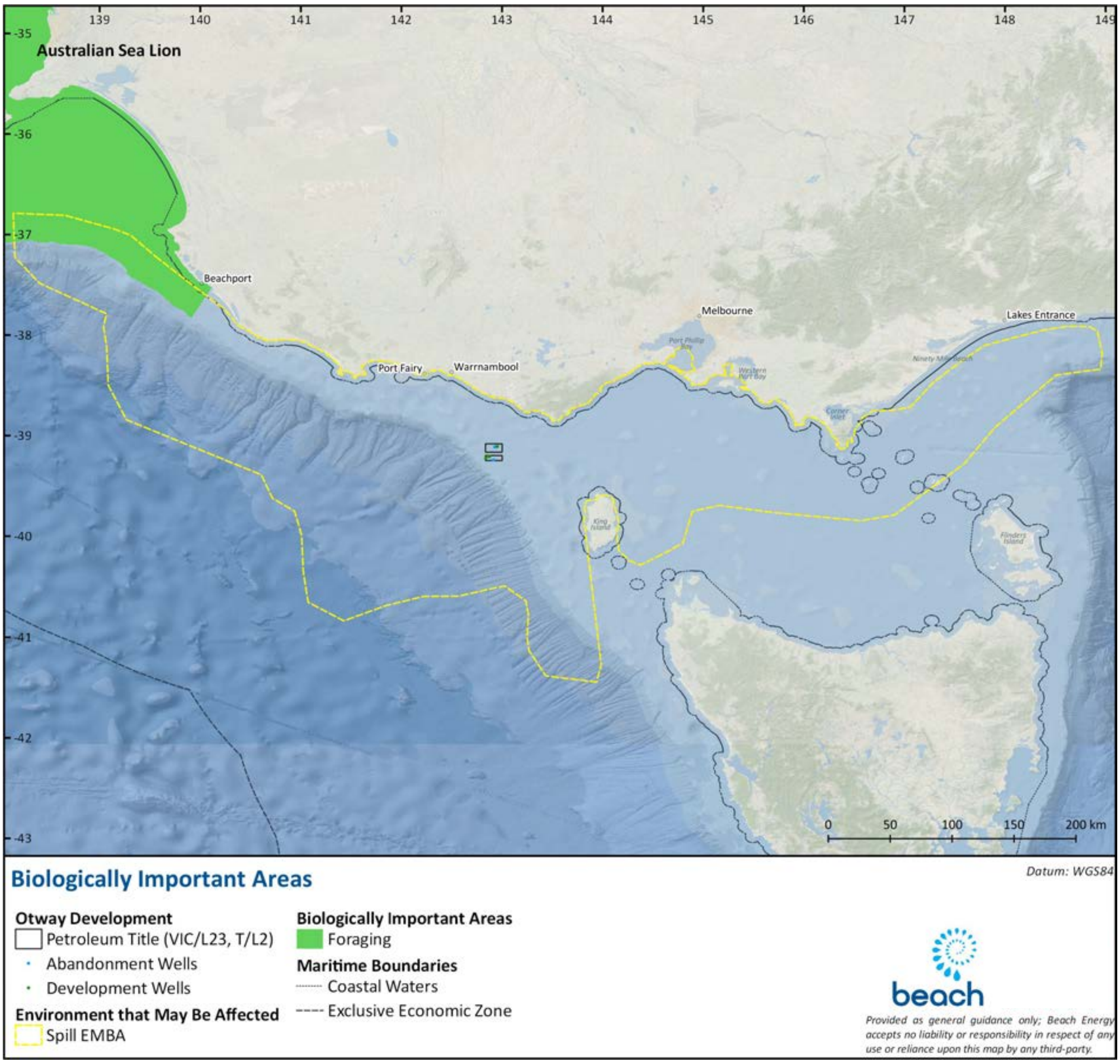


Figure 5-28: Australian sea lion foraging BIA

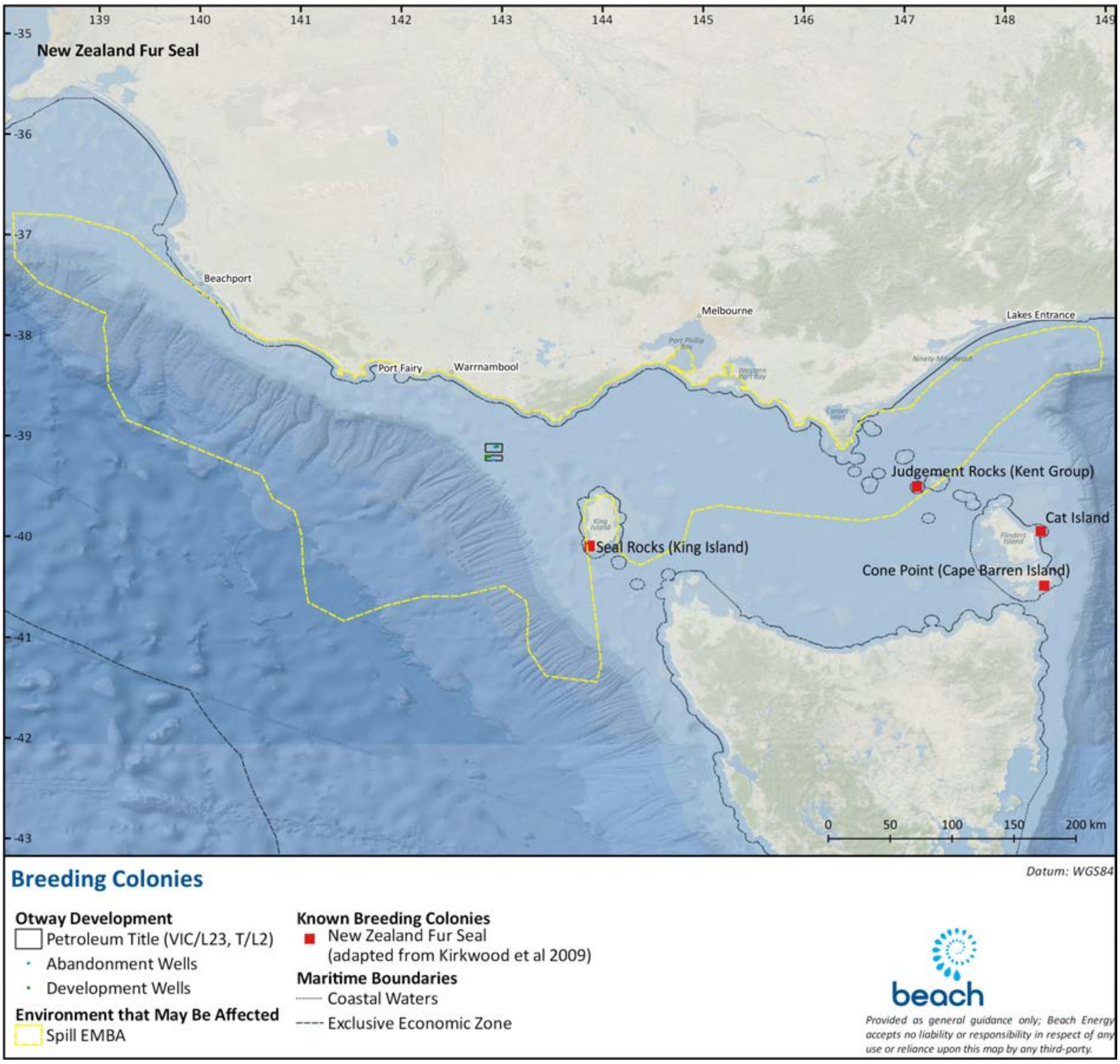


Figure 5-29: Locations of New Zealand fur-seal breeding colonies (Kirkwood et al., 2009).

Australian fur-seal

Australian fur-seals (*A. pusillus*) breed on islands of the Bass Strait but range throughout waters off the coasts of South Australia, Tasmania, Victoria and NSW. Numbers of this species are believed to be increasing as the population recovers from historic hunting (Hofmeyr et al., 2008). The species is endemic to south-eastern Australian waters.

In Victorian waters they breed on offshore islands, including Lady Julia Percy Island, Seal Rocks in Westernport Bay, Kanowna and Rag Islands off the coast of Wilson's Promontory and The Skerries off Wingan Inlet in Gippsland (Figure 5-30). There are important breeding sites on Lady Julia Percy Island and Seal Rocks, with 25% of the population occurring at each of these islands. Their preferred breeding habitat is a rocky island with boulder or pebble beaches and gradually sloping rocky ledges.

Haul out sites with occasional pup births are located at Cape Bridgewater, at Moonlight Head, on various small islands off Wilsons Promontory and Marengo Reef near Apollo Bay. Australian fur-seals are present in the region all year, with breeding taking place during November and December.

Research being undertaken at Lady Julia Percy Island indicates that adult females feed extensively in the waters between Portland and Cape Otway, out to the 200 m bathymetric contour. Seal numbers on the island reach a maximum during the breeding season in late October to late December. By early December, large numbers of lactating females are leaving for short feeding trips at sea and in late December there is an exodus of adult males. Thereafter, lactating females continue to alternate between feeding trips at sea and periods ashore to suckle their pups. Even after pups begin to venture to sea, the island remains a focus, and at any time during the year groups may be seen ashore resting (Robinson et al., 2008; Hume et al., 2004; Arnould & Kirkwood, 2007).

During the summer months, Australian fur-seals travel between northern Bass Strait islands and southern Tasmania waters following the Tasmanian east coast, however, 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 and Otway on the benthos at depths of between 60 – 80 m and generally within 100 – 200 km of the breeding colony for up to five days at a time.

Male Australian fur-seals are bound to colonies during the breeding season from late October to late December, and outside of this they time forage further afield (up to several hundred kilometres) and are away for long periods, even up to nine days (Kirkwood et al., 2009; Hume et al., 2004).

As there are breeding and haul out sites within the spill EMBA it is likely that Australian fur-seal would be present in the spill EMBA.

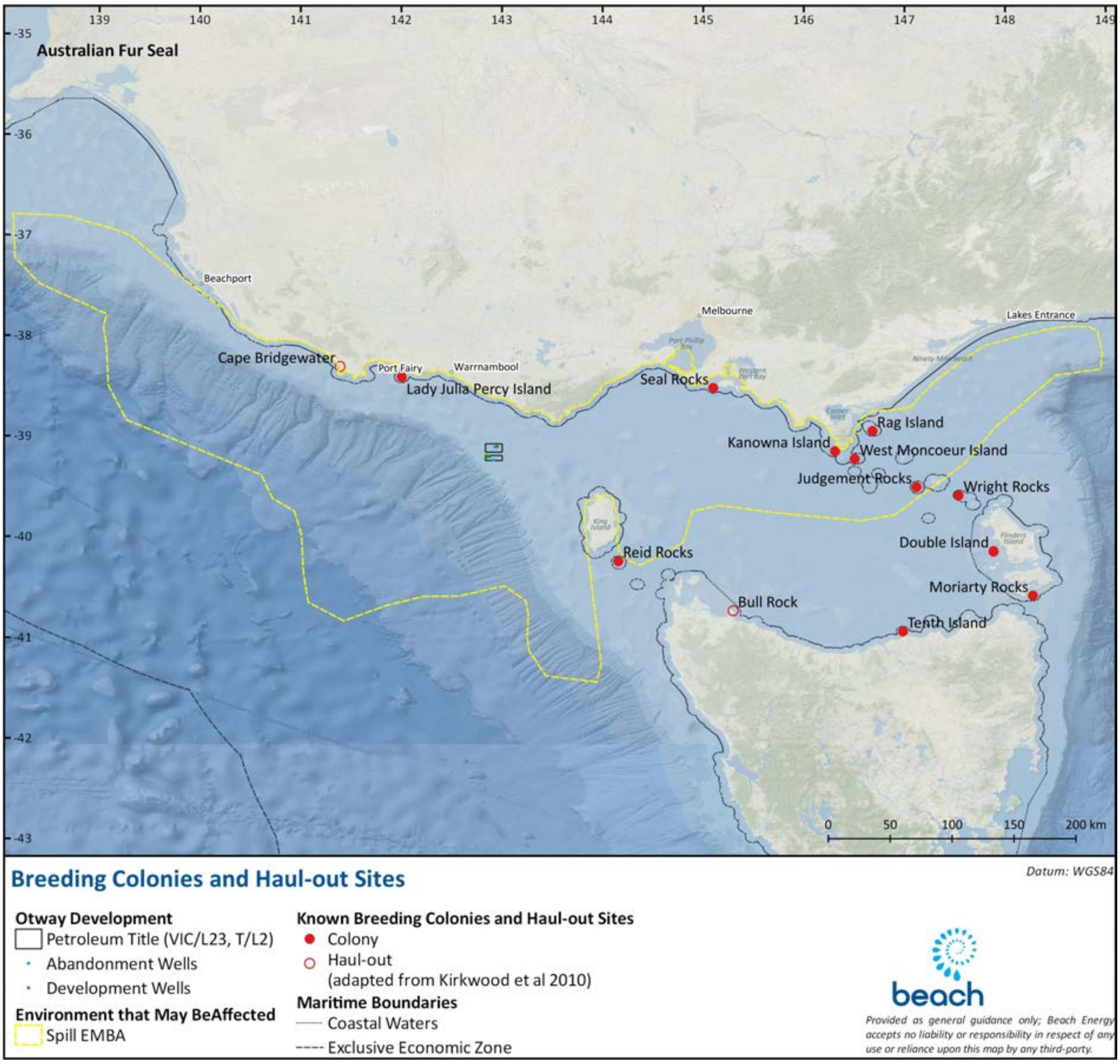


Figure 5-30: Locations of Australian fur-seal breeding colonies and haul out sites (Kirkwood et al., 2010)

5.7.7.8 Pest species

Invasive marine species (IMS) are marine plants or animals that have been introduced into a region beyond their natural range and have the ability to survive, reproduce and establish. More than 200 non-indigenous marine species including fish, molluscs, worms and a toxic alga have been detected in Australian coastal waters.

It is widely recognised that IMS can become pests and 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 & Grosholz, 2006).

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.

Key known pest species in the South-East Marine Region include (NOO, 2001):

- Northern pacific sea star (*Asterias amurensis*)*;

- Fan worms (*Sabella spallanzannii* and *Euchone* sp)*;
- Bivalves (*Crassostrea gigas* (Pacific oyster) Corbulagibba and Theorafragilis);
- Crabs (*Carcinus maenas* (European shore crab)* and *Pyromaia tuberculata*);
- Macroalgae (*Undaria pinnatifida* (Japanese giant kelp)* *and Codium fragile tormentosoides*; and
- The introduced New Zealand screw shell (*Maoricolpus roseus*).

Other introduced species tend to remain confined to sheltered coastal environments rather than open waters (Hayes et al. 2005).

The Marine Pests Interactive Map (DoEE, 2020) indicates that the Port of Geelong (where the AHTS are likely to mobilise from) are known to harbour the IMS indicated with an asterisk (*) in the list above, along with the Asian date mussel (*Musculista senhousia*).

5.8 Socio-economic environment

This section describes the socio-economic environment within the operational area and MDO spill EMBA.

5.8.1 Coastal settlements

Australians have a strong affinity to the coast, with over 80% of the population living within 50 km of the coast The coastal settlements that lie on the coast of the MDO spill EMBA are (from west to east) Discovery Bay, Cape Nelson, Portland, Port Fairy, Warrnambool, Peterborough, Childers Cove, Bay of Islands, Port Campbell, Princetown, Moonlight Head, Cape Otway, Apollo Bay, Cape Patton, Lorne, Anglesea, Torquay, Port Phillip, Mornington Peninsula, Western Port, French Island, Kilcunda, Venus Bay, Cape Liptrap, Waratah Bay and Wilsons Promontory. All settlements are within Victoria. These settlements are administered by different councils, with some of the larger councils including the Glenelg Shire Council (Portland), Moyne Shire Council (Port Fairy, Peterborough), Warrnambool City Council, Shire of Corangamite (Port Campbell, Princetown) and the Shire of Colac Otway (Apollo Bay).

The largest settlement within the EMBA is Mornington Peninsula, with a population just under 300,000 (Table). The Warrnambool, Peterborough, Childers Cove, Bay of Islands, Port Campbell, Princetown, Moonlight Head, Cape Otway, Apollo Bay, Cape Patton, Lorne and Anglesea settlements are along the Great Ocean Road, a National Heritage listed stretch along the Victorian coastline, with Warrnambool marking the western end. Warrnambool is another large settlement within the EMBA, with a population just under 30,000 (Table) and is a former port for the state of Victoria. The Port of Warrnambool has a breakwater and yacht club and provides shelter for commercial fishing boats. Portland and Port Fairy are the next largest centres with populations of 9,712 and 3,340, respectively (Table). Portland is Victoria's western-most commercial port and is a deep-water port with breakwaters sheltering a marina and boat ramp. Port Fairy has both harbour and fish processing facilities, but is not suitable for use by large vessels, nor is Port Campbell.

The coastal settlements within the EMBA all provide services to the commercial and recreational fishing industries in south-west Victoria and rely on fishing and tourism to contribute to their economies through income and employment. In Portland and Princetown, the largest employment industries are the agriculture, forestry and fishing industries, accounting for 59 and 28%, respectively (Table 5-20). In all but the two largest centres, accommodation and food services (which are heavily reliant on tourism) is either the first or second largest employment industry (Table).

Table 5-20: Coastal settlement population estimates and employment figures

Settlement	Population[1]	% of employment in industries relevant to potential impacts[2]	
		Agriculture, forestry & fishing	Accommodation & food services
Discovery Bay	N/A	N/A	N/A
Cape Nelson	N/A	N/A	N/A
Portland	9,712	2.8	8.8
Port Fairy	3,340	6.5	12.8
Warrnambool	29,661	2.1	9.1
Peterborough	247	6.7	13.3
Childers Cove	N/A	N/A	N/A
Bay of Islands	N/A	N/A	N/A
Port Campbell	478	28.4	16.6
Princetown	241	59.3	10.5
Moonlight Head	N/A	N/A	N/A
Cape Otway	15	N/A	N/A
Apollo Bay	1,598	3.6	27.9
Cape Patton	N/A	N/A	N/A
Lorne	1,114	0	0
Anglesea	2,545	0	4.8
Torquay	13,258	0	0
Port Phillip	100,872	0	0
Mornington Peninsula	289,142	0	0
Western Port	N/A	N/A	N/A
French Island	119	N/A	N/A
Kilcunda	396	0	0
Venus Bay	944	0	0
Cape Liptrap	N/A	N/A	N/A
Waratah Bay	56	N/A	N/A
Wilsons Promontory	13	N/A	N/A
Corner Inlet	N/A	N/A	N/A
Eurobodalla (NSW)	92	N/A	N/A

[1] Data from Australian Bureau of Statistics 2016 census, available at www.censusdata.abs.gov.au

[2] Data from Australian Bureau of Statistics 2016 census, available at www.censusdata.abs.gov.au

5.8.2 Petroleum exploration

Petroleum exploration has been undertaken within the Otway Basin since the early 1960s. Gas reserves of approximately 2 trillion cubic feet (tcf) have been discovered in the offshore Otway Basin since 1995, with production from five gas fields using 700 km of offshore and onshore pipeline. Up to 2015, the DEDJTR reports that 23 PJ of liquid hydrocarbons (primarily condensate) has been produced from its onshore and offshore basins, with 65 PJ remaining, while 85 PJ of gas has been produced (Victoria and South Australia), with 1,292 PJ remaining.

No other petroleum exploration activities are planned in the immediate vicinity of the TN-1 or TW-1 wells during the anchor laying activities.

5.8.3 Petroleum production

There is no non-Beach oil and gas infrastructure within the operational area.

The Cooper Energy-operated Casino, Henry and Netherby gas fields and associated pipelines and the Cooper Energy-operated Minerva gas field and pipeline occur within the MDO spill EMBA (Figure 5-31). Beach's Yolla gas pipeline is overlapped by the eastern part of the MDO spill EMBA.

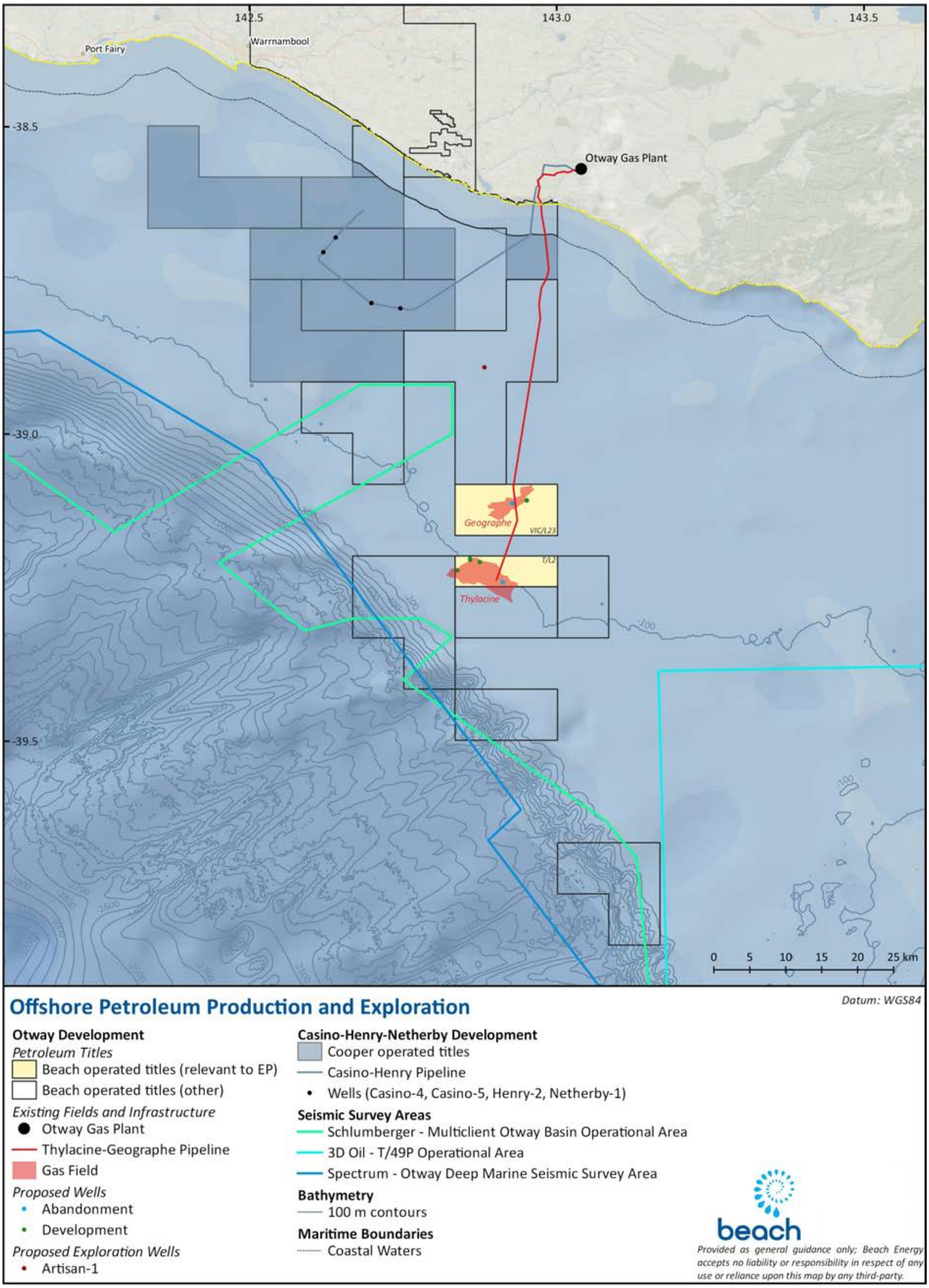


Figure 5-31: Oil and gas exploration and production

5.8.4 Shipping

The SEMR is one of the busiest shipping regions in Australia and Bass Strait is one of Australia's busiest shipping routes (Figure 5-32). Commercial vessels use the route when transiting between ports on the east, south and west coasts of Australia, and there are regular passenger and cargo services between mainland Australia and Tasmania.

Agricultural products and woodchips are transported from the Port of Portland to receiving ports in the Gulf of St Vincent, South Australia, and through Bass Strait to Melbourne and Sydney (NOO, 2004). The Port of Melbourne has over 3,300 vessels calling in to the port every year and is anticipating a doubling in container trade in the next decade (Port of Melbourne, 2012). Bass Strait is also transited by commercial vessels that may not call into ports on the south coast. There are also numerous minor shipping routes in the area, such as those that service King Island. Grassy is the main shipping port on King Island and is the destination for a weekly shipping service from Melbourne and Devonport.

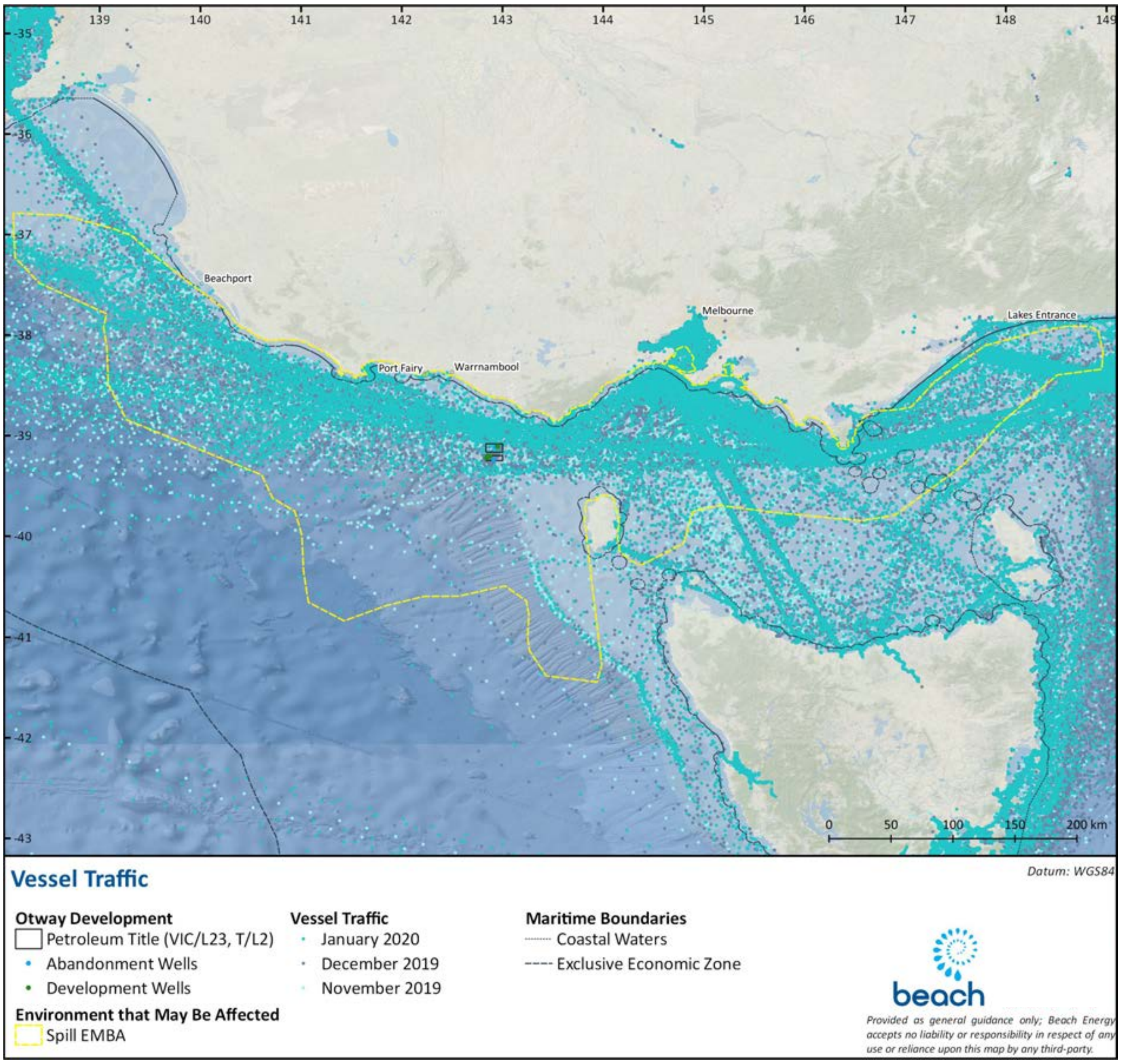


Figure 5-32: Vessel traffic

5.8.5 Tourism

Consultation has identified that the key areas of tourism in the region include land-based sightseeing from the Great Ocean Road and lookouts along that road, helicopter sightseeing, private and chartered vessels touring into the Twelve Apostles Marine Park, diving and fishing. Land-based tourism in the region peaks over holiday periods and in 2011, Tourism Victoria reported a total of approximately 8 million visitors to the Great Ocean Road region.

Local vessels accessing the area generally launch from Boat Bay in the Bay of Islands or from Port Campbell. Given the available boat launching facilities in the area (Peterborough and Port Campbell), and the prevailing sea-state of the area, vessel-based tourism is limited.

5.8.6 Recreational diving

Recreational diving occurs along the Otway coastline. Popular diving sites near Peterborough include several shipwrecks such as the *Newfield*, which lies in 6 m of water and the *Schomberg* in 8 m of water. Peterborough provides several good shore dives at Wild Dog Cove, Massacre Bay, Crofts Bay and the Bay of Islands. In addition, there is the wreck of the *Falls of Halladale* (4-11 m of water) which can be accessed from shore or via boat.

Consultation with local vessel charterers and providers of SCUBA tank fills has confirmed that diving activity is generally concentrated around The Arches Marine Sanctuary and the wreck sites of the *Loch Ard* and sometimes at the *Newfield* and *Schomberg* shipwrecks. Diving activity peaks during the rock lobster season with the bulk of recreational boats accessing the area launching from Boat Bay at the Bay of Islands or Port Campbell.

5.8.7 Recreational fishing

Recreational fishing is popular in Victoria and is largely centred within Port Phillip Bay and Western Port, although beach- and boat-based fishing occurs along much of the Victorian coastline.

The recreational fisheries that occur within the EMBA are:

- Rock lobster;
- Finfish (multiple species are targeted, including sharks);
- Abalone;
- Scallops;
- Squid;
- Pipi.

Of these, active recreational fishing for rock lobster, abalone, finfish and sharks is likely to occur within the MDO spill EMBA. Recreational scallop and squid fishing primarily occurs within Port Phillip Bay and Western Port and as such fishing for these species is unlikely within the EMBA. Pipi harvesting occurs in Venus Bay, in the eastern portion of the EMBA, but due to high levels of toxins in pipis at that location the public is currently advised that they are unsafe for human consumption.

Information relating to the target species, fishing locations, landed catch, value and other relevant aspects of each fishery is included in Table 5-21.

Table 5-21: Recreational fisheries within the spill EMBA

Fishery	Target species	Description	Fishing activity
Rock lobster	Southern rock lobster	Recreational catch is taken by hand from coastal inshore reefs in waters less than about 20 m deep. A daily bag limit of 2 lobster applies.	Yes
Finfish	Snapper King George whiting Salmon Flathead Bream Tuna Sharks	Recreational fishing occurs along the Victorian coastline from beaches, jetties and vessels (privately owned and chartered). Artificial reefs have also been established in Port Phillip Bay and offshore from Torquay, to enhance recreational fishing opportunities.	Yes
Scallops	Commercial scallops Doughboy scallops	Scallops are collected by hand by recreational fishers while diving. Most recreational catch occurs within Port Phillip Bay.	Unlikely
Abalone	Blacklip abalone Greenlip abalone	A permanent closure is in place for greenlip abalone in Port Phillip Bay, and for both greenlip and blacklip abalone from the intertidal to 2 m water depth in all of Victoria. The central zone (which overlaps with the EMBA) is open to recreational abalone take only on nominated days between November and April.	Yes
Squid	Gould's squid	Recreational squid fishing predominantly occurs in Port Phillip Bay and Western Port, but also in other sheltered waters such as at Portland. Fishing is generally from jetties such as at Queenscliff (Port Phillip Bay) and Flinders (Mornington Peninsula, Western Port) or from boats.	Unlikely
Pipi	Pipi	Pipi are harvested from the intertidal zone. Currently the only recreational harvest occurs in Venus Bay, although the VFA has advised that high levels of toxins are present in pipis and advises that they are unsafe for human consumption.	Unlikely (due to toxins)

5.8.8 Commonwealth-managed fisheries

The following Commonwealth-managed fisheries overlap the MDO spill EMBA:

- Bass Strait Central Zone Scallop Fishery (Bass Strait CZSF)
- Eastern Tuna and Billfish Fishery (ETBF)
- Skipjack Tuna Fishery
- Small Pelagic Fishery (SPF)
- Southern Bluefin Tuna Fishery (SBTF)
- Southern and Eastern Scalefish and Shark Fishery (SESSF)
- Southern Squid Jig Fishery.

Of these fisheries, the Bass Strait Central Zone Scallop Fishery, ETBF, SBTF, SESSF and Southern Squid Jig Fishery have catch effort within the MDO spill EMBA and SESSF and Southern Squid Jig Fishery have catch effort within the operational area based on ABARES reports 2014 – 2019 (Patterson et al. 2018; 2017; 2016; 2015; Georgeson et al. 2014). The Skipjack Fishery is not currently active and management arrangements for the fishery are under review.

Information relating to the target species, fishing locations, landed catch, value and other relevant aspects of each fishery is included in Table 5-22.

Engagement with AFMA was undertaken in relation to providing licensing information for any Commonwealth fishers who are active within the Beach Otway development operational area which includes the development drilling and well abandonment operational areas. AFMA replied that currently no vessels are active within the operational area (Stakeholder Record AFMA 02).

Table 5-22: Commonwealth-managed fisheries within the EMBA

Fishery	Target species	Description	Fishing Effort - Operational Area	Fishing Effort - EMBA
Bass Strait Central Zone Scallop Fishery	Scallops	Fishery operates in the Bass Strait between the Victorian and Tasmanian and starts at 20 nm from their respective coastlines. Fishing effort is concentrated around King and Flinders Islands. Currently 12 active boats using towed dredges. Fishing season is 1 April to 31 December. Actual catch in 2017 was 2964 tonnes. The major landing ports in Victoria are Apollo Bay and Queenscliff. Total fishery value in 2016 was A$6 million. Fishing mortality: not subject to overfishing. Biomass: Not over fished. There has been fishing effort in the EMBA based on ABARES data 2013 – 2018. There has been no fishing effort in the operational area based on ABARES data 2013 – 2018.		
Eastern Tuna and Billfish Fishery	Albacore tuna Bigeye tuna Yellowfin tuna Broadbill swordfish Striped marlin	A longline and minor line fishery that operates in water depths > 200 m from Cape York to Victoria. Fishery effort is typically concentrated along the NSW coast and southern Queensland coast. No Victorian ports are used. In 2017 there was some fishing effort in Victoria at low levels. The number of active vessels has decreased within the fishery from around 150 in 2002 to 46 in 2017. Actual catch in the 2017 season was 4615 tonnes. Total fishery value in 2016-17 was A$35.7 million. Fishing mortality: not subject to overfishing. Biomass: Not over fished. There has been fishing effort within the EMBA in 2017 based on ABARES data 2013 – 2018. There has been no fishing effort in the operational area based on ABARES data 2013 – 2018.		
Skipjack Tuna Fishery (Eastern)	Skipjack tuna	The Skipjack Tuna Fishery is not currently active and the management arrangements for this fishery are under review. There has been no catch effort in this fishery since the 2008 -2009 season.		

Fishery	Target species	Description	Fishing Effort - Operational Area	Fishing Effort - EMBA
Small Pelagic Fishery (Western sub-area)	Jack mackerel Blue mackerel Redbait Australian sardine	The Small Pelagic Fishery extends from the southern Queensland to southern Western Australia. Fishers use midwater trawls and purse seine nets. Geelong is a major landing port. Total retained catch of the four target species was 5713 tonnes in the 2017-18 season. Fishery effort generally concentrated in the near-shore Great Australian Bight to the west and south of Port Lincoln. Fishing mortality: not subject to overfishing. Biomass: Not over fished. There has been no fishing effort in the EMBA based on ABARES data 2013 – 2018. There has been no fishing effort in the operational area based on ABARES data 2013 – 2018.		
Southern and Eastern Scalefish and Shark Fishery (SESSF) (Commonwealth Trawl Sector and Scalefish Hook Sector)	Blue-eye trevalla Blue grenadier Blue warehou Deepwater sharks Eastern school whiting Flathead Gemfish Gulper shark Jackass morwong John dory Mirror dory Ocean jacket Ocean perch Orange roughy Smooth oreodory Pink ling	The Southern and Eastern Scalefish and Shark Fishery stretches south from Fraser Island in southern Queensland, around Tasmania, to Cape Leeuwin in southern Western Australia. The EMBA is within the Commonwealth Trawl Sector and Scalefish Hook Sector. A multi-sector, multi-species fishery that uses a range of gear year-round. Fishing is generally concentrated along the 200 m bathymetric contour. Total retained catch of the target species was 8631 tonnes in the 2017-18 season. In 2016-17, the fishery value was A$46.4 million. Fishing mortality: not subject to overfishing. Biomass: Not over fished. There has been fishing effort in the EMBA based on ABARES data 2013 – 2018. There has been fishing effort in the operational area based on ABARES data 2013 – 2018.		

Fishery	Target species	Description	Fishing Effort - Operational Area	Fishing Effort - EMBA
Southern Bluefin Tuna Fishery	Southern bluefin tuna	The Southern Bluefin Tuna Fishery covers the entire sea area around Australia, out to 200 nm from the coast. Southern bluefin tuna are also commonly caught off the NSW coastline. In this area, fishers catch these fish using the longline fishing method. A pelagic longline and purse seine fishery that was worth $38.6 million in 2016-17 (actual catch was 5334 tonnes). The fishery operates year-round. Fishery effort is generally concentrated in the Great Australian Bight and off the southern NSW coast. Fishing mortality: not subject to overfishing. Biomass: Over fished. There has been fishing effort within the EMBA in 2017 based on ABARES data 2013 – 2018. There has been no fishing effort in the operational area based on ABARES data 2013 – 2018.		
Southern Squid Jig Fishery	Gould's squid (arrow squid)	A single species fishery that operates year-round. Portland and Queenscliff are the major Victorian landing ports. Fishing effort is generally concentrated along the 200 m bathymetric contour with highest fishing intensity south of Portland and Warrnambool. In 2016-17, the actual catch of 828 tonnes was worth A$2.24 million. In 2016-17 there were eight active vessels in the fishery. Fishing mortality: not subject to overfishing. Biomass: Not over fished. There has been fishing effort in the EMBA based on ABARES data 2013 – 2018. There has been fishing effort in the operational area based on ABARES data 2013 – 2018.		

Sources: Australian Fisheries Management Authority (www.afma.gov.au), ABARES Fishery Status Reports 2014 to 2019.

* *Green highlighting denotes presence, red highlighting denotes absence.*

5.8.9 Victorian-managed fisheries

There are eight Victorian-managed fisheries that overlap the EMBA:

- Rock Lobster Fishery;
- Giant Crab Fishery;
- Abalone Fishery;
- Scallop (Ocean) Fishery;
- Wrasse (Ocean) Fishery;
- Snapper Fishery (Ocean fishery trawl);
- Pipi Fishery; and
- Eel Fishery.

A description of these fisheries is detailed in Table 5-23.

Monthly catch data by fishery grid area for each species with catch (t) and number of fishers was obtained from the VFA for the period of 2014 – 2018. Data was requested from VFA for the following grids around the operational area:

- J10; J11; J12
- K10; K11; K12
- L10; L11; L12

The operational area is within grid cells L11 and L12.

From the data obtained from the VFA it was identified that only the rock lobster and giant crab fisheries have catch effort within the grids. This aligns with data obtained from VFA and detailed in Table 5-24 and Table 5-25.

For the Giant Crab Fishery, the data shows:

- There has been a maximum of one fisher for the months that fishing effort occurred within a grid (other than J12, which had no fishing).

For the Rock Lobster Fishery, the data shows:

- There has been a maximum of one fisher for the months that fishing effort occurred within a grid.

Table 5-23: Victorian-managed fisheries in the EMBA

Fishery	Target species	Description	Fishing Effort - Operational Area	Fishing Effort - EMBA
Rock Lobster Fishery (western zone)	Southern rock lobster	Victoria's second most valuable fishery with a production value of A$24 million in 2014-15. Since 2009/10, annual quotas have been set at between 230 and 260 tonnes and have been fully caught each year. In the western zone, most catch is landed through Portland, Port Fairy, Warrnambool, Port Campbell and Apollo Bay. Closed seasons operate for male (15 September to 15 November) and female (1 June to 15 November) lobsters. Southern rock lobsters are found to depths of 150 m, with most of the catch coming from inshore waters less than 100 m deep. Fishing data from VFA for 2014 – 2018 identified that there is fishing effort within the EMBA and operational areas. Based on information from SIV, approximately 40 t of southern rock lobster has been caught within the grids for which data was provided for over the last 10 years. This equates to between 1.5 – 1.7% of the total catch over the 10-year period.		
Giant Crab Fishery	Giant crab	A small fishery operating in western Victoria and closely linked with the Rock Lobster Fishery. Most vessels are used primarily for rock lobster fishing with giant crab taken as by-product. Fishing effort is concentrated on continental shelf edge (~200 m deep). Giant crabs inhabit the continental slope at approximately 200 m depth and are most abundant along the narrow band of the shelf edge. Closed seasons operate for male (15 September to 15 November) and female (1 June to 15 November) giant crabs. Total landed catch in 2015-16 was 10 tonnes. Fishing data from VFA for 2014 – 2018 identified that there is fishing effort within the EMBA but not within the operational areas. Based on information from SIV approximately 18 t of giant crab has been caught within the operational area of the last 10 years. The total catch over the last 10 years has been 157.8 t so 18 t equates to This equates to 11% of the total catch being caught in the operational area.		

Fishery	Target species	Description	Fishing Effort - Operational Area	Fishing Effort - EMBA
Abalone Fishery (western zone)	Blacklip abalone Greenlip abalone	A highly valuable fishery (A$20 million in 2014-15) that operates along most of the Victorian shoreline, generally to 30 m depth. Abalone are harvested by divers. Total allowable commercial catch limits of blacklip abalone for the western zone are considerably less than the central and eastern zone (for 2017-18 season, 63.2 tonnes compared with 274.0 and 352.5 tonnes, respectively). There are 14 licences in the western zone. The water depths where abalone are fished are close to shore within the EMBA. No fishing effort was identified in the operational area.		
Scallop (Ocean) Fishery	Scallops	Extends the length of the Victorian coastline from high tide mark to 20 nm offshore. Fishers use a scallop dredge. Temporary closures occur when stocks are low to allow scallop beds to recover. Total allowable commercial catch for 2015-16 was set at 135 tonnes. Scallops are mostly fished from Lakes Entrance and Welshpool. Fishing data from VFA for 2014 – 2018 did not identify scallop fishing effort within the grids provided which include the operational area. Based on the fishery location scallop fishing effort may occur within the EMBA.		
Wrasse (Ocean) Fishery	Bluethroat wrasse Purple wrasse Small catches of rosy wrasse, senator wrasse and southern Maori wrasse	Extends the length of the Victorian coastline from high tide mark to 20 nm offshore. Fishers mostly use hook and line. Limited entry fishery with 22 current licences. Total annual catches in 2014-15 and 2015-16 were ~30 tonnes. Fishing data from VFA for 2014 – 2018 did not identify wrasse fishing effort within the grids provided which include the operational area. Based on the fishery location wrasse fishing effort may occur within the EMBA.		
Snapper Fishery (western stock) (Ocean fishery trawl (inshore) licence)	Snapper	Snapper are caught using lines, nets and haul seine. Over 90% of the catch is from Port Phillip Bay, and around 5% from coastal waters. In 2014-15, 147 tonnes were landed at a value of A$1.38 million. Fishing data from VFA for 2014 – 2018 did not identify snapper fishing effort within the grids provided which include the operational area. Based on the fishery location snapper fishing effort may occur within the EMBA.		
Pipi Fishery	Pipi	Main commercial harvesting area is Discovery Bay with limited activity in Venus Bay. Harvested in the high impact beach zone using traditional dip nets. Total annual catches in 2016–17 and 2017–18 were 42 tonnes each year. Discovery Bay and Venus Bay are within the spill EMBA.		

Fishery	Target species	Description	Fishing Effort - Operational Area	Fishing Effort - EMBA
Eel Fishery		Target species are the short-finned eel (*Anguilla australis*) and long-finned eel (*A. reinhardtii*). Commercial fishers are only permitted to use fyke nets. Total catch for both species in 2016 was ~60 tonnes. Species spend the majority of their life cycle in fresh water or estuaries but travel to the ocean to spawn once before dying. Estuaries and migration routes are within the spill EMBA.		
Bays and Inlet Fisheries		Multi-species, multi gear fishery utilising octopus, fish and crab traps plus line fishing, seine nets mussel rakes and underwater breathing apparatus. Fisheries within Western Port and Port Phillip Bay are within the spill EMBA.		

Sources: Victorian Fisheries Authority (www.vfa.vic.gov.au), DoEE (2015), State Govt of Victoria (2015a, b).

* *Green highlighting denotes presence, red highlighting denotes absence.*

Table 5-24: Giant Crab Fishery fisher per grid per month from 2014 to 2018

Month	J10	La Bella K10	La Bella and umbilical route K11	Geographe and umbilical route K12	L10	Thylacine L11	Thylacine L12
Jan 2014		1					
Feb 2014		1					
Dec 2014		1				1	
Jan 2015		1					
Feb 2015			1				
Nov 2015						1	
Dec 2015	1	1				1	
Jan 2016						1	
Mar 2016						1	
Apr 2016						1	
May 2016		1					
Mar 2017		1				1	
Apr 2017		1				1	
May 2017		1			1	1	
Jun 2017		1			1		
Aug 2017						1	1
Jan 2018						1	
May 2018						1	1
Jun 2018							1
Aug 2018				1			
Dec 2018		1					1

Note: Data only shows those months where there was fishing effort.
Highlighted cells cover the operational area.

Table 5-25: Rock Lobster Fishery fisher per grid per month from 2014 to 2018

Month	J10	La Bella and flowline route J11	Artisan, flowline and umbilical route J12	La Bella K10	La Bella and umbilical route K11	Geographe and umbilical route K12	L10	Thylacine L11	Thylacine L12
Jan 2014	1	1		1					
Feb 2014	1	1		2	1				
Mar 2014			1						
Jul 2014			1						
Aug 2014					1	1			
Sep 2014	1	1							
Dec 2014	1				1				
Jan 2015			1	1	1				
Feb 2015	1				1	1			
Apr 2015	1				1				1
May 2015	1								
Dec 2015	1			1					
Jan 2016								1	
Feb 2016	1			1					
Mar 2016			1	1		1			
Apr 2016			1		1	1		1	
May 2016	1								
Feb 2017						1			
Mar 2017						1			
Apr 2017	1								
May 2017			1						
Jun 2017			1				1		
Aug 2017						1			1
Dec 2017	1								
Feb 2018	1		1						
Aug 2018	1		1			2			
Sep 2018			1		1	1			
Dec 2018	1			1					

Note: Data only shows those months where there was fishing effort.
Highlighted cells cover the operational area.

5.8.10 Tasmanian-managed fisheries

There are eight Tasmanian state managed commercial fisheries that occur within the spill EMBA (entrained hydrocarbons only):

- Abalone Fishery;
- Commercial Dive Fishery;
- Giant Crab Fishery;
- Rock Lobster Fishery;
- Scalefish Fishery;
- Scallop Fishery;
- Seaweed Fishery; and
- Shellfish Fishery.

A description of these fisheries is in Table 5-26. No Tasmanian fisheries operate within the operational area.

The jurisdiction of all eight Tasmanian state managed fisheries intersects with parts of the EMBA. Historic catch assessments indicate that Commercial Dive, Scallop and Shellfish Fisheries activities are unlikely to occur in the EMBA, with fishing effort located in other areas of these fisheries. The Rock Lobster and Abalone Fisheries, which are by far the most productive and economically important Tasmanian fisheries accounting for 95% of the total value, are both expected to be active within the EMBA. Giant Crab, Scalefish, Scallop and Seaweed Fisheries are also likely to be active within the EMBA to varying degrees.

The jurisdictional area of the Seaweed Fishery extends to the limit of Tasmanian State waters coastal waters (3 nm). The jurisdictional area for the Scallop Fishery extends from the high water mark to 20 nm from Tasmanian state waters into the Bass Strait and out to the limits of the AFZ (200 nm) off the rest of the state, as defined in the 1986 Offshore Constitutional Settlement (OCS) arrangements for scallop stock. The Abalone, Rock Lobster, Giant Crab, Commercial Dive, Scalefish and Shellfish Fisheries apply throughout Tasmanian State waters as defined in the 1996 OCS arrangements for invertebrates and finfish stock.

Table 5-26: Tasmanian-managed fisheries in the EMBA

Fishery	Target species	Description	Fishing Effort - EMBA
Abalone Fishery (Northern and Bass Strait Zones)	Black lip (*Haliotis rubra*) and greenlip abalone (*H. laevigata*)	Largest wild abalone fishery in the world (providing ~25% of global production) and a major contributor to the local economy. Abalone are hand-captured by divers in depths between 5-30 m. Blacklip abalone are collected around on rocky substrate around the Tasmanian shoreline and are the main focus of the fishery. Greenlip abalone are distributed along the north coast and around the Bass Strait islands and usually account for around 5% of the total wild harvest. Total landings were 1561 t for 2017, comprising 1421 t of blacklip and 140 t of greenlip abalone. Production value was approximately $70 million. The EMBA intersects the Northern Zone (waters around King Island) and Bass Strait Zone (waters in the Northern Bass Strait Region) of the Abalone Fishery.	
Commercial Dive Fishery (Northern Zone)	White sea urchin (*Heliocidaris urethrograms*), black sea urchin (*Centrostephanus rodgersii*) and periwinkles (*Lunella undulate*)	Dive capture fishery that targets several different species; the main species collected being sea urchins and periwinkles. In 2010-2011 (the most recent period for which information was available) approximately 100 t of sea urchins and 15 t of periwinkles were harvested, and the fishery had a total commercial value of around $250,000. Sea urchins and periwinkles accounting for 63% and 37% of the total respectively. Jurisdiction encompasses all Tasmanian State waters (excluding protected and research areas), although licence holders largely operate out of small vessels (<10 m) and effort is concentrated on the south and east costs of Tasmania around ports. The EMBA intersects the Northern Zone of the Commercial Dive Fishery at King Island and in the northern Bass Strait. The Northern Zone of the fishery is defined as the area of Tasmanian State waters on the east coast bounded by the line of latitude 42°20'40"S in the south and extending north to the line of latitude 41°00'26"S (from the southern point of Cape Sonnerat to Red Rocks).	
Giant Crab Fishery	Giant crab (*Pseudocarcinus gigas*)	The giant crab fishery is a comparatively small fishery with the annual harvest set at 46.6 tonnes but with a high landed value of around $2 million. The fishery has been commercially targeted since the early 1990s moving from open access to limited entry. The area of the fishery includes waters surrounding the state of Tasmania generally south of 39°12 out to 200 nm. Within the area of the fishery, most effort takes place on the edge of the continental slope in water depths between 140 m and 270 m. CPUE has declined continually since the inception of the fishery in the early 1990s indicating that it has been overfished. The TAC has been reduced to 20.7 t for 2017/18 and 2019/2020 to address the issue. The EMBA potentially overlaps the area where giant crabs are fished for on the continental slope.	

Fishery	Target species	Description	Fishing Effort - EMBA
Rock Lobster Fishery	Southern rock lobster (*Jasus edwardsii*)	Southern rock lobster are the other major wild-caught Tasmanian fishery. For 2019-20 the Total Allowable Catch has remained at 1220.7 t which includes the Total Allowable Recreational Catch (TARC) of 170 tonnes and the Total Allowable Commercial Catch (TACC) of 1050.7 tonnes or 100 kg per unit for the 2019-20 season. Rock lobster made up a volume of 1,047 t or 25% percent of total fisheries production in 2015/16. Production value was $89 million or 51% of total fisheries value in 2014/15 (up 7% from 2013/14). Southern rock lobsters are found to depths of 150 m with most of the catch coming from inshore waters less than 100 m deep throughout state waters. There are 209 vessels active in the fishery. The EMBA potentially overlaps the Rock Lobster Fishery.	
Scalefish Fishery (northwest coast)	Numerous species, but the majority of effort is on # species	Complex multi-species fishery harvesting a range of scalefish, shark and cephalopod species. Fourteen different fishing methods are used. The total catch was around 270 t in 2014/15, a decline of 20 t compared to the previous season. The highest landings of finfish include wrasse (81 t), southern calamari (76 t), flathead (36 t), southern garfish (34 t), banded morwong (30 t) and Australian salmon (23 t). The EMBA potentially overlaps the Scalefish Fishery.	
Scallop Fishery	Commercial scallop (*Pecten fumatus*)	Fishery area extends 20 nm from the high water mark of Tasmanian state waters into Bass Strait and out to 200 nm offshore from the remainder of the Tasmanian coastline. Eight vessels are active in the fishery. Fishers use a scallop dredge. Scallop beds are generally found along the east coast and Bass Strait in depths between 10-20 m but may occur in water deeper than 40 m in the Bass Strait. Scallop habitat is protected through a ban on dredging in waters less than 20 m and a network of dredge-prohibited areas around the state. There is high variability in abundance, growth, mortality, meat yield and condition of scallop stock in the fishery and recruitment is sporadic and intermittent. Managed using an adaptable strategy where surveys are undertaken to estimate abundance and decision rules are used to open an area (or areas) to fishing. When open the scallop fishery contributes significantly to total fisheries production. In 2015 the scallop fishing season ran from July to October and the catch was 781 t. At present the Tasmanian Commercial Scallop fishery remains closed. The EMBA does not overlap the area of effort for the Scallop Fishery.	

Fishery	Target species	Description	Fishing Effort - EMBA
Seaweed Fishery	Bull kelp (*Durvillea Pototorum*), Japanese kelp (*Undaria pinnatifida*)	Components of this fishery include collection of cast bull kelp and harvesting of Japanese kelp, an introduced species. The majority of cast bull kelp is collected from King Island. The right to harvest and process kelp on King Island was granted exclusively to Kelp Industries Pty Ltd in the mid-1970s. About 80 to 100 individuals collect cast bull kelp and transport it to the Kelp Industries plant in Currie. An average annual harvest above 3000 t (dried weight) has been produced in recent years, accounting for about 5% of the world production of alginates (i.e. the end product of dried bull kelp). The cast bull kelp harvesting on King Island generates about $2 million annually. Comparatively minor cast bull kelp collection also occurs at two centres of operation on Tasmania's West Coast: around Bluff Hill Point and at Granville Harbour. Japanese kelp is harvested by divers only along Tasmania's east coast where it is already well established. The EMBA potentially overlaps the Seaweed Fishery.	
Shellfish Fishery	Katelysia cockles (*Katelysia scalarina*), Venerupis clam (*Venerupis largillierti*), native oyster (*Ostrea angasi*), Pacific oyster (*Crassostrea gigas*)	Comprises specific shellfish species hand captured by divers in defined locations on the east coast of Tasmania, namely Angasi oysters in Georges Bay, Venerupis clams in Georges Bay and Katelysia cockles in Ansons Bay. The taking of Pacific oysters, an invasive species, is also managed as part of the fishery but no zones apply. Pacific oysters can be collected throughout all State waters (which includes areas within the EMBA), as the aim of harvesting these animals is to deplete the wild population. The estimated total value of the shellfish fishery based on landings from 2001-2005 was $345,538. The EMBA does not overlap the Shellfish Fishery.	

Sources: DPIPWE (2015), Patterson et al (2016), (DoEE, 2017c), (FRDC, 2017).

* *Green highlighting denotes presence, red highlighting denotes absence.*

5.9 Cultural environment

5.9.1 Maritime archaeological heritage

Shipwrecks over 75 years old are protected within Commonwealth waters under the *Underwater Cultural Heritage Act 2018* (Cth), in Victorian State waters under the *Victorian Heritage Act 1995* (Vic) and in Tasmanian waters under the *Historic Cultural Heritage Act 1995*. Some historic shipwrecks lie within protected zones of up to 800 m radius, typically when the shipwreck is considered fragile or at particular risk of interference. In Tasmania, the Historic Heritage Section of the Parks and Wildlife Service is the government authority responsible for the management of the State's historic shipwrecks and other maritime heritage sites.

Within the spill EMBA is a stretch of coastline known as the 'Shipwreck Coast' because of the large number of shipwrecks present, with most wrecked during the late nineteenth century. The strong waves, rocky reefs and cliffs of the region contributed to the loss of these ships. More than 180 shipwrecks are believed to lie along the Shipwreck Coast (DELWP, 2016b) and well-known wrecks include the *Loch Ard* (1878), *Thistle* (1837), *Childere* (1839), *John Scott* (1858) and *Schomberg* (1855).

The wrecks represent significant archaeological, educational and recreational (i.e. diving) opportunities for locals, students and tourists (Flagstaff Hill, 2015).

None of the shipwrecks on the western section of the Victorian coast are covered by shipwreck protection zones declared under Section 103 of the *Victorian Heritage Act 1995* (DoE, 2016q, 2016r; DELWP, 2016b). On the central Victorian coast, a protection zone is in place around the shipwreck of the steamship SS Alert, which lies off Cape Schank, southeast of the entrance to Port Phillip Bay and within the spill EMBA. Six shipwreck protection zones occur within Port Phillip Bay (DoE, 2016q, 2016r; DTPLI, 2015) but outside the spill EMBA.

There are over 200 historic wrecks in the spill EMBA. Only one of these wrecks, the *SS Alert*, has a protection zone that is within the spill EMBA.

There is no identified aircraft wreckage within the EMBAs.

5.9.2 Aboriginal heritage

Aboriginal groups inhabited the southwest Victorian coast as is evident from the terrestrial sites of Aboriginal archaeological significance throughout the area. During recent ice age periods (the last ending approximately 12,000-14,000 years ago), sea levels were significantly lower, and the coastline was a significant distance seaward of its present location, enabling occupation and travel across land that is now submerged.

Coastal Aboriginal heritage sites include mostly shell middens, some stone artefacts, a few staircases cut into the coastal cliffs, and at least one burial site. The various shell middens within the Port Campbell National Park and Bay of Islands Costal Park are close to coastal access points that are, in some cases, now visitor access points (Parks Victoria, 2006b).

Aboriginal 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 Aboriginal peoples, leading to the relocation of people to missions on Bruny Island, Flinders Island and other sites, and finally to Oyster Cove, their numbers diminished drastically. The Aboriginal Heritage Register (AHR), lists over 13,000 sites; however, there is no searchable database to identify any sites in the EMBAs. It must be assumed that sites will be scattered along the coast of King Island within the spill EMBA.

5.9.3 Native title

The National Native Title Tribunal (NNTT) database identifies two claims have been accepted for registration over the adjacent coastal shoreline (and terrestrial component of the spill EMBA). One claim is by the Eastern Maar people (VC2012/001), registered in 2013, and extends seaward 100 m from the mean low-water mark of the coastline (NNTT, 2016). There is currently no determination registered over the area of the claim (still active) in the National Native Title Register. There is also a registered claim (2014/001) over Wilson's Promontory by the Gunaikurnai people. There are no registered claims in Tasmania.

6 Environmental Impact and Risk Assessment Methodology

6.1 Overview

This section outlines the environmental impact and risk assessment methodology used for the assessment of the program activities. 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 this risk assessment process.

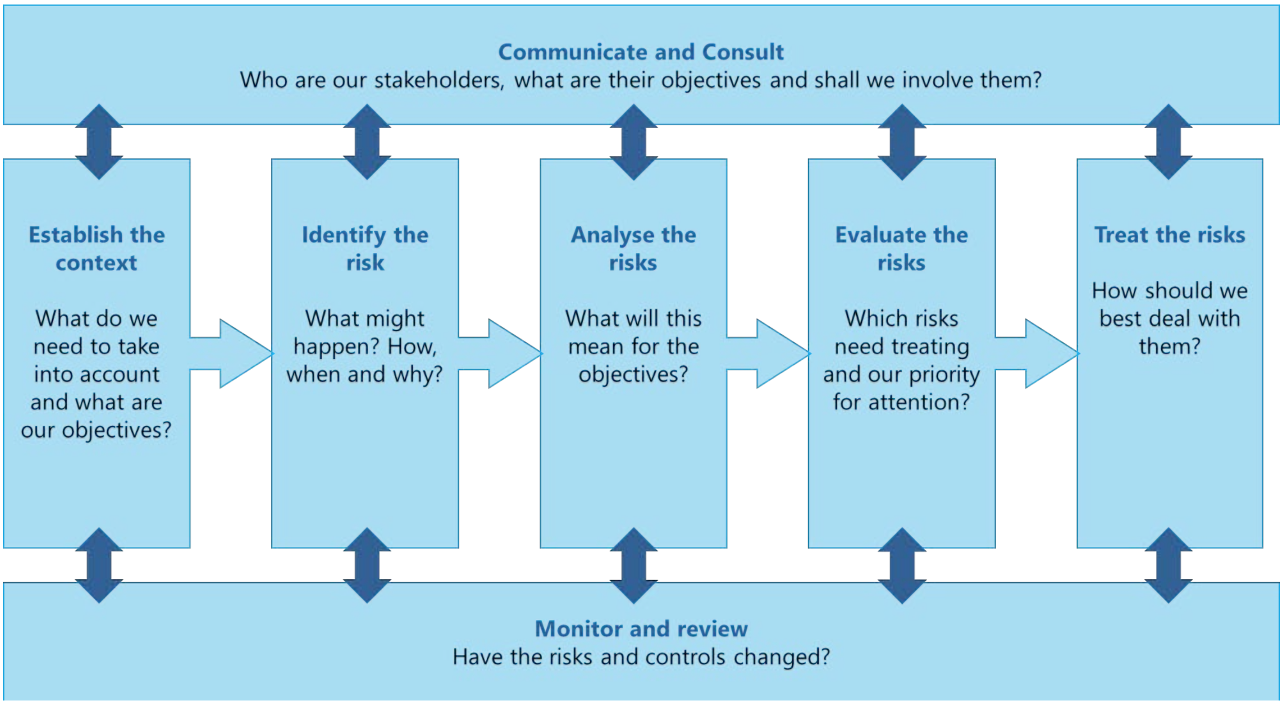


Figure 6-1: Risk assessment process

6.1.1 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: a. exercising a right conferred on a petroleum titleholder under the Act by a petroleum title; or, b. discharging an obligation imposed on a petroleum titleholder by the Act or a legislative instrument under the Act.
Consequence	The consequence of an environmental impact 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 MNES. An environmental emergency condition may, or may not, correspond with a safety incident considered to be a Major Accident Event.
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	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	Defined under the OPGGS(E)R as a statement of the performance required of a control measure.
Environmental risk	An unplanned environmental impact has the potential to occur, due either directly or indirectly from undertaking the activity.
Likelihood	The chance of an environmental risk occurring.
Measurement criteria	A verifiable mechanism for determining control measures are performing as required.
Residual risk	The risk remaining after control measures have been applied (i.e. after risk treatment).

6.2 Communicate and consult

In alignment with Regulation 11A(2) of the OPGGS(E)R, during the development of this EP, Beach has consulted with relevant person(s) (stakeholders) to obtain information in relation to their activities within the operational area and potential impacts to their activities. This information is used to inform the EP and the risk assessment undertaken for the activity. Stakeholder consultation is an iterative process that continues throughout the development of the EP and for the duration of a petroleum activity as detailed in Section 9.

6.3 Establish the context

Context for the risk assessment process is established by:

- Understanding the regulatory framework in which the activity takes place (described in Section 3, 'Applicable Requirements');
- Identifying the environmental aspects of the activity (and associated operations) that will or may cause environmental impacts or may present risks to the environment (based upon the 'Activity Description' in Section 4);
- Identifying the environment that may be affected, either directly or indirectly, by the activity (based upon the 'Existing Environment' as described in Section 0); and
- Understanding the concerns of stakeholders and incorporating those concerns into the design of the activity where appropriate (outlined in Section 9, 'Stakeholder Consultation').

6.4 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 EMBA, 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).

6.5 Analyse the potential impacts 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 risk differ. In this way, the controls can be directly linked to the impact or risk.

6.5.1 Establish environmental performance outcomes

Environmental performance outcomes (EPOs) are developed to provide a measurable level of performance for the management of environmental aspects of an activity to ensure that environmental impacts and risks will be of an acceptable level. EPOs have been developed based on the following:

- Ecological receptors: MNES: Significant Guidelines 1.1 to identify the relevant significant impact criteria. The highest category for the listed threatened species or ecological communities likely to be present within the EMBA is used, for example: endangered over vulnerable. Where appropriate species recovery plan actions and/or outcomes.
- Commercial fisheries: VFA core outcome of sustainable fishing and aquaculture (https://vfa.vic.gov.au/about).
- Marine users: OPGGS Act 2006 (Cth) Section 280.

6.6 Evaluate and treat the potential impacts and risks

The following steps are undertaken using the environmental risk assessment 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, identify the likelihood (probability) of unplanned environmental impacts occurring;
- For unplanned events, 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); and
- Establish environmental performance standards for each of the identified control measures.

Table 6-2: Environmental risk assessment matrix

Environmental Risk Assessment Matrix								
Consequence Rating	Natural Environment	Reputational and/or Community damage / impact / social / cultural heritage	Likelihood of Occurrence					
			Remote (1)	Highly Unlikely (2)	Unlikely (3)	Possible (4)	Likely (5)	Almost Certain (6)
			<1% chance of occuring within the next year. Occurance requires exceptional circumstances. Exceptionally unlikely event in the long-term future. Only occur as a 100 year event.	>1% chance of occuring within the next year. May occur but not anticipated. Could occur years to decades.	>5% chance of occuring in the next year. May occur but not for a while. Could occur within a few years.	>10% chance of occuring within the next year. May occur shortly but a ditict probability iot won't. Could occur within months to years.	>50% chance of occuring within the next year. Balance of probability that it will occur. Could occur within weeks to months.	99% chance of occuring within the next year. Impact is occuring now. Could occur within days to weeks.
Catastrophic (6)	Long-term destruction of highly valued ecosystem or very significant effects on endangered species or habitats (formally managed).	Irreparable damage or highly valued items or structures of great cultural significance. Negative international or prologed national media (e.g. 2 weeks)	High	High	Severe	Severe	Extreme	Extreme
Critical (5)	Significant impact on highly valued (formally managed) species or habitats to the point of eradication or impairment of ecosystem. Widespread long-term impact.	Major irreparable damage to highly valued structures / items of cultural significance. Negative national media for 2 days or more. Significant public outcry.	Medium	Medium	High	Severe	Severe	Extreme
Major (4)	Very serious environmental effects, such as dosplacement of species and partial impairment of ecosystem (formally managed). Widespread medium and some long-term impact.	Significant damage to items of cultural significance. Negative national media for 1 day. NGO adverse attention.	Medium	Medium	Medium	High	Severe	Severe
Serious (3)	Moderate effects on biological or physical environment (formally managed) and serious short-term effects but not affecting ecosystem functions.	Permanent damage to items of cultural significance. Negative State media. Heightened concern from local community. Criticism by NGOs.	Low	Medium	Medium	Medium	High	Severe
Moderate (2)	Minor short-term damage to area of limited significance (not formally managed). Short-term effects but not affecting ecosystem functions.	Some damage to items of cultural significance. Minor adverse local public or media attention and complaints.	Low	Low	Medium	Medium	Medium	High
Minor (1)	No lasting effects. Low-level impacts on biological and physical environment to an area of low significance (not formally managed).	Low level repairable damage to commonplace structures. Public concern restricted to local complaints.	Low	Low	Low	Medium	Medium	Medium

6.7 Demonstration of ALARP

Beach's approach to demonstration of ALARP includes:

- Systematically identify and assess all potential environmental impacts and risks associated with the activity;
- Where relevant, apply industry 'good practice' controls to manage impacts and risks;
- Assess the effectiveness of the controls in place and determine whether the controls are adequate according to the 'hierarchy of control' principle; and
- 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, 2019) 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, 2019) has been applied, whereby the level of ALARP assessment is dependent upon the:

- Residual impact and risk level (high versus low); and
- The degree of uncertainty associated with the assessed impact or risk.

The following section details how the guidance provided in NOPSEMA's EP decision making guideline (NOPSEMA, 2019).

6.7.1 Residual impact and risk levels

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 environmental risk assessment matrix, the impact consequence is rated as 'minor' or 'moderate' or risks are rated as 'low', 'medium' or 'high.' In these cases, applying 'good industry practice' (as defined in Section 6.7.2.1) is sufficient to manage the impact or risk to ALARP.

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 environmental risk assessment matrix (Table 6-2), the impact consequence is rated as 'serious', 'major', 'critical' or 'catastrophic', or when the risk is rated as 'severe' or 'extreme'. In these cases, further controls must be considered as per Section 6.7.2.

An iterative risk evaluation process is employed until such time as any further reduction in the residual risk ranking is not reasonably practicable to implement. At this point, the impact or risk is reduced to ALARP. The determination of ALARP for the consequence of planned operations and the risks of unplanned events is outlined in Table 6-3.

Table 6-3: ALARP determination for consequence (planned operations) and risk (unplanned events)

Consequence ranking	Minor	Moderate	Serious	Major	Critical	Catastrophic
Planned operation	Broadly acceptable	Tolerable if ALARP		Intolerable		
Residual impact category	Lower order impacts		Higher order impacts			
Risk ranking	Low	Medium	High	Severe	Extreme	
Unplanned event	Broadly acceptable	Tolerable if ALARP		Intolerable		
Residual risk category	Lower order risks			Higher order risks		

6.7.2 Uncertainty of impacts and risks

In addition to the evaluation of residual impacts and risks as described above, the relative level of uncertainty associated with the impact or risk is also used to inform whether the application of industry good practice is sufficient to manage impacts and risks to ALARP, or if the evaluation of further controls is required.

In alignment with NOPSEMA's ALARP Guidance Note (NOPSEMA, 2015), 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). Specifically, the framework considers impact severity and several guiding factors:

- Activity type;
- Risk and uncertainty; and
- Stakeholder influence.

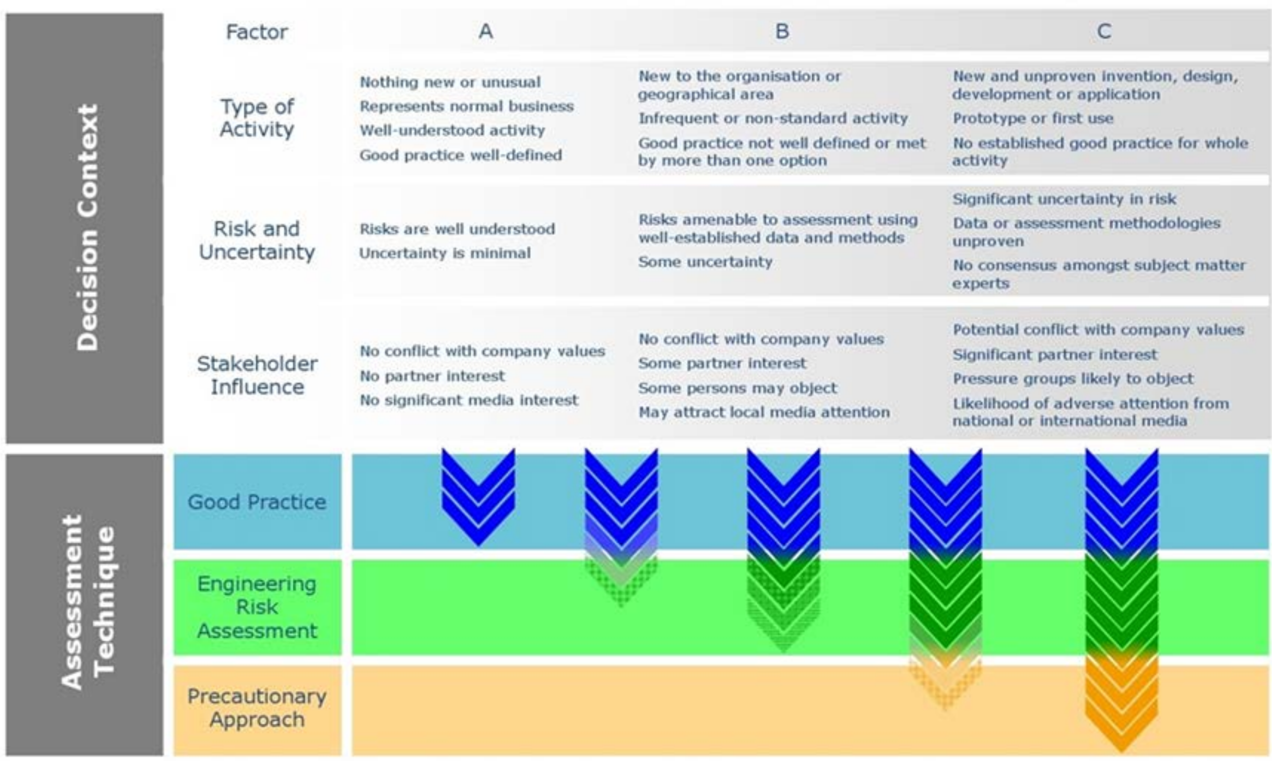


Figure 6-2: OGUK (2014) decision support framework

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.

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.

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:

- Good practice;
- Engineering risk assessment; and
- Precautionary approach.

6.7.2.1 Good practice

OGUK (2014) defines 'good practice' as the recognised risk management practices and measures that are used by competent organisations to manage well-understood impacts and risks arising from their activities.

'Good practice' can also be used as the generic term for those measures that are recognised as satisfying the law. For this EP, sources of good practice include:

- Requirements from Australian legislation and regulations;
- Relevant Australian policies;
- Relevant Australian Government guidance;
- Relevant industry standards and/or guidance material; and
- Relevant international conventions.

If the ALARP technique is determined to be 'good practice', further assessment ('engineering risk assessment') is not required to identify additional controls. However, additional controls that provide a suitable environmental benefit for an insignificant cost are also identified at this point.

6.7.2.2 Engineering risk assessment

All potential impacts and risks that require further assessment are subject to an 'engineering risk assessment'. Based on the various approaches recommended in OGUK (2014), Beach believes the methodology most suited to this activity is a comparative assessment of risks, costs, and environmental benefit. A cost–benefit analysis should show the balance between the risk benefit (or environmental benefit) and the cost of implementing the identified measure, with differentiation required such that the benefit of the control can be seen and the reason for the benefit understood.

6.7.2.3 Precautionary approach

OGUK (2014) states that if the assessment, considering all available engineering and scientific evidence, is insufficient, inconclusive, or uncertain, then a precautionary approach to impact and risk management is needed. A precautionary approach will mean that uncertain analysis is replaced by conservative assumptions that will result in control measures being more likely to be implemented.

That is, environmental considerations are expected to take precedence over economic considerations, meaning that a control measure that may reduce environmental impact is more likely to be implemented. In this decision context, the decision could have significant economic consequences to an organisation.

6.8 Demonstration of acceptability

Regulation 13(5)(c) of the OPGGS(E)R requires demonstration that environmental impacts and risks are of an acceptable level.

Beach considers a range of factors when evaluating the acceptability of environmental impacts and risks associated with its activities. This evaluation works at several levels, as outlined in Section 6.8.1 which is based on Beach's interpretation of the NOPSEMA EP content requirements (NOPSEMA, 2019).

6.8.1 Acceptability criteria

Beach has defined a set of criteria to determine acceptability of an impact or risk, following risk mitigation. Where an impact or risk is not considered acceptable, further control measures are required to lower the risk, or alternative options will be considered. The Beach acceptability criteria considers:

- Principles of Ecological Sustainable Development (ESD)
- Internal Context
- External Context
- Other requirements.

These criteria are described in the following sections and are consistent with NOPSEMA EP content requirements (NOPSEMA, 2019).

6.8.1.1 Principles of Ecologically Sustainable Development

Section 3A of the EPBC Act defines ecologically sustainable development (ESD), which is based on Australia's National Strategy for Ecological Sustainable Development (1992) that defines ESD 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.'

Relevant ESD principles and how they are applied by Beach:

- 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 risk assessment process.

To meet this acceptance criteria, the activity must be carried out in a manner consistent with the relevant ESD principles above.

6.8.1.2 Internal Context

The Lattice Health Safety and Environment Management System (Lattice HSEMS) includes Standards and Procedures relevant to the way Beach operates.

At the core of the HSEMS are 20 performance standards which detail specific performance requirements for the implementation of the HSE Environmental Policy and management of potential HSE impacts and risks.

Where relevant, Standards and Procedures in the Lattice management system that 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 the company HSE Environment Policy. Where specific internal procedures, guidelines, expectations are in place for management of the impact or risk in question, acceptability is demonstrated.

6.8.1.3 External Context

External context considers stakeholder expectations, obtained from stakeholder consultation.

Beach has undertaken stakeholder consultation, which is described in detail in Section 9. 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.

6.8.1.4 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 3);
- Policies and guidelines (described in Section 3.7);
- International agreements (described in Section 3);

- EPBC Management Plans (described in Section3.1); and
- Australian Marine Park designations (described in Section 5.2).

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, environmental performance objectives and standards are consistent with the nature of the receiving environment based upon formal management plans.

6.9 Monitoring and review

Monitoring and review activities are incorporated into the impact and risk management process to ensure that controls are effective and efficient in both design and operation. This is achieved through the EPO, EPS and measurement criteria that are described for each environmental impact or risk. Monitoring and review are described in detail in the Implementation Strategy ((Chapter 8).

7 Environmental Impact and Risk Assessment

In alignment with Regulation 13 (5) of the OPGGS(E)R, this section of the EP details the potential environmental impacts and risks associated with the activity and provides an evaluation of all the impacts and risks appropriate to the nature and scale of each impact or risk. This evaluation includes impacts and risks arising directly or indirectly from the activity and includes potential oil pollution emergencies and the implementation of oil spill response strategies and monitoring.

In addition, this section details the control measures (systems, procedures, personnel or equipment) that will be used to reduce potential impacts and risks to ALARP and acceptable levels.

This chapter also presents the EPO, EPS and measurement criteria required to manage the identified impacts and risks.

The following definitions are used in this section, as defined in Regulation 4 of the OPPGS(E):

- EPO – 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.
- EPS – a statement of the performance required of a control measure.
- Measurement criteria– defines the measure by which environmental performance will be measured to determine whether the EPO has been met.

A summary of the impact and risk ratings for each impact identified and assessed in this chapter is presented in Table 7-1.

Table 7-1. Beach Otway Development Anchoring and Mooring environmental impact and risk rating summaries

No.	Hazard	Inherent	Residual
Impacts		Consequence rating	
1	Light emissions	Minor	Minor
2	Atmospheric emissions	Minor	Minor
3	Underwater noise emissions	Minor	Minor
4	Physical presence	Minor	Minor
5	Seabed disturbance	Minor	Minor
6	Planned marine discharges	Minor	Minor
Risks		Risk rating	
7	Establishment of IMS	Medium	Low
8	Collision with marine fauna	Low	Low
9	Unplanned marine discharge	Low	Low
11	LoC Marine Diesel Oil	Low	Low
Hydrocarbon spill response activities (risk)			
12	Oil Spill Response activities	Low	Low

7.1 IMPACT: Light emissions

7.1.1 Hazards

The following activities will result in artificial lighting:

- Vessel navigation and deck lighting – this will be maintained while the vessel is on location for maritime and crew safety purposes.

7.1.2 Known and potential environmental impacts

The known and potential environmental impacts of artificial lighting are:

- Localised 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).

7.1.3 EMBA

The EMBA for light emissions associated with vessel activities is likely to be less than a 100 m radius around the vessel.

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

- Plankton;
- Fish (e.g. squid); and
- Seabirds

7.1.4 Evaluation of Environmental Impacts

Seabirds

Seabirds may be attracted to the vessels at night due to the light glow. 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).

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 provide enhanced capability for seabirds to forage at night.

Should such light attraction occur during the activity, it will be short temporary and highly localised and therefore will not have impacts at the species population level or ecosystem level.

There are no actions within the National Recovery Plan for Threatened Albatrosses and Giant Petrels 2011-16 (DSEWPC, 2011) that are compromised by light emissions from this activity.

Fish and plankton

Fish and zooplankton may be directly or indirectly attracted to lights. 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 results in an increase in food source 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 potentially lead to increased predation rates compared to unlit areas.

Should such light attraction occur during the activity, it will be temporary and highly localised and therefore will not have impacts at the species population level or ecosystem level.

Cetaceans

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.

7.1.5 Impact Assessment

Table 7-2 presents the impact assessment for light emissions.

Table 7-2: Impact assessment for light emissions

Summary		
Summary of impacts	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).	
Extent of Impact	Localised – small radius of light glow around the vessel/s.	
Duration of Impact	Temporary – duration of activity (Approximately 2 days).	
Level of certainty of impacts	HIGH – the impacts of light glow on marine fauna are well known.	
Impact decision framework context	A – nothing new or unusual, represents business as usual, well understood activity, good practice is well defined.	
Impact Consequence (inherent)		
Minor		
Environmental Controls and Performance Measurement		
EPO	EPS	Measurement criteria
External vessel lighting conforms to that required by maritime safety standards.	Light glow is minimised by managing external vessel lighting in accordance with: • AMSA Marine Orders Part 30 (Prevention of Collisions). • AMSA Marine Orders Part 59 (Offshore Support Vessel Operations).	Vessel class certifications are current.
Impact Consequence (residual)		
Minor		
Alternative controls considered but not adopted		

Use of fauna-sensitive lighting (e.g., different coloured lights, shielding, motion detector).	There is no critical habitat for light-sensitive species in or around the activity area that would be disrupted by vessels light glow. The activity is only a few days in duration.
Use low-spill lighting shields.	

Demonstration of ALARP
A 'minor' residual impact consequence is considered to be ALARP and a 'lower order' impact. An ALARP analysis is therefore not required.

Demonstration of Acceptability		
Policy compliance	Beach Environment Policy objectives are met.	
Management system compliance	The proposed management of the impact is aligned with the Beach Environment Policy. Activities will be undertaken in accordance with the Implementation Strategy (Chapter 8).	
Stakeholder engagement	Stakeholder consultation has been undertaken (see Chapter 9), with no concerns expressed regarding light emissions.	

Legislative context	The performance standards outlined in this EP align with the requirements of:
	• *Navigation Act* 2012 (Cth):
	  o Part 3 (Prevention of Collisions).
	  o AMSA Marine Order 30 (Prevention of Collisions).	

Industry practice	The consideration and adoption of the controls outlined in the below-listed codes of practice and guidelines demonstrates that BPEM is being implemented for this activity.	
	Environmental, Health and Safety Guidelines for Offshore Oil and Gas Development (World Bank Group, 2015)	Guidelines met with regard to: • Ship collision (item 120). To avoid collisions with third-party and support vessels, offshore facilities should be equipped with navigational aids that meet national and international requirements, including navigational lights on support vessels.
	APPEA CoEP (2008)	Objectives regarding light emissions from offshore activities are: • To reduce light emissions to ALARP and an acceptable level. The EPS listed in this table meet these objectives.
	Environmental management in oil and gas exploration and production (UNEP IE, 1997)	The environmental protection measures listed for offshore operations have been considered and adopted as necessary in the activity design and performance standards. This EP addresses the point of undertaking an environmental assessment to identify protected areas and local sensitivities.
	National Light Pollution Guidelines (Commonwealth of Australia, 2020).	With regard to seabirds, these guidelines point to implementing measures in the National Recovery Plan for Threatened Albatrosses and Giant Petrels 2011-2016 (DSEWPaC, 2011a).

		Light emissions are not identified as a threat in National Recovery Plan for Threatened Albatrosses and Giant Petrels 2011-2016 (DSEWPaC, 2011a).
Environmental context	*Marine reserve management plans*	None triggered by these emissions.
	Species Conservation Advice/ Recovery Plans/ Threat Abatement Plans	The National Recovery Plan for Threatened Albatrosses and Giant Petrels 2011-2016 (DSEWPC, 2011) does not list artificial lighting as a key threat. The Recovery Plan for the White Shark (DSWEPC, 2013) does not list artificial lighting as a key threat. The approved conservation advice for the fairy tern (DSEWPC, 2011c) and the draft recovery plan (DoEE, 2019b) do not list artificial lighting as a key threat. Light emissions will be managed in a manner to not impact on the recovery of orange-bellied parrots as per the Orange-bellied parrot Recovery Plan (DELWP, 2016a). There are no recovery plans, conservation advice or listing advice for the common diving-petrel, short-tailed shearwater or wedge-tailed shearwater. The Recovery Plan for Marine Turtles in Australia (DoEE, 2017) is not relevant given the rare sighting of vagrant turtles in Bass Strait.
ESD principles	The EIA presented throughout this EP demonstrates that ESD principles (a), (b), (c) and (d) are met (noting that principle (e) is not relevant).	
Statement of acceptability	*All relevant legislation is met to ensure the vessel meets lighting safety requirements.* Beach believes it has demonstrated that the impacts of light emissions are acceptable because it: • Is adhering to its Environment Policy and EMS; • Has openly engaged with stakeholders to encourage concerns to be raised; • Is complying with relevant legislation; • Has taken relevant industry codes of practice and guidelines into account during activity planning and in formulating control measures; and • Has considered ESD principles.	

Environmental Monitoring

- None required

Record Keeping

- Vessel class certification.

7.2 IMPACT: Atmospheric emissions

7.2.1 Hazards

Atmospheric emissions are generated from combustion engines used on the vessel.

7.2.2 Known and potential environmental impacts

Atmospheric emissions can lead to a change in air quality and an increase in greenhouse gas emission.

Air emissions may impact receptors such as:

- Air quality;
- Seabirds.

7.2.3 EMBA

The EMBA for atmospheric emissions associated with vessel activities is the local air shed – likely to be within hundreds of metres of the vessels, both horizontally and vertically.

Receptors that may occur within this EMBA, either as residents or migrants, are seabirds.

Localised and temporary decrease in air quality from diesel combustion

The combustion of MDO or marine gas oil (MGO) fuel can create continuous or discontinuous plumes of particulate matter (soot or black smoke) and the emission of non-GHG, such as sulphur oxides (SOX) and nitrous oxides (NOX). Inhaling this particulate matter can cause or exacerbate health impacts to humans exposed to the particulate matter, such as offshore personnel or residents of nearby towns (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. In the proposed activity area, this is limited to seabirds overflying the vessel.

Particulate matter released from the vessels is not likely to impact on the health or amenity of the nearest human coastal settlements (e.g., Port Campbell, 65 km away), 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 exhaust points.

Contribution to the GHG effect

The use of fuel to power engines, generators and any mobile/fixed plant will result in gaseous emissions of GHG such as carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O). While these emissions add to the GHG load in the atmosphere, which adds to global warming potential, they are relatively small on a global scale, representing an insignificant contribution to overall GHG emissions. The activity is similar to other industrial activities contributing to the accumulation of GHG in the atmosphere.

The extent of the area of impact is predicted to be localised to the emission point as offshore winds will rapidly disperse atmospheric emission to background levels close to the source for a while the activity is undertaken. The severity is assessed as minor based on emissions will rapidly disperse to background levels close to the emission source and it is unlikely that seabirds would be this close to the emission source.

7.2.4 Impact Assessment

Table 7-3 presents the impact assessment for atmospheric emissions.

Table 7-3. Impact assessment for atmospheric emissions

Summary	
Summary of impacts	Decrease in air quality due to gaseous emissions and particulates from MDO combustion and contribution to the incremental build-up of GHG in the atmosphere (influencing climate change).

Extent of Impact	Localised – local air shed.	
Duration of Impact	Temporary – duration of activity, approximately 2 days (emissions are rapidly dispersed and diluted).	
Level of certainty of impacts	HIGH – the impacts of atmospheric emissions are well known.	
Impact decision framework context	A – nothing new or unusual, represents business as usual, well understood activity, good practice is well defined.	
Impact Consequence (inherent)		
Minor		
Environmental Controls and Performance Measurement		
EPO	EPS	Measurement criteria
Combustion systems operate in accordance with MARPOL Annex VI (Prevention of Air Pollution from Ships) requirements.	Only low-sulphur (<0.5% m/m) MDO will be used in order to minimise SOx emissions.	Bunker receipts verify the use of low-sulphur marine grade diesel.
	All combustion equipment is maintained in accordance with the PMS (or equivalent).	PMS records verify that combustion equipment is maintained to schedule.
	Vessel equipment, systems, fittings, arrangements and materials comply with the applicable requirements of MARPOL Annex VI.	Air Pollution Prevention Certificate (IAPP) is current.
	Vessel implements its Ship Energy Efficiency Management Plan (SEEMP) to monitor and reduce air emissions.	SEEMP records verify energy efficiency records have been adopted.
	Firefighting and refrigeration systems are managed to minimise Ozone Depleting Substances (ODS).	ODS record book is available and current.
Solid combustible waste will only be burned within an incinerator, and only if logistics don't allow for the timely removal of waste from the vessel.	Only a MARPOL VI-approved incinerator is used to incinerate solid combustible waste (food waste, paper, cardboard, rags, plastics).	IMO incinerator certificate verifies the incinerator meets MARPOL requirements.
	Oil and other noxious liquid substances will not be incinerated.	The Oil Record Book and Garbage Record Book verify that waste oil and other noxious liquid substances are transferred to shore for disposal.
Fuel use will be measured, recorded and reported.	Fuel use will be measured, recorded and reported for abnormal consumption, and in the event of abnormal fuel use, corrective action is taken to minimise air pollution.	Fuel use is recorded in the daily operations reports.
Preventative maintenance shall be undertaken to ensure combustible equipment is in good working order.	Combustion equipment is maintained in accordance with manufacturer's specification as detailed within the preventative maintenance system	Maintenance records for combustible equipment are current and completed to date.
Impact Consequence (residual)		

<table>
<tr><th colspan="2">Minor</th></tr>
<tr><th colspan="2">Alternative controls considered but not adopted</th></tr>
<tr><td>Eliminate use of MDO.</td><td>This would not allow the activity to take place.</td></tr>
<tr><td>No incineration on vessels.</td><td>Incineration of wastes on vessels using MARPOL-certified equipment and procedures is an accepted practice, which avoids potentially greater impact through transport, treatment and disposal onshore. Incineration also saves space on board and may prevent health hazards created by long-term storage of wastes pending onshore disposal.</td></tr>
<tr><th colspan="2">Demonstration of ALARP</th></tr>
<tr><td colspan="2">A ‘minor’ residual impact consequence is considered to be ALARP and a ‘lower order’ impact. An ALARP analysis is therefore not required.</td></tr>
</table>

<table>
<tr><th colspan="3">Demonstration of Acceptability</th></tr>
<tr><td>Policy compliance</td><td colspan="2">Beach Environment Policy objectives are met.</td></tr>
<tr><td>Management system compliance</td><td colspan="2">The proposed management of the impact is aligned with the Beach Environment Policy.
Activities will be undertaken in accordance with the Implementation Strategy (Chapter 8).</td></tr>
<tr><td>Stakeholder engagement</td><td colspan="2">Stakeholder consultation has been undertaken (see Chapter 9), with no concerns expressed regarding atmospheric emissions.</td></tr>
<tr><td>Legislative context</td><td colspan="2">The performance standards outlined in this EP align with the requirements of:
• Navigation Act 2012 (Cth):
  ○ Chapter 4 (Prevention of Pollution).
• Protection of the Sea (Prevention of Pollution by Ships) Act 1983 (Cth):
  ○ Part IIID (Prevention of Air Pollution).
  ○ AMSA Marine Orders Part 97 (Air Pollution), enacting MARPOL Annex VI (especially Regulations 6, 14, 16).</td></tr>
<tr><td rowspan="3">Industry practice</td><td colspan="2">The consideration and adoption of the controls outlined in the below-listed codes of practice and guidelines demonstrates that BPEM is being implemented for this activity.</td></tr>
<tr><td>Environmental, Health and Safety Guidelines for Offshore Oil and Gas Development (World Bank Group, 2015)</td><td>Guidelines met with regard to:
• Air emissions (item 11). The overall objective to reduce air emissions.
• Air emissions (item 12). During equipment selection, air emission specifications should be considered, as should the use of very low sulphur content fuels and/or natural gas.</td></tr>
<tr><td>APPEA CoEP (2008)</td><td>Objectives regarding atmospheric emissions from offshore activities are:
• To reduce GHG emissions to ALARP and an acceptable level.
The EPS listed in this table meet these objectives.</td></tr>
</table>

	Environmental management in oil and gas exploration and production (UNEP IE, 1997)	The environmental protection measures listed for offshore operations have been considered and adopted as necessary in the activity design and performance standards. This EP addresses the point of undertaking an environmental assessment to identify protected areas and local sensitivities.
Environmental context	*Marine reserve management plans*	None triggered by these emissions.
	Species Conservation Advice/ Recovery Plans/ Threat Abatement Plans	The National Recovery Plan for Threatened Albatrosses and Giant Petrels 2011-2016 (DSEWPC, 2011) lists climate change as a key threat, though the most pervasive threat is accidental mortality and injury from interactions with fishing activities.
ESD principles	The EIA presented throughout this EP demonstrates that ESD principles (a), (b), (c) and (d) are met (noting that principle (e) is not relevant).	
Statement of acceptability	*All relevant legislation and industry guidelines are met to reduce the volume of atmospheric emissions.* Beach energy believes it has demonstrated that the impacts of atmospheric emissions are acceptable because it: • Is adhering to Beach's Environment Policy and EMS; • Has openly engaged with stakeholders to encourage concerns to be raised; • Is complying with relevant legislation; • Has taken relevant industry codes of practice and guidelines into account during activity planning and in formulating control measures; and • Has considered ESD principles.	
Environmental Monitoring		
• Fuel use		
Record Keeping		
• Vessel PMS records. • Vessel fuel use records. • Vessel bunkering receipts. • Waste manifests (for incineration). • ODS record book. • Oil record book. • Garbage record book. • Activity-specific discharges and emissions register.		

7.3 IMPACT: Underwater noise emissions

7.3.1 Hazards

During normal operations the vessel will generate continuous noise from propeller cavitation, thrusters, hydrodynamic flow around the hull, and operation of machinery and equipment.

7.3.2 Known and potential environmental impacts

Underwater noise emissions from the vessels may impact biological receptors such as:

- Fish (with and without swim bladders) including commercial species such as sharks and scalefish;
- Marine reptiles; and
- Marine mammals.

Potential impacts of underwater noise emissions from the vessel are:

- Behavioural changes; and
- Auditory impairment, permanent threshold shift (PTS) and temporary threshold shift (TTS).

7.3.3 EMBA

The AHTS vessel will use DP to maintain position. Anchor handling vessels can generate sound at levels between 108 and 182 dB re 1 μPa @ 1 m at dominant frequencies between 50 Hz and 7 kHz (Simmonds et al., 2004; McCauley, 1998). Studies of underwater noise generated from a DP anchor handling vessel indicate highest measured levels up to 137 dB re 1 μPa, at 405m with levels of 120 dB re 1 μPa recorded at 3.5 km when the vessel was maintaining position beside the rig for loading purposes (McCauley, 1998). When underway at 12 knots (22 km/h) vessel noise of 120 dB re 1 μPa was recorded at 0.5 – 1 km.

The EMBA for underwater sound from the vessel is unlikely to be beyond hundreds of metres from the sound source, as outlined in this chapter.

Receptors that are known to occur or may occur within the underwater sound EMBA, either as residents or migrants, are:

- Benthic species;
- Pelagic species (plankton, fin fish);
- Cetaceans; and
- Pinnipeds.

7.3.4 Evaluation of Impacts

Activities that generate underwater sound can affect marine fauna by interfering with aural communication, eliciting changes in behaviour and, potentially, causing either acute or chronic physiological damage. Various studies have investigated the effects of seismic sound upon a range of marine biota and generally concluded that, although a sound source may pose a potential risk to individuals in very close proximity to the source, the transitory nature of vessel operations and the limited range over which possible effects can occur make it unlikely that vessel noise poses a significant hazard to populations of marine species (McCauley et al., 2000a; Wardle et al., 2001; Gausland, 2000; Thomson et al, 2014).

Vessel sound

The vessel will generate low levels of sound. This is generated from propeller cavitation (the dominant sound source), hydrodynamic flow around the hull and from onboard machinery (Popper et al., 2014).

It is unlikely that engine sound levels will be greater than that of any other similarly-size vessel normally operating in the area (such as vessels supporting the offshore oil and gas operations in the area, recreational vessels, and merchant vessels travelling in the nearby shipping fairway, see Section 5.6.1).

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 between investigation sites, 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); and
- 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 have been recorded at levels of up to 182 dB re 1µPa at 1 m (McCauley, 1998). Under this mode of operation, McCauley (1998) measured underwater broadband noise of approximately 137 dB re 1µPa at 405 m. Levels of 120 dB re 1 µPa extended for a distance of approximately 3-5 km from the source, depending on water depth, seabed composition and other factors.

Under normal operating conditions when the vessel is idling or moving between sites, vessel noise would be detectable over only a short distance. For example, Woodside (2003) found that vessel noise levels rarely (<1% of the time) exceeded a threshold of 120 dB re 1 µPa (i.e., around the typical ambient underwater sound intensity in the activity area) from an acoustic monitoring site 5.1 km from the source when a drilling support vessel was holding position using DP bow thrusters.

The environmental significance of acoustic disturbances arising from the vessel during this activity is considered to be negligible because:

- The activity will be of very short duration (a few days);
- The activity will be undertaken over a very small area;
- The presence of threatened cetaceans in the region is known to be low;
- There are no sensitive ecosystems in the activity area, such as reefs or kelp forests;
- There are no beds of commercial scallops or habitat for southern rock lobster in the activity area;
- Benthic sensitivities in and around the activity area are sparse;
- Fish species known to occur in the region are common and widely distributed and are likely to experience only temporary displacement from habitat (thus avoiding physiological effects); and
- There is no spatially-limiting habitat for the fin fish and benthic species known to occur in the activity area (i.e., the sandy seabed habitats are widespread through the shallow waters of eastern Bass Strait).

Temporary and permanent threshold shifts are very unlikely to occur in any marine species as a result of vessel operations.

The sounds produced by the vessel during this activity will not be outside the range of other vessels operating in the region (see Table 5.5) and ambient underwater sound of the activity area (see Table 5.6).

Marine Mammals

PTS and TTS

The US National Marine Fisheries Service (NMFS 2018) reviewed available literature to determine exposure criterion for temporary hearing threshold shift (TTS) and injury, referred to as the onset of non-recoverable permanent hearing loss (permanent threshold shift [PTS]) for marine mammals based on their frequency hearing range. The NFMS (2018) exposure criteria are based on a cumulative sound exposure levels over a period of 24 hours and are detailed in Table 7-1.

Jasco Applied Sciences undertook modelling for an offshore support vessel (typical of the type that would be used for the anchor installation activity) for Woodside's Browse to North West Shelf Project (Woodside, 2019). Modelling was undertaken for two locations in water depths of 463 m and 515 m. Noise levels from the support vessel are likely to be about 137 dB re 1 µPa at 405 m.

SVT undertook modelling for a MODU and offshore support vessel typical of the type that would be used for the activity (Shell, 2018). Modelling was undertaken for three locations in water depths of 152 m to 192 m. The cetacean PTS and TT criteria were not reached under any modelled scenarios.

Though the water depths at the modelled locations for both the Woodside and Shell projects are deeper than at the TN-1 and TW-1 locations (100 m – 105 m), this would lead to an overestimate of the received noise levels as propagated noise levels may be higher in deeper water for the same source. SVT (Shell, 2018) details that:

the propagation of noise through the water is dependent upon a number of environmental factors. The depth of the water limits the lowest frequency of noise that can propagate, the deeper the water the lower the cut-off frequency. Because of this, propagated noise levels may be higher in deeper water for the same source.

Thus, the results of the Woodside and Shell projects modelling for the support vessel can be applied to the activity with confidence as they:

- Are in deeper water and hence more likely to be an overestimate in distance to received levels.
- Used a source level of 183 dB re 1 µPa @ 1 m, which is at the higher range of source level for a DP support vessel based on the fact that support vessels can generate sound at levels between 108 and 182 dB re 1 µPa @ 1 m at dominant frequencies between 50 Hz and 7 kHz (Simmonds et al., 2004; McCauley, 1998).

Thus, for the assessment the modelling results in Table 7-1 are used with:

- PTS criteria being reached at 60 m from the vessel within an area of 0.01 km^2.
- TTS criteria being reached at 400 m from the vessel within an area of 0.5 km^2.

Table 7-1: Cetacean noise criteria and predicted distances

Hearing group	**Threshold** Weighted SEL_{24h} ($L_{E,24h}$; dB re 1 µPa^2·s)	**R_{max} km**	**Area km^2**
PTS			
Low-frequency cetaceans	199	0.06	0.01
Mid-frequency cetaceans	198	-	-
High- frequency cetaceans	173	0.07	0.02
TTS			
Low-frequency cetaceans	179	0.40	0.50
Mid-frequency cetaceans	178	0.06	0.01
High- frequency cetaceans	153	0.86	2.32

Table 7-2 details the marine mammals that may be undertaking biologically important behaviours, such as calving, foraging, resting or migration (as defined by Commonwealth of Australia, 2015c), that could result in them being within the ensonification area above the PTS and TTS criteria (0.86 km) for a period of 24 hrs or greater. These were identified from the PMST report and BIAs (Table). As only low-frequency cetaceans were identified, the furthest distance to the low- frequency PTS and TTS criteria of 400 m and the associated area of 0.50 km^2 (Table 7-1) will be used for the consequence evaluation.

Table 7-2: Marine mammal species with biologically important behaviours within the PTS and TTS ensonification area

Species	Biologically Important Behaviour
Blue whale	Foraging, feeding or related behaviour known to occur within area.
	Foraging BIA
Fin whale	Foraging, feeding or related behaviour known to occur within area.
	No BIAs
Pygmy right whale	Foraging, feeding or related behaviour likely to occur within area.
	No BIAs
Sei whale	Foraging, feeding or related behaviour known to occur within area.
	No BIAs

Foraging behaviour for the blue, fin, pygmy right and sei whales has been identified as potentially occurring within the area where the PTS and TTS criteria is reached. As detailed in Section 5.7.7.6, cetacean foraging within the Otway shelf, and hence the area where the PTS and TTS criteria is reached, is typically from January to April which overlaps the period when vessel activities may occur.

The Conservation Management Plan for the Blue Whale (Commonwealth of Australia, 2015c) details that anthropogenic noise in BIAs will be managed such that any blue whale continues to utilise the area without injury and is not displaced from a foraging area. The conservation plan identifies shipping and industrial noise, which includes drilling activities, as a threat that is classed as a minor consequence which is defined as individuals are affected but no affect at a population level. The conservation plan details that given the behavioural impacts of noise on pygmy blue whales are largely unknown, a precautionary approach has been taken regarding assignation of possible consequences.

The area of impact is small with the worst case being a zone of impact 0.4 km from a vessel. Thus, at any one time, the area of impact would be ~0.5 km^2 which equates to ~0.001% of the pygmy blue whale high density foraging BIA (35,627 km^2).

The fin, pygmy blue and sei whales do not have conservation management plans. The fin and sei whales have conservation advice (TSSC, 2015f; TSSC, 2016g) which both identify anthropogenic noise as a threat with the conservation and management actions of:

- Once the spatial and temporal distribution (including BIAs) of sei whales is further defined, an assessment of the impacts of increasing anthropogenic noise (including from seismic surveys, port expansion, and coastal development) should be undertaken on this species.
- If required, additional management measures should be developed and implemented to ensure the ongoing recovery of sei whales.

The fin and sei whales conservation advice (TSSC, 2015f; TSSC, 2016g) have a consequence rating for anthropogenic noise and acoustic disturbance as 'minor' with the extent over which the threat may operate as 'moderate'-'large'. There is no conservation advice for the pygmy right whale and the Species Profile and Threats (SPRAT) Database (DoEE, 2020a) does not identify anthropogenic noise and acoustic disturbance as a threat.

The extent of impact is predicted to be ~0.001% of the pygmy blue whale high density foraging BIA for a duration of several days while anchoring activities are undertaken.

- Though the activity is likely during the period when pygmy blue whales are likely to be foraging within the BIA (January through to April (Gill et al., 2011), the area of potential impact within the BIA is very small, at any one time being ~0.001% of the pygmy blue whale high density foraging BIA.
- The Conservation Management Plan for the Blue Whale (Commonwealth of Australia, 2015c) details that shipping and industrial noise are classed as a minor consequence for which the definition is: individuals are affected but no affect at a population level.
- The Conservation Management Plan for the Blue Whale (Commonwealth of Australia, 2015c) details that "It is the high intensity signals with high peak pressures received at very short range that can cause acute impacts such as injury and death." As vessel noise are continuous noise sources and do not have high intensity signals it is unlikely that they would cause injury to foraging pygmy blue whales.
- The fin and sei whales conservation advice (TSSC, 2015f; TSSC, 2016g) have a consequence rating for anthropogenic noise and acoustic disturbance as minor with the extent over which the threat may operate as moderate-large.
- The pygmy right whale SPRAT Database (DoEE, 2020a) in lieu of no conservation advice, does not identify anthropogenic noise and acoustic disturbance as a threat.
- The seabed survey undertaken by Fugro (2019) did not identify any seabed features that would provide for upwellings where congregations of krill are likely to occur.

Behaviour

The current interim NFMS (2014) criterion of 120 dB re 1 µPa for non-impulsive sound sources such as vessels is used as the marine mammal behavioural criteria for this assessment as it represents a conservative criterion as. Southall et al. (2007) reviewed an extensive review of literature and studies in relation to marine mammal behavioural response to impulsive (seismic, pile driving) and non-impulsive (drilling, vessels) found that most marine mammals exhibited varying responses between 140 and 180 dB re 1 µPa.

Marine Turtles

The Recovery Plan for Marine Turtles in Australia (Commonwealth of Australia, 2017b) identifies noise interference as a threat to turtles. It details that exposure to chronic (continuous) loud noise in the marine environment may lead to avoidance of important habitat.

Popper et al. (2014) details that there is no direct evidence of mortality or potential mortal injury to sea turtles from ship noise.

There are currently no quantitative exposure guideline or criteria for marine turtles for continuous sound such as those generated by vessels. Popper et al. (2014) found that there was insufficient data available and instead suggested general distances to assess potential impacts. Using semi-quantitative analysis, Popper et al. (2014) suggests that there is a low risk to marine turtles from shipping and continuous sound except for TTS near (tens of metres) to the sound source, and masking at near, intermediate (hundreds of metres) and far (thousands of metres) distances and behaviour at near and intermediate distances from the sound source. Based on this information avoidance behaviour may occur within the operational area (2 km).

Three marine turtle species may occur within the activity area though no BIAs or habitat critical to the survival of the species were identified.

The extent of the area of impact is predicted to be within the operational area for a duration of several days while the vessel is on location. The severity is assessed as minor based on:

- The Recovery Plan for Marine Turtles in Australia (Commonwealth of Australia, 2017b) details that exposure to chronic (continuous) loud noise in the marine environment may lead to avoidance of important habitat and no marine turtle important habits are located within the area that maybe impacted.
- Avoidance behaviour may occur within the operational area where no marine turtle important habits are located.
- Low numbers of marine turtles are predicted in the operational area and therefore impacts would be limited to a small number of individuals.

Fish

Popper et al. (2014) details that there is no direct evidence of mortality or potential mortal injury to fish from ship noise. Popper et al., (2014) details that risks of mortality and potential mortal injury, and recoverable injury impacts to fish with no swim bladder (sharks) is low and that TTS in hearing may be a moderate risk near (tens of metres) the vessel. For fish with a swim bladder risks of mortality and potential mortal injury impacts is low. No cumulative impacts are expected as there are no habitats likely to support site-attached fish in the operational area.

Behavioural impacts are more likely such as moving away from the vessels. There are no habitats or features within the operational area that would restrict fish and sharks from moving away from the vessels.

The activity area is within a distribution BIA for the white shark though no habitat critical to the survival of the species or behaviours were identified. The Recovery Plan for the White Shark (*Carcharodon carcharias*) (DSEWPaC, 2013a) does not identify noise impacts as a threat.

No commercial fishing for fish species were identified within the operational area. Thus, impacts to commercial fisheries are not predicted.

The extent of the area of impact is predicted to be within the operational area for a duration of up to 2 days while the vessels are on location. The severity is assessed as minor based on:

- The Recovery Plan for the White Shark (*Carcharodon carcharias*) (DSEWPaC, 2013a) does not identify noise impacts as a threat.
- Avoidance behaviour may occur within the operational area, however, no habitats likely to support site-attached fish have been identified within the operational area.
- No commercial fishing occurs within the operational area.

7.3.5 Impact Assessment

Table 7-6 presents the impact assessment for underwater sound impacts to marine fauna.

Table 7-6. Underwater sound EIA – biological receptors

Summary	
Summary of impacts	Physiological or pathological impacts to local populations of marine fauna and avifauna.
Extent of Impact	Minor area affected localised from vessel location
Duration of Impact	Underwater sound generation will be of a short duration.

Level of certainty of impacts	HIGH - vessel sound levels are well known.
Impact decision framework context	A – nothing new or unusual, represents business as usual, well understood activity, good practice is well defined. Vessel operations are ubiquitous and are well regulated in Australia.

Impact Consequence (inherent)	
Receptor	Consequence rating
Marine Mammals	Minor
Fish	Minor
Turtles	Minor

Environmental Controls and Performance Measurement		
EPO	EPS	Measurement criteria
Maintain safe operating distance from cetaceans to avoid impact	In accordance with EPBC Regulations 2000 – Part 8 Division 8.1 interacting with cetaceans, vessels maintain a safe operating distance of at least 500m from cetaceans.	Copies of sighting reports are maintained to verify reports were made and distance from cetaceans maintained. Any whale sightings will be recorded using the DAWE sighting sheets.
Vessel engines and thrusters are well maintained.	Engines and thrusters are maintained in accordance with manufacturer's instructions via the Planned Maintenance System (PMS) to ensure they are operating efficiently.	PMS records verify that engines and thrusters are maintained to schedule.

Impact Consequence (residual)	
Receptor	Consequence rating
Marine Mammals	Minor
Fish	Minor
Turtles	Minor

Alternative controls considered but not adopted	
MMOs stationed on support vessels. Use of dedicated vessels for MMO.	In light of the activity timed to occur outside of the known southern right whale aggregation and migration period (along with aggregation area), and the location of the activity outside of a defined pygmy blue whale migration route and foraging area, CarbonNet does not consider it necessary to station additional MMOs on support vessels, or to contract vessels dedicated specifically to MMO duties, to monitor the observation zone.

Demonstration of ALARP
A 'minor' residual impact consequence is considered to be ALARP and a 'lower order' impact. An ALARP analysis is therefore not required.

Demonstration of Acceptability	
Policy compliance	Beach Environment Policy objectives are met.
Management system compliance	The proposed management of the impact is aligned with the Beach Environment Policy.

<table>
<tr><td></td><td colspan="2">Activities will be undertaken in accordance with the Implementation Strategy (Chapter 8).</td></tr>
<tr><td>Stakeholder engagement</td><td colspan="2">There have been no stakeholder objections or claims regarding noise emissions.</td></tr>
<tr><td>Legislative context</td><td colspan="2">The performance standards outlined in this EP align with the requirements of:
• EPBC Act 1999 (Cth):
o Section 229, 229A – all cetaceans protected in Australian waters, and it is an offence to kill, injure or interfere with a cetacean.</td></tr>
<tr><td rowspan="4">Industry practice</td><td colspan="2">The consideration and adoption of the controls outlined in the below-listed codes of practice and guidelines demonstrates that BPEM is being implemented for this activity.</td></tr>
<tr><td>Environmental, Health and Safety Guidelines for Offshore Oil and Gas Development (World Bank Group, 2015)</td><td>Guidelines met with regard to:
Noise (item 74). The preparation of this EP meets the objectives of these guidelines, whereby sensitive areas for marine life are identified, and soft-start and stop procedures are in place when marine mammals are sighted within 500 m of the activity.</td></tr>
<tr><td>APPEA CoEP (2008)</td><td>Objectives regarding underwater sound from offshore vessel operations are:
• Reduce the impact on cetaceans and other marine life to ALARP and an acceptable level.
• To reduce the impacts to benthic communities to ALARP and an acceptable level.
The performance standards listed in this table meet these objectives.</td></tr>
<tr><td>Environmental management in oil and gas exploration and production (UNEP IE, 1997)</td><td>The environmental protection measures listed for offshore seismic operations have been considered and adopted as necessary in the activity design and performance standards. This EP addresses the point of undertaking an environmental assessment to identify protected areas and local sensitivities.</td></tr>
<tr><td rowspan="2">Environmental context</td><td>Marine reserve management plans</td><td>Not applicable.</td></tr>
<tr><td>Species Conservation Advice/ Recovery Plans/ Threat Abatement Plans</td><td>The Conservation Management Plan for the Blue Whale (DoE, 2015b) and the Conservation Management Plan for the Southern Right Whale (DSEWPC, 2012b) identify noise interference as a threat to both species. The plans state that the risk of physical impacts is minimised by the implementation of EPBC Act policy Statement 2.1, which this activity is implementing.
The Recovery Plan for the White Shark (DSEWPC, 2013) does not list anthropogenic sound as a threat to this species.
The Recovery Plan for Marine Turtles in Australia (DoEE, 2017k) identifies noise interference as a threat to turtles. This is not triggered by this activity given the absence of turtle BIAs in the EMBA.</td></tr>
</table>

		The National Recovery Plan for Threatened Albatross and Giant Petrels 2011-16 (DSEWPC, 2011) does not list noise pollution as a threat.
ESD Principles	The EIA presented throughout this EP demonstrates that ESD principles (a), (b), (c) and (d) are met (noting that principle (e) is not relevant).	
Statement of acceptability	Beach believes it has demonstrated that the impacts of underwater sound on biological receptors are acceptable because it: • Is adhering to Beach's Environment Policy and EMS; • Has openly engaged with stakeholders and considered information they provided when determining the timing of the activity and adopting commensurate control measures; • Is complying with relevant legislation and industry best practice; • Has taken relevant marine reserve and species management plans into account when determining control measures; and • Has considered ESD principles.	
Environmental Monitoring		
• Cetacean observations during activity by vessels.		
Record Keeping		
• Incident reports. • Cetacean Sighting reports		

7.4 IMPACT: Physical presence of vessel

7.4.1 Hazards

The AHTS vessel will be on location for several days (and up to a week, at worst). The mooring equipment will be located on the seabed out to 2 km from the well location.

7.4.2 Known and potential environmental impacts

The physical presence of the AHTS vessel will not displace any other marine users such as:

- Recreation and tourism
- Commercial shipping
- Petroleum activities
- Commercial fishing

7.4.3 Consequence evaluation

Recreation and tourism

Due to the long distance from shore (66 - 68 km) and the fact that there are no emergent features within the operational area, recreational fishing and tourism is unlikely.

Commercial shipping

The operational area in intersected by a major shipping route (Section 5.8.4), however vessel activities associated with the Otway Gas Development have been ongoing for over 10 years and to date there has been no interactions or incidents. As such, it is unlikely that a single AHTS vessel's presence in the operational area for up to a week will have any negative consequences for shipping.

Petroleum activities

The nearest other oil and gas activity occuring at the same time as the anchoring activity is the operation of the Geographe-Thylacine gas pipeline, operated by Beach. The pipeline is 2.8 km away from the anchoring activity. Displacement impacts to other petroleum activities is not predicted.

Commercial fishing

AFMA detailed that there are currently no active vessels in Commonwealth fisheries within the operational area (Stakeholder Record AFMA 02). Therefore, no interactions with fisheries vessels of activities are anticipated.

Stakeholders have raised concerns in relation to displacement of their fishing activities during the Otway development drilling and well abandonment project. The extent of displacement is the operational area (2 km radius) for a duration of up to a week (likely just several days). The severity is assessed as minor based on:

- Small area of displacement (12.6 km^2) around the given Thylacine well (TN-1 or TW-1) for several days.
- No trawl or gill net fishing occurs in the operational areas.
- No habitat that would support rock lobsters has been identified in the operational area.
- Limited fishing has been identified within the operational area.

Via stakeholder engagement it has been agreed that any displacement impacts can be managed based on:

- Look-ahead information will be provided to fishers allowing them to plan their fishing activity to avoid when the vessels will be on location.
- Operating protocol developed and provided to those fishers that potentially fish at the well locations to minimise impacts to fishers.
- Beach has detailed in its Commercial Fisher Operating Protocol provided to potentially impacted fishers that fishers should not suffer an economic loss as a result of Beach's activities. Should a fisher incur additional costs in order to work around Beach's activities, or if they have lost catch or have damaged equipment Beach will assess the claim and ask for evidence including past fishing history and the loss incurred and, where the claim is genuine, will provide compensation. Beach will also ensure that the evidence required is not burdensome on the fisher while ensuring genuine claims are processed.

7.4.4 Impact Assessment

Table 7-7 presents the impact assessment for the physical presence of the AHTS vessel.

Table 7-7. Impact assessment for the physical presence of the AHTS vessel

Summary	
Summary of impacts	The physical presence of the AHTS vessel may displace other marine users.
Extent of impacts	Localised.
Duration of impacts	Up to a week.

Level of certainty of impacts	HIGH - Fishing activity in the activity area is well understood.
Impact decision framework context	A - nothing new or unusual, represents business as usual, well understood activity, good practice is well defined.

Impact Consequence (inherent)

Receptor	Consequence rating
Recreation and tourism	Minor
Commercial shipping	Minor
Petroleum activities	Minor
Commercial fishing	Minor

Environmental Controls and Performance Measurement

EPO	EPS	Measurement criteria
The location and timing of the activity will be communicated to local marine users.	Advice to AHO is provided at least two weeks prior to the activity commencing.	Copies of notifications are available.
		Notice to Mariners listing the vessel name and location is issued prior to the activity commencing.
	A look-ahead notification is issued to fisheries stakeholders who operate in the activity area at least two weeks prior to the activity commencing.	AusCoast warnings listing the vessel's location is issued by AMSA.
		Consultation database and emails verify that notifications were issued at least two weeks prior to the activity commencing.
Fishers' claims are promptly addressed.	Commercial fisher claims are handled in accordance with the Beach Commercial Fisher Operating Protocol.	Consultation database verifies that claims were addressed in accordance with the protocol in a timely manner.

Impact Consequence (residual)

Receptor	Consequence rating
Recreation and tourism	Minor
Commercial shipping	Minor
Petroleum activities	Minor
Commercial fishing	Minor

Alternative controls considered but not adopted

Not applicable.

Demonstration of ALARP

A 'minor' residual impact consequence is considered to be ALARP and a 'lower order' impact. An ALARP analysis is therefore not required.

Demonstration of Acceptability

Policy compliance	Beach's Environment Policy objectives are met

<table>
<tr><td>Management system compliance</td><td colspan="2">The proposed management of the impact is aligned with the Beach Environment Policy.
Activities will be undertaken in accordance with the Implementation Strategy (Chapter 8).</td></tr>
<tr><td>Stakeholder engagement</td><td colspan="2">Commercial fisheries concerns have been raised about the presence of vessels in the operational area (for the broader drilling campaign). This has led to Beach developing a Commercial Fisher Operating Protocol.</td></tr>
<tr><td>Legislative context</td><td colspan="2">The EPS outlined in this EP align with the requirements of:
• OPGGS Act 2006 (Cth):
○ Section 460 (Interference with other rights) – a person carrying on activities in an offshore permit … must carry on those activities in a manner that does not interfere with navigation, fishing, conservation of the resources of the sea and seabed (and other matters)…….to a greater extent than is necessary for the reasonable exercise of the rights and performance of the duties of the person.</td></tr>
<tr><td rowspan="4">Industry Practice</td><td colspan="2">The consideration and adoption of the controls outlined in the below-listed guidelines and codes of practice demonstrates that BPEM is being implemented.</td></tr>
<tr><td>Environmental, Health and Safety Guidelines for Offshore Oil and Gas Development (World Bank Group, 2015)</td><td>Guidelines met with regard to:
• Ship Collision (item 120). To avoid collisions with third-party and support-vessels, offshore facilities should be equipped with navigational aids that meet national and international requirements.
• Ship Collision (item 121). The relevant maritime, port, or shipping authority should be notified of all permanent offshore facilities, as well as safety zones.
• Ship Collision (item 122). A subsea pipeline corridor safety zone should be established to define anchoring exclusion zones and provide protection for fishing gear.</td></tr>
<tr><td>APPEA CoEP (2008)</td><td>The EPS listed in this table meet the following offshore drilling objectives:
• To reduce the impact on other marine resource users to ALARP and to an acceptable level.
• To reduce risks to public safety to ALARP and an acceptable level.</td></tr>
<tr><td>Environmental management in oil and gas exploration and production (UNEP IE, 1997)</td><td>The environmental protection measures listed for offshore development and production operations in Table 5 of the guidelines have been considered in the development of the EPS listed in this table.</td></tr>
<tr><td>Environmental context</td><td>Marine reserve management plans</td><td>None triggered by this hazard.</td></tr>
</table>

	Species Conservation Advice/ Recovery Plans/ Threat Abatement Plans	None triggered by this hazard.
ESD Principles	The EIA presented throughout this EP demonstrates that ESD principles (a), (b), (c) and (d) are met (noting that principle (e) is not relevant).	
Statement of acceptability	Beach believes it has demonstrated that the impacts of physical presence on recreational and commercial receptors are acceptable because it: • Is adhering to Beach's Environment Policy and EMS; • Has openly engaged with stakeholders and considered information they provided when determining the timing of the activity and adopting commensurate control measures; • Is complying with relevant legislation and industry best practice; • Has taken relevant marine reserve and species management plans into account when determining control measures; and • Has considered ESD principles.	
Environmental Monitoring		
• Not applicable.		
Record Keeping		
• Stakeholder consultation database. • Notices to Mariners.		

7.5 IMPACT: Seabed disturbance

7.5.1 Hazards

Seabed disturbance will occur where there is interaction with the seabed from the anchors and mooring chains for the period of time this equipment is 'wet parked'.

Note that anchoring activities (the process of holding the drill rig on location) are addressed in the Otway Development Drilling and Well Abandonment EP (CDN/ID S4100AH717905) and are not addressed here.

7.5.2 Known and potential environmental impacts

Seabed disturbance will impact on benthic habitats and fauna through smothering and alteration of habitat and localised and temporary increases in suspended sediments near the seabed while the anchors and mooring lines are installed.

7.5.3 Consequence evaluation

The extent of the benthic disturbance is estimated to be up to 1,152 m^2 (0.11 ha) if eight anchors are used, or up to 1,728 m^2 (0.17 ha) if 12 anchors are used (see also Table 4-3).

The October 2019 seabed surveys undertaken around the proposed Thylacine well locations (Fugro, 2019) identified:

- The seabed topography is dominated by exposed rock on the seabed;
- Small patches of very thin transgressive coarse sand are present across the survey area;
- The seabed showed a scattered sessile biota on a sandy seafloor; and

- No rocky reefs or outcrops were identified.

The operational areas overlap the Shelf Rocky Reefs and Hard Substrates KEF. No threatened ecological communities or habitats critical to the survival of the species are identified within the operational area. The Shelf Rocky Reefs and Hard Substrates KEF is in all areas of the SEMR continental shelf including Bass Strait, from the sub-tidal zone shore to the continental shelf break. The seabed survey (Fugro, 2019) identified that the substrate was hard substrate but did not identify rocky reefs.

NERA (2018) detailed that during anchoring activities, there is also potential for soft sediments to be suspended into the water column, which has the potential to affect benthic communities through a decrease in water quality or light penetration near the seabed. NERA (2018) surmised that given the hydrodynamics in open ocean areas, the area of decreased water quality is expected to be localised and temporary, as sediments would settle out of the water column relatively quickly. The seabed in the operational area consists of a sandy floor within an open ocean area thus impacts in relation to suspended sediments from benthic disturbance would be on a similar localised temporary scale or less as identified by NERA (2018).

There is limited information on the recovery of benthic habitats after the removal of anchors and other equipment. As the affected areas are expected to be like the surrounding seabed, it would be expected that once the anchors and mooring chains are removed, seabed sediments would begin to fill the area of disturbance and that re-colonisation of benthic organisms would occur. This could take months to a year or more but is unlikely to have lasting effects.

The extent of the area of impact is predicted to be up to 1,728 m^2 (0.17 ha) for a duration of up to months to years while the disturbed area recolonises. The severity is assessed as minor based on:

- The small area of impact;
- There being no sensitive or protected benthic habitat or species, including commercial invertebrate species, in the operational area; and
- There being no impediment to the disturbed areas recolonising as the benthic habitat and associated biota is uniform in the broader region.

7.5.4 Impact Assessment

Table 7-8 presents the impact assessment for seabed disturbance.

Table 7-8. Impact assessment for seabed disturbance

Summary	
Summary of impacts	Localised turbidity of the water column at the seabed, smothering of seabed habitat by anchoring activities, seabed damage and displacement of a small area of seabed habitat.
Extent of impact	Localised – around individual points of disturbance.
Duration of impact	Temporary – returning to pre-impact condition months after impact.
Level of certainty of impacts	HIGH – the impacts of seabed disturbance are well known.
Impact decision framework context	A – nothing new or unusual, represents business as usual, well understood activity, good practice is well defined.
Impact Consequence (inherent)	
Minor	

Environmental Controls and Performance Measurement		
EPO	EPS	Measurement criteria
Avoid anchoring on seabed of high biodiversity value.	A site survey has been undertaken of operational area to identify rocky reefs or outcrops that are typically of high biodiversity value and habitat for rock lobsters. No rocky reefs or outcrops were identified	Site survey report is on file.
	The mooring analysis is undertaken to ensure the anchor and anchoring pattern is appropriate for the seabed type. It ensures there is no slippage of the anchors that can result in increased benthic disturbance.	Mooring analysis is completed and on file.
Seabed disturbance is limited to the operational area.	All mooring equipment shall be within the operational area (within 2 km of the TN-1 or TW-1 well). Mooring equipment will not be deployed outside the area that has been previously surveyed.	Mooring plan in place and current
Impact Consequence (residual)		
Minor		
Alternative controls considered but not adopted		
Not applicable.		
Demonstration of ALARP		
A 'minor' residual impact consequence is considered to be ALARP and a 'lower order' impact. An ALARP analysis is therefore not required.		

Demonstration of Acceptability		
Policy compliance	Beach Environment Policy objectives are met	
Management system compliance	The proposed management of the impact is aligned with the Beach Environment Policy. Activities will be undertaken in accordance with the Implementation Strategy (Chapter 8).	
Stakeholder engagement	Stakeholder consultation has been undertaken, with no concerns expressed regarding seabed disturbance.	
Legislative context	There are no legislative controls regarding seabed disturbance.	
Industry Practice	The consideration and adoption of the controls outlined in the below-listed codes of practice and guidelines demonstrates that BPEM is being implemented for this activity.	
	Environmental, Health and Safety Guidelines for Offshore Oil and Gas Development (World Bank Group, 2015)	No guidance is provided regarding seabed disturbance.
	APPEA CoEP (2008)	Objectives regarding seabed disturbance from offshore drilling are:

		• To reduce the impacts to benthic communities to acceptable levels and to ALARP. The EPS listed in this table meet these objectives.
	Environmental management in oil and gas exploration and production (UNEP IE, 1997)	The environmental protection measures listed for offshore exploration and appraisal operations in Table 5 of the guidelines specifies that site selection considers ecological sensitivities. This has been considered in the development of the EPS listed in this table.
Environmental context	*Marine reserve management plans*	Not triggered by this impact.
	Species Conservation Advice/ Recovery Plans/ Threat Abatement Plans	Not triggered by this impact.
ESD principles	The EIA presented throughout this EP demonstrates that ESD principles (a), (b), (c) and (d) are met (noting that principle (e) is not relevant).	
Statement of acceptability	*All relevant industry guidelines are met to ensure that seabed disturbance is minimised.* Beach believes it has demonstrated that the risks of seabed disturbance are acceptable because it: • Is adhering to Beach's Environment Policy and EMS; • Has openly engaged with stakeholders to encourage concerns to be raised; • Is complying with relevant legislation; • Has taken relevant industry codes of practice and guidelines into account during activity planning and in formulating control measures; and • Has considered ESD principles.	
Environmental Monitoring		
• None required.		
Record Keeping		
• Site survey report. • Mooring analysis report.		

7.6 IMPACT: Planned marine discharges – waste waters and putrescible waste

7.6.1 Hazards

The AHTS vessel will discharge wastes including sewage and grey water, cooling and brine water, bilge water and deck drainage and putrescible waste.

Based on the short duration of the activity, volumes of planned discharges will be very low (in the order of several cubic metres per day for liquid wastes, and about 2 kg/day for putrescible waste).

7.6.2 Known and potential environmental impacts

Planned marine discharges can result in changes in water quality such as increased temperature, salinity, nutrients, chemicals and hydrocarbons, which can lead to toxic effects to marine fauna.

Putrescible waste discharges can result in changes in normal fauna behaviour.

7.6.3 Consequence evaluation

Sewage and grey water

Sewage will be treated through a sewage treatment plant (STP) to a tertiary level, so there are no potential impacts relating to the release of particulate matter, chemicals and pathogens in untreated sewage.

Nutrients in sewage, such as phosphorus and nitrogen, may contribute to eutrophication of receiving waters (although usually only still, calm, inland waters and not offshore waters), causing algal blooms, which can degrade aquatic habitats by reducing light levels and producing certain toxins, some of which are harmful to marine life and humans. Given the tidal movements and currents in open oceanic waters, eutrophication of receiving waters will not occur.

Grey water (used water from the galley, showers, hand basins and laundry) can contain a wide variety of pollutant substances at different strengths, including oil and some organic compounds, hydrocarbons, detergents and grease, metals, suspended solids, chemical nutrients, food waste, coliform bacteria and some medical waste. Grey water is treated through the STP, so pollutants will be largely removed from the discharge stream.

The effects of sewage and sullage discharges on the water quality at Scott Reef were monitored for a drill rig operating near the edge of the deep-water lagoon area at South Reef. Monitoring at stations 50 m, 100 m and 200 m downstream of the rig and at five different water depths confirmed that the discharges were rapidly diluted in the upper 10 m water layer and no elevations in water quality monitoring parameters (e.g., total nitrogen, total phosphorous and selected metals) were recorded above background levels at any station (Woodside, 2011). Conditions associated with this example at Scott Reef are considered conservative given the high numbers of personnel onboard a drill rig (typically 100-120) compared with vessels used for geotechnical and geophysical activities, and because vessels engaged in such activities are mobile (as opposed to a drill rig anchored on location).

Treated sewage and grey water discharges will be rapidly diluted in the surface layers of the water column and dispersed by currents. The biological oxygen demand (BOD) of the treated effluent is unlikely to lead to oxygen depletion of the receiving waters (Black et al., 1994), as it will be treated prior to release. On release, surface water currents will assist with oxygenation of the discharge.

Plankton forms the basis of all marine ecosystems, and plankton communities have a naturally patchy distribution in both space and time (ITOPF, 2011a). They are known to have naturally high mortality rates (primarily through predation), however in favourable conditions (e.g., supply of nutrients), plankton populations can rapidly increase. Once the favourable conditions cease, plankton populations will collapse and/or return to previous conditions. Plankton populations have evolved to respond to these environmental perturbations by copious production within short generation times (ITOPF, 2011). 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, and is likely to return to background conditions within tens to a few hundred metres of the discharge location (NERA, 2017). Accordingly, impacts further up the food chain (e.g., fish, reptiles, birds and cetaceans) are expected to be negligible.

Cooling and brine water

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.

Modelling of continuous waste water discharges (including cooling water) undertaken by Woodside for its Torosa South-1 drilling program in the Scott Reef complex found that discharge water temperature decreases quickly as it mixes with the receiving waters, with the discharge water temperature being less than 1ºC above background levels within 100 m (horizontally) of the discharge point, and will be within background levels within 10 m vertically (Woodside, 2008). As such, impacts to most receptors are expected to be negligible even within this mixing zone.

Models developed by the US EPA for temporary brine discharges from vessels assuming no ocean current (i.e. 0 m/s) found that brine discharges from the surface dilute 40‑fold at 4 m from the source (Woodside, 2014). Thus, brine discharges from a vessel within the operational area, where ocean currents range from 0.2 m/s to 2.0 m/s, are likely to dilute in a shorter distance. Therefore, there is potentially for slightly elevated salinity levels and a minor reduction in water quality within 4 m from the vessels.

Brine water will sink through the water column where it will be rapidly mixed with receiving waters and 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.

Scale inhibitors and biocide are likely to be used in the heat exchange and desalination process to avoid fouling of pipework. Scale inhibitors are 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 and are very soluble in water (Black et al., 1994). These chemicals are inherently safe at the low dosages used, as they are usually 'consumed' in the inhibition process, ensuring there is little or no residual chemical concentration remaining upon discharge.

Bilge water and deck drainage

Small volumes and low concentrations of oily water (<15 ppm) from bilge discharges and traces of chemicals or hydrocarbons discharged to the ocean through open deck drainage may temporarily reduce water quality.

Given the absence of sensitive habitat types in the water column of the operational area, the greatest risk will be to plankton and pelagic fish. These discharges will be rapidly diluted, dispersed and biodegraded to undetectable levels within a very small mixing zone.

While small volumes and low concentrations of oily water from bilge discharges may temporarily reduce water quality, such discharges are not expected to induce acute or chronic toxicity impacts to marine fauna or plankton through ingestion or absorption through the skin. In the event the oily water separator malfunctions and discharges off-specification water, these impacts may occur, though this is only likely in a highly localised mixing zone (meaning that few individuals would be exposed).

Putrescible waste

The overboard discharge of macerated food wastes creates a localised and temporary increase in the nutrient load of surface and near-surface waters. This in turn acts as a food source for scavenging marine fauna and/or seabirds, whose numbers may temporarily increase as a result. The rapid consumption of putrescible waste by scavenging fauna, and its physical and microbial breakdown, ensures that the impacts of such discharges are insignificant.

The impacts of all these 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 streams prior to discharge;

- High dilution and dispersal factor in open waters;
- Distance from shore (and sensitive habitats);
- High biodegradability and low persistence of the wastes; and
- Absence of sensitive habitats in the activity area.

7.6.3.1 Impact Assessment

Table 7-9 presents the impact assessment for the discharge of treated sewage and grey water.

Table 7-9. Impact assessment for the discharge of waste waters and putrescible wastes

Summary		
Summary of impacts	Reduction in surface water quality around the discharge point.	
Extent of impact	Localised (up to 500 m from discharge point).	
Duration of impact	Temporary – duration of activity (several days, up to one week).	
Level of certainty of impacts	HIGH – the impacts of vessel discharges are well known.	
Impact decision framework context	A – nothing new or unusual, represents business as usual, well understood activity, good practice is well defined.	
Impact Consequence (inherent)		
Sewage and grey water		Minor
Cooling and brine water		Minor
Bilge water and deck drainage		Minor
Putrescible waste		Minor
Environmental Controls and Performance Measurement		
EPO	EPS	Measurement criteria
Sewage and grey water		
Sewage and grey water is treated prior to overboard discharge in accordance with Regulation 9 of MARPOL Annex IV.	Sewage and grey water is treated in a STP, the STP meets MARPOL standards.	ISPP certificate is valid and verifies the installation of a MARPOL-approved STP.
	The STP is maintained in accordance with the vessel's PMS.	PMS records confirm that the STP is maintained to schedule.
Untreated sewage will only be discharged when the vessel is greater than 12 nm from shore.	In accordance with Regulation 11 of MARPOL Annex IV, as enacted by AMSA Marine Orders Part 96: • Untreated sewage and grey water is only discharged when the vessel is greater than 12 nm from shore (e.g., in the event of STP malfunction).	Activity-specific discharges and emissions register verifies that untreated sewage is only discharged when the vessel is >12 nm from shore.
Cooling and brine water		

Equipment that requires cooling by water, and the RO plant, is well maintained.	Engines and associated equipment that require cooling by water will be maintained in accordance with the vessel PMS so that they are operating within accepted parameters.	PMS records verify that the equipment is maintained to schedule.
Only low-toxicity chemicals are used in the cooling and brine water systems.	Only ONCS 'Gold'/'Silver' (CHARM) or 'D'/'E' (non-CHARM)-rated chemicals are used in the cooling and brine water systems.	Chemical inventory records verify that biocides and scale inhibitors are of low toxicity.
Bilge water and deck drainage		
Bilge water discharges comply with MARPOL Annex I requirements.	All bilge water passes through a MARPOL-compliant oily water separator (OWS) set to limit oil-in-water (OIW) to <15 ppm prior to overboard discharge.	IOPP certificate is current.
	The OWS is maintained in accordance with the vessel PMS.	PMS records verify that the OWS is maintained to schedule.
	The OWS is calibrated in accordance with the PMS to ensure the 15 ppm OIW limit is met.	PMS records verify that the OWS is calibrated to schedule.
No whole residual bilge oil is discharged overboard.	The residual oil from the OWS is pumped to tanks and disposed of onshore.	The Oil Record Book verifies that waste oil is transferred to shore.
Hydrocarbon or chemical spills on the vessel are prevented from being discharged overboard.	Hydrocarbon and chemical storage areas (process areas) are bunded and drain to the bilge tank (or equivalent).	Hydrocarbon and chemical storage areas are bunded and drain to the bilge tank.
	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).	Site inspections (and associated completed checklists) verify that portable bunds and/or drip trays are used in non-process areas as required.
The marine crews are competent in spill response and have appropriate resources to respond to a spill.	The vessel crews are competent in spill response and have appropriate response resources in order to prevent or minimise hydrocarbon or chemical spills discharging overboard.	Training records verify that vessel crews receive spill response training.
	Fully stocked SMPEP response kits and scupper plugs or equivalent drainage control measures are readily available to the deck crews and used in the event of a spill to deck to prevent or minimise discharge overboard.	Site inspection verifies that fully stocked spill response kits and scupper plugs (or equivalent) are available on deck in high-risk locations.
		Review of incident reports indicate that the spills of hydrocarbons or chemicals to deck are cleaned up.
Putrescible waste		
Putrescible waste discharges comply with AMSA Marine Order 95 (Marine pollution	A MARPOL Annex V-compliant Garbage Management Plan (GMP) is in place that sets out the procedures for minimising, collecting, storing, processing and discharging garbage.	A GMP is in place, readily available on board and kept current.

prevention – garbage), which enacts MARPOL Annex V requirements.	A MARPOL Annex V-compliant macerator is in place, functional, in use and set to macerate to ≤25 mm using to ensure rapid breakdown upon discharge.	PMS records verify that the macerator is functional and regularly maintained.
	Un-macerated putrescible waste is only discharged overboard when the vessel is >12 nm from the coastline.	The Garbage Record Book is in place and verifies non-macerated putrescible waste is discharged in water <12 nm from shore.

Impact Consequence (residual)	
Sewage and grey water	Minor
Cooling and brine water	Minor
Bilge water and deck drainage	Minor
Putrescible waste	Minor

Alternative controls considered but not adopted

Not applicable.

Demonstration of ALARP

A 'minor' residual impact consequence is considered to be ALARP and a 'lower order' impact. An ALARP analysis is therefore not required.

Demonstration of Acceptability	
Policy compliance	Beach Environment Policy objectives are met
Management system compliance	The proposed management of the impact is aligned with the Beach Environment Policy. Activities will be undertaken in accordance with the Implementation Strategy (Chapter 8).
Stakeholder engagement	Stakeholder consultation has been undertaken, with no concerns expressed regarding liquid waste and putrescible waste discharges.

Legislative context	The EPS outlined in this EP align with the requirements of:
	• *Navigation Act* 2012 (Cth):
	  ○ Chapter 4 (Prevention of Pollution).
	  ○ AMSA Marine Order 91 (Marine Pollution Prevention - oil).
	  ○ AMSA Marine Order 93 (Marine Pollution Prevention – noxious liquid substances).
	  ○ AMSA Marine Order 95 (Marine Pollution Prevention – garbage).
	  ○ AMSA Marine Order 96 (Marine Pollution Prevention – sewage).
	• *Protection of the Sea (Prevention of Pollution from Ships) Act* 1983 (Cth):
	  ○ Part II (Prevention of pollution by oil).
	  ○ Part III (Prevention of pollution by noxious substances).

Industry Practice	The consideration and adoption of the controls outlined in the below-listed codes of practice and guidelines demonstrates that BPEM is being implemented for this activity.

	Environmental, Health and Safety Guidelines for Offshore Oil and Gas Development (World Bank Group, 2015)	Guidelines met with regard to: • Cooling water (items 41 & 42). Antifouling chemical dosing to prevent marine fouling of cooling water systems should be carefully considered and appropriate screens to be fitted to the seawater intake to avoid entrainment and impingement of marine flora and fauna. The cooling water discharge depth should be selected to maximise mixing and cooling of the thermal plume to ensure it is within 3ºC of ambient seawater temperature within 100 m of the discharge point. • Desalination brine (item 43). Consider mixing desalination brine from the potable water system with cooling water or other effluent streams. • Other waste waters (item 44). Grey and black water should be treated in an appropriate on-site marine sanitary treatment unit in compliance with MARPOL.
	APPEA CoEP (2008)	Objectives regarding waste waters and putrescible waste are: • To reduce the volume of wastes produced to acceptable levels and to ALARP. The EPS listed in this table meet this objective.
	Environmental management in oil and gas exploration and production (UNEP IE, 1997)	This guideline states that sewage and oily water from drainage systems and bilges should be properly treated prior to discharge to meet local and international standards, and treatment must be adequate to prevent discolouration and visible floating matter. This EPS listed in this table satisfy this requirement.
Environmental context	*Marine reserve management plans*	Not triggered by this impact.
	Species Conservation Advice/ Recovery Plans/ Threat Abatement Plans	Not triggered by this impact.
ESD principles	The EIA presented throughout this EP demonstrates that ESD principles (a), (b), (c) and (d) are met (noting that principle (e) is not relevant).	
Statement of acceptability	*All relevant industry guidelines are met to ensure that waste water and putrescible waste discharges are minimised.* Beach believes it has demonstrated that the risks of waste water and putrescible waste discharges are acceptable because it: • Is adhering to Beach's Environment Policy and EMS; • Has openly engaged with stakeholders to encourage concerns to be raised; • Is complying with relevant legislation;	

	• Has taken relevant industry codes of practice and guidelines into account during activity planning and in formulating control measures; and • Has considered ESD principles.
Environmental Monitoring	
• Not applicable.	
Record Keeping	
• PMS records. • Certificates – IOPP, ISPP. • Oil Record Book. • Garbage Management Book. • Crew training records. • SMPEP. • Chemical inventory. • Location of treated sewage discharges.	

7.7 RISK: Establishment of Invasive Marine Species

7.7.1 Hazard

The introduction of marine pests could occur during vessel operations as a result of:

- Discharge of ballast water containing foreign species.
- Translocation of species through biofouling of the vessel hull, anchors and/or niches (e.g. sea chests, bilges and strainers).

The AHTS vessel will 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.

The DAWR Biosecurity Department indicates that ballast water is responsible for 20-30% of all marine pest incursions into Australian waters (DAWR, 2015). 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.

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).

Successful IMS invasion requires the following three steps:

- Colonisation and establishment of the marine pest on a vector (e.g., hull) in a donor region (e.g., home port).
- Survival of the settled marine species on the vector during the voyage from the donor to the recipient region (e.g., project area).
- Colonisation (e.g., dislodgement or reproduction) of the marine species in the recipient region, followed by successful establishment of a viable new local population.

7.7.2 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, the following known and potential environmental impacts may occur:

- Change in ecosystem dynamics.
- Changes to the functions, interests or activities of other users.

Change in ecosystem dynamics may include 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 area.

7.7.3 Consequence evaluation

IMS may become established where conditions are suitable, and these species may have impacts on local ecological and economic values. Establishment of IMS is most likely to occur in shallow waters in areas where large numbers of vessels are present and are stationary for an extended period.

In the event of an IMS being introduced to the marine environment, successful colonisation is dependent upon suitable substrate availability. The operational area does not present a location conducive to marine pest survival because it is located in deep waters (100 – 105 m).

IMS introduced during the activity has the potential to impact ecosystem dynamics. As a result of a change in ecosystem dynamics, further impacts may occur, which include change in the functions, interests or activities of other users.

Receptors potentially impacted by a change in ecosystem dynamics include:

- Marine invertebrates;
- Benthic habitat (soft sediment, macroalgae, soft corals); and
- Commercial fisheries.

7.7.3.1 Marine invertebrates and benthic habitats

IMS are likely to have little or no natural competition or predators, thus potentially outcompeting native species for food or space, preying on native species, or changing the nature of the environment. It is estimated that Australia has more than 250 established marine pests, and that approximately one in six introduced marine species becomes a pest (DoE, 2015). Once established, some pests can be difficult to eradicate (Hewitt et al., 2002) and therefore there is the potential for a long-term or persistent change in habitat structure. It has been found that highly disturbed environments (such as marinas) are more susceptible to colonisation than open-water environments, where the number of dilutions and the degree of dispersal are high (Paulay et al., 2002).

The chances of successful colonisation in the Otway region are considered small given:

- The Fugro seabed survey (2019) identified that the seabed is dominated by exposed rock with very thin transgressive coarse sand and no rocky reefs or outcrops. This type of habitat is not conducive to the establishment of IMS and is outside of coastal waters where the risk of IMS establishment is considered greatest (BRS, 2007).

- The operational area is geographically isolated from other subsea or surface infrastructure which might be suitable for colonisation.

- The operational area does not present a location conducive to marine pest survival because it is located in deep waters.

Areas of higher value or sensitivity are located away from the operational area (e.g. The Twelve Apostles MNP is located approximately 60 km away from TN-1). While unlikely, if an IMS was introduced, and if it did colonise an area, it is expected that any colony would remain fragmented and isolated, and only survive within the vicinity of the operational area (i.e. it would not be able to propagate to nearshore environments, and protected marine areas present in the wider region).

7.7.3.2 Commercial fisheries

The introduction of IMS has the potential to result in changes to the functions, interest or activities of other users, including commercial fisheries. Marine pest species can deplete fishing grounds and aquaculture stock, with between 10% and 40% of Australia's fishing industry being potentially vulnerable to marine pest incursion. For example, the introduction of the northern Pacific sea star (*Asterias amurensis*) in Victorian and Tasmanian waters was linked to a decline in scallop fisheries (DSE, 2004). However, areas suitable for commercial scallop fishing are not expected near the operational area; commercially suitable scallop aggregations occur in the waters of eastern Victoria (Koopman et al. 2018).

AFMA has confirmed there is no fishing effort for Commonwealth fisheries within the operational area. There is some fishing effort from the Victorian rock lobster fishery.

7.7.4 Risk Assessment

Table 7-10 presents the risk assessment for the introduction of IMS.

Table 7-10. Risk assessment for the introduction of IMS

Summary			
Summary of risks	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.		
Extent of risk	Localised (isolated locations if there is no spread) to widespread (if colonisation and spread occurs).		
Duration of risk	Short-term (IMS is detected and eradicated, or IMS does not survive long enough to colonise and spread) to long-term (IMS colonises and spreads).		
Level of certainty of risks	HIGH – the impacts associated with IMS introduction are well known and the vectors of introduction are known. Regulatory guidelines controlling these vectors have been established.		
Risk decision framework context	A – nothing new or unusual, represents business as usual, well understood activity, good practice is well defined.		
Risk assessment (inherent)			
Risk focus	Consequence	Likelihood	Risk rating
Environmental	Serious	Possible	Medium
Commercial fisheries	Minor	Unlikely	Low
Environmental Controls and Performance Measurement			
EPO	EPS	Measurement criteria	

No introduction of IMS.	A vessel contractor pre-qualification is undertaken to ensure vessel biofouling and ballast water controls meet these EP requirements.	Vessel contractor pre-qualification report verifies the vessel meets the EP requirements as outlined throughout this table.
	Biofouling	
	The vessel has a current International Anti-fouling System (IAFS) Certificates and is complaint with and Marine Order Part 98 (Anti-fouling Systems).	The IAFS certificate is available and current.
	Anchors and mooring equipment are cleaned prior to deployment to field.	In-water equipment checklist.
	The vessel is subject to an IMS evaluation prior to mobilising to site based on the following: • Reviewing recent inspection or audit reports (e.g., CMID) to ensure that the risk of IMS introduction is low. • Determining recent ports of call to determine the IMS risk of those ports. • Determining the need for in-water cleaning and/or re-application of anti-fouling paint if neither has been done recently in line with Antifouling and in-water cleaning guidelines (DoA/DoE, 2015). • Implementing the biofouling guidance provided in Section 2.3 of the National Biofouling Management Guidance for the Petroleum Production and Exploration Industry (Commonwealth of Australia, 2009).	An IMS evaluation report (or memo or similar) verifies that the evaluation took place and that the IMS risk is low.
	Ballast water	
	Support vessels will fulfil the requirements of the Australian Ballast Water Management Requirements (DAWR, 2017, v7). This includes requirements to: • Carry a valid Ballast Water Management Plan (BWMP). • Submit a Ballast Water Report (BWR) through the Maritime Arrivals Reporting System (MARS). o If intending to discharge internationally-sourced ballast water, submit BWR through MARS at least 12 hours prior to arrival.	BWMP is available and current. BWR (or exemption) is submitted prior to entry to the activity area. A valid BWMC is in place. An up-to-date BWRS is in place. An ePAR is available and signed off by DAWR.

	o If intending to discharge Australian-sourced ballast water, seek a low-risk exemption through MARS. • Hold a Ballast Water Management Certificate (BWMC). • Ensure all ballast water exchange operations are recorded in a Ballast Water Record System (BWRS).		
Risk assessment (residual)			
Risk focus	Consequence	Likelihood	Risk rating
Environmental	Serious	Remote	Low
Commercial fisheries	Minor	Remote	Low

Alternative controls considered but not adopted	
The vessel does not undertake ballast water exchange during the activity.	Ballast water exchange is required to maintain vessel stability, and a blanket control such as this is not possible given the unknown conditions that may be faced by the vessels at the time of the activity. Forbidding a vessel to exchange ballast may compromise the safety of personnel onboard.
Transfer ballast water to a second vessel for discharge outside the activity area in water depths that comply with the Australian Ballast Water Requirements.	This activity would lead to increased activity down-time and increase the overall duration (and thus cost) of the activity. The use of a second vessel working in close proximity to the primary vessel increases the risk of collision and compromises the safety of personnel onboard both vessels.
Only use vessels located in Victoria	A specialised AHTS vessel is required for this activity. These vessels travel all over the world undertaking these activities. Using a locally-based vessel (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
Demonstration of ALARP	
A 'Low' residual risk rating is considered to be ALARP and a 'lower order' impact. An ALARP analysis is therefore not required.	

Demonstration of Acceptability	
Policy compliance	Beach Environment Policy objectives are met.
Management system compliance	The proposed management of the impact is aligned with the Beach Environment Policy. Activities will be undertaken in accordance with the Implementation Strategy (Chapter 8).
Stakeholder engagement	Stakeholder consultation has been undertaken (see Chapter 9), with no concerns expressed regarding the introduction and spread of IMS.
Legislative context	The performance standards outlined in this EP align with the requirements of: • *Biosecurity Act* 2015 (Cth):

	○ Chapter 4 (Managing biosecurity risk). ○ Chapter 5, Part 3 (Management of discharge of ballast water). • *Protection of the Sea (Harmful Anti-fouling Systems) Act* 2006 (Cth): ○ Part 2 (Application or use of harmful anti-fouling systems). ○ Part 3 (Anti-fouling certificates and anti-fouling declarations). • *Marine Order 98 (Marine pollution – anti-fouling systems).*	
Industry Practice	The consideration and adoption of the controls outlined in the below-listed codes of practice and guidelines demonstrates that BPEM is being implemented for this activity.	
	Environmental, Health and Safety Guidelines for Offshore Oil and Gas Development (World Bank Group, 2015)	There are no guidelines regarding preventing the introduction of IMS.
	APPEA CoEP (2008)	The EPS listed in this table meet the following offshore drilling objectives: • To reduce the risk of introduction of marine pests to ALARP and to an acceptable level. • To reduce the impacts to benthic communities to ALARP and to an acceptable level.
	Environmental management in oil and gas exploration and production (UNEP IE, 1997)	The are no environmental protection measures provided for IMS management. This EP addresses the point of undertaking an environmental assessment to identify protected areas and local sensitivities.
	IMS-specific	
	The National Strategic Plan for Marine Pest Biosecurity (2018-2023) (DAWR, 2018)	None of the five objectives of this strategic plan are compromised by this activity, with the EPS specifically meeting objective 1 (minimise the risk of marine pest introduction, establishment and spread).
	Australian Ballast Water Management Requirements (DAWR, 2017, v7)	This guidance regarding ballast water management and reporting is addressed in the EPS in this table.
	National Biofouling Management Guidance for the Petroleum Production and Exploration Industry (Commonwealth of Australia, 2009)	This guidance regarding biofouling management and reporting is addressed in the EPS in this table.
Environmental context	*Marine reserve management plans*	The South-east Commonwealth Marine Reserves Network Management Plan 2013-23 (DNP, 2013) identifies invasive species and diseases translocated by shipping, fishing vessels and other vessels as a threat to the AMP network. The EPS listed in this table aimed at minimising the introduction of IMS and do not conflict with the strategies outlined in the plan that aim to address this threat.

	Species Conservation Advice/ Recovery Plans/ Threat Abatement Plans	Not triggered by this hazard.
ESD principles	The EIA presented throughout this EP demonstrates that ESD principles (a), (b), (c) and (d) are met (noting that principle (e) is not relevant).	
Statement of acceptability	*All relevant legislation and industry guidelines are met to minimise the risk of introducing IMS to the operational area.* Beach believes it has demonstrated that the risks of introducing IMS are acceptable because it: • Is adhering to Beach's Environment Policy and EMS; • Has openly engaged with stakeholders to encourage concerns to be raised; • Is complying with relevant legislation; • Has taken relevant industry codes of practice and guidelines into account during activity planning and in formulating control measures; and • Has considered ESD principles.	

Environmental Monitoring

- Not applicable.

Record Keeping

- Vessel contractor pre-qualification reports.
- IAFS Certificate.
- Ballast water discharges
- DAWR-signed ePAR.
- BWMP.
- BWR.
- BWMC.
- BWRS.
- DAWR-signed ballast water exchange logs.
- Incident reports.

7.8 RISK: Collision with Marine Fauna

7.8.1 Hazards

The AHTS vessel may collide with marine fauna, particular large and highly mobile animals such as whales, dolphins and seals. The mooring lines connected to buoys may lead to entanglement with the same types of fauna.

7.8.2 Known and potential environmental impacts

Marine fauna injury or death may occur as a result of vessel strike or entanglement in a mooring line.

7.8.3 Consequence evaluation

Entanglement of a whale, dolphin or seal with a mooring line is considered highly unlikely as entanglement is only likely to occur where multiple lines are placed closely together and the animal is large enough to become entangled in two or more lines. Given that the mooring lines will be located a minimum of tens of metres apart, entanglement is not considered further here.

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 (e.g., narwhals) 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). The DoEE (2017) notes that whale and dolphin watching from vessels has a relatively low impact on target animals when appropriate management measures are implemented (noting of course that support vessels are not operating in a cetacean watching capacity).

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.
- 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 swim through the waters of the operational area.
- 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 is considered remote.

Marine fauna species most susceptible to vessel strike are typically characterised by one or more of the following characteristics:

- Commonly dwells at or near surface waters;
- Often slow moving or large in size;
- Frequents areas with a high levels of vessel traffic; and
- Fauna population is small, threatened, or geographically concentrated in areas that also correspond with high levels of vessel traffic.

The National Strategy for Mitigating Vessel Strike of Marine Mega-fauna (Commonwealth of Australia, 2017a) identifies cetaceans and marine turtles as being vulnerable to vessel collisions.

Three marine turtle species may occur within the operational area though no BIAs or critical habitat to the survival of the species were identified. The Recovery Plan for Marine Turtles in Australia (DoEE, 2017d) identified vessel strike as a threat.

Three seals species may occur within the operational area. No BIAs or habitat critical to the survival of the species are identified for these seals.

Five whale species (or species habitat) may migrate through the operational area. Foraging behaviours were identified for some species (sei, blue, fin and pygmy right whales); no other important behaviours were identified. The operational area intersects a distribution BIA for the southern right whale and a foraging BIA for the pygmy blue whale. The Conservation Management Plan for the blue whale and for the southern right whale and Conservation Advice for the sei whale, fin whale and humpback whale identify vessel strike as a threat.

Protected species vulnerable to vessel strikes are identified as being transient in the area except for pygmy blue whales within the foraging BIA. Pygmy blue whales are likely to be foraging within the BIA (January through to April (Gill et al., 2011) which overlaps the period of the activity. The Conservation Management Plan for the Blue Whale (Commonwealth of Australia 2015b) detail that collisions will impede the recovery of blue whale populations if a sufficient number of individuals in the population lose reproductive fitness or are killed.

The occurrence of vessel strikes is very low with no incidents occurring to date associated with Beach's activities in the Otway or broader Bass Strait region.

The extent of the area of where the risk of a vessel collision with fauna may occur is within the operational area and the risk could occur while the activity is undertaken. The severity is assessed as moderate and likelihood as highly unlikely based on the fact that:

- The vessel will be slow moving or stationary.
- The occurrence of vessel strikes is very low.
- If an incident occurred, it would be restricted to an individual animal.

7.8.4 Risk Assessment

Table 7-11 presents the risk assessment for vessel collision with fauna.

Table 7-11. Risk assessment for collision with marine fauna

Summary	
Summary of risks	Injury or death of cetaceans and/or pinnipeds.
Extent of risk	Localised – limited to individuals coming into contact with the vessel.
Duration of risk	Temporary (if individual animal dies or has a minor injury) to long-term (if there is a serious injury).
Level of certainty of risk	HIGH – injury may result in the reduced ability to swim and forage. Serious injury may result in death.
Risk decision framework context	A – nothing new or unusual, represents business as usual, well understood activity, good practice is well defined.

Risk assessment (inherent)			
Risk	Consequence	Likelihood	Risk rating
Individual animal	Minor	Unlikely	Low
Population level	Minor	Remote	Low

Environmental Controls and Performance Measurement		
EPO	EPS	Measurement criteria
No injury or death of megafauna as a result of vessel strike or entanglement.	The Australian Guidelines for Whale and Dolphin Watching (DEWHA, 2005) for sea-faring activities will be implemented, which 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.	Daily operations reports note when cetaceans and pinnipeds were sighted and what actions were taken to avoid collision or entanglement.

	• 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 crew has completed an environmental induction covering the above-listed requirements for vessel and megafauna interactions.	Induction and attendance records verify that all crews have completed an environmental induction.
Vessel strike is reported to regulatory authorities.	Vessel strike causing injury to or death of a cetacean is reported to the DoEE via the online National Ship Strike Database (https://data.marinemammals.gov.au/report/shipstrike) within 72 hours of the incident.	Electronic record of report submittal is available.

Risk assessment (residual)

Risk	Consequence	Likelihood	Risk rating
Individual animal	Minor	Highly unlikely	Low
Population level	Minor	Remote	Low

Alternative controls considered but not adopted

Undertake the activity during the time window when cetaceans and pinnipeds are not present.	There is no period of time cetaceans and pinnipeds are not present. This makes this option unfeasible.
Undertake the activity only during daylight hours so as to increase the chance of detecting megafauna.	This measure would double the activity's duration and lead to additional emissions and discharges over that time, and increase the likelihood of interactions with megafauna due to the longer presence of the vessel. This measure is not commensurate with a low risk rating. Given the slow moving (or stationary) of the vessel and the underwater sound footprint created by them (which generally elicits a level of avoidance behaviour), the risk of encounter at night is considered the same as that during daylight hours. Even in daylight hours, little can be done to deter inquisitive megafauna from coming into contact with vessels.

Demonstration of ALARP

A 'Low' residual risk rating is considered to be ALARP and a 'lower order' impact. An ALARP analysis is therefore not required.

Demonstration of Acceptability

Policy compliance	Beach Environment Policy objectives are met.
Management system compliance	The proposed management of the risk is aligned with the Beach Environment Policy.

	Activities will be undertaken in accordance with the Implementation Strategy (Chapter 8).	
Stakeholder engagement	Stakeholder consultation has been undertaken (see Chapter 9), with no concerns expressed regarding vessel strikes with megafauna.	

Legislative context	The EPS outlined in this EP align with the requirements of:
	• *EPBC Act* 1999 (Cth):
	  ○ Section 199 (failing to notify taking of listed species or listed ecological community).
	• *EPBC Regulations* 2000 (Cth):
	  ○ Part 8 (Interacting with cetaceans and whale watching).
	• AMSA Marine Notice 2016/15 – Minimising the risk of collisions with cetaceans.	

Industry Practice	The consideration and adoption of the controls outlined in the below-listed codes of practice and guidelines demonstrates that BPEM is being implemented for this activity.	
	Environmental, Health and Safety Guidelines for Offshore Oil and Gas Development (World Bank Group, 2015)	There are no guidelines regarding minimising the risk of vessel strike or entanglement with megafauna.
	APPEA CoEP (2008)	The EPS listed in this table meet the following offshore development and production objectives: • To reduce the risks to the abundance, diversity, geographical spread and productivity of marine species to ALARP and to an acceptable level.
	Environmental management in oil and gas exploration and production (UNEP IE, 1997)	The environmental protection measures listed for offshore development and production activities have been considered and adopted as necessary in the activity design and performance standards. This EP addresses the point of undertaking an environmental assessment to identify protected areas and local sensitivities.
	Megafauna collision-specific	
	The Australian Guidelines for Whale and Dolphin Watching (DoEE, 2017)	The EPS listed in this table are aligned with the requirements of these guidelines, despite the fact that the vessel is not acting in the capacity of dedicated whale or dolphin watching vessels.
	National Strategy for Reducing Vessel Strike on Cetaceans and other Marine Megafauna (DoEE, 2017).	The EPS listed in this table are aligned with objective 3 of this strategy, which is to reduce the likelihood and severity of megafauna vessel collisions.
Environmental context	*Marine reserve management plans*	None triggered by this hazard.
	Species Conservation Advice/ Recovery Plans/ Threat Abatement Plans	Vessel collisions are listed as a threat to cetaceans in the:

		• Conservation Management Plan for the Southern Right Whale (DSEWPC, 2012b); • Conservation Management Plan for the Blue Whale (DoE, 2015d); • Conservation advice for the sei whale (TSSC, 2015b); • Conservation advice for the fin whale (TSSC, 2015c); and • Conservation advice for the humpback whale (TSSC, 2015d). The EPS listed in this table aim to minimise the risk of vessel strike with megafauna and do not breach the management actions of the above-listed whale conservation plans.
ESD principles	The EIA presented throughout this EP demonstrates that ESD principles (a), (b), (c) and (d) are met (noting that principle (e) is not relevant).	
Statement of acceptability	*All relevant legislation and industry guidelines are met to minimise the risk of vessel strike with megafauna.* Beach believes it has demonstrated that the risks of vessel strike with megafauna are acceptable because it: • Is adhering to Beach's Environment Policy and EMS; • Has openly engaged with stakeholders to encourage concerns to be raised; • Is complying with relevant legislation; • Has taken relevant industry codes of practice and guidelines into account during activity planning and in formulating control measures; and • Has considered ESD principles.	
Environmental Monitoring		
• Vessel crew induction presentation and attendance records. • Megafauna sighting by vessel crew.		
Record Keeping		
• Megafauna sightings records. • Induction records. • Incident reports.		

7.9 RISK: Overboard Release of Waste

7.9.1 Hazards

The handling and storage of materials and waste on board the vessel has the potential for accidental overboard disposal of hazardous and non-hazardous materials and waste, creating marine debris.

Small quantities of hazardous and non-hazardous materials will be used and waste created, and then handled and stored on the vessel. In the normal course of operations, solid and liquid hazardous and non-hazardous materials and wastes will be stored on the vessel until it is disposed of via port facilities for disposal at licensed onshore facilities. However, accidental releases to sea are a possibility, especially in rough ocean conditions when items may roll off or be blown off the deck.

The following non-hazardous materials and wastes will be disposed of to shore, but have the potential to be accidentally dropped or disposed overboard due to overfull bins or crane operator error:

- Paper and cardboard;
- Wooden pallets;
- Scrap steel, metal, aluminium, cans;
- Glass; and
- Plastics.

The following hazardous materials may be used and waste generated through the use of consumable products and will be disposed to shore, but may be accidentally dropped or disposed 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); and
- 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 and skip bins.

7.9.2 Known and potential environmental impacts

Waste accidently released to the marine environment may lead to marine pollution, injury or death to individual marine fauna through ingestion or entanglement or localised (and normally temporary) smothering of benthic habitat.

7.9.3 Consequence evaluation

Hazardous Materials and Waste

Hazardous materials and wastes are defined as a substance or object that exhibits hazardous characteristics, is no longer fit for its intended use and requires disposal.

Some of these hazardous characteristics (as outlined in Annex III to the Basel Convention) include being toxic, flammable, explosive and poisonous.

Marine debris (or marine litter) is defined as any persistent, manufactured or processed solid material discarded, disposed of or abandoned in the marine and coastal environment.

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 area are broadly similar to those elsewhere in the region (e.g., extensive sandy plains), 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 will be disposed of 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 unlikely to result from the activity.

Non-hazardous Materials and Waste

Discharged overboard, non-hazardous wastes can cause smothering of benthic habitats as well as injury or death to marine fauna or seabirds through ingestion or entanglement (e.g., plastics caught around the necks of seals or ingested by seabirds and fish). For example, the TSSC (2015) reports that there have been 104 records of cetaceans in Australian waters impacted by plastic debris through entanglement or ingestion since 1998 (humpback whales being the main species).

Marine fauna including cetaceans, turtles and seabirds can be severely injured or die from entanglement in marine debris, causing restricted mobility, starvation, infection, amputation, drowning and smothering (DoEE, 2018k). 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, this debris may lead to infection or the amputation of flippers, tails or flukes (DoEE, 2018k).

If dropped objects such as skip bins are not retrievable (e.g., by crane), these items may permanently smother very small areas of seabed, resulting in the loss of benthic habitat. However, as with most subsea infrastructure, the items themselves are likely to become colonised by benthic fauna over time (e.g., sponges) and become a focal area for sea life, so the net environmental impact is likely to be neutral. The benthic habitats in the activity area are broadly similar to those elsewhere in the region (e.g., extensive sandy plains), so impacts to very localised areas of seabed will not result in the long-term loss of benthic habitat or species diversity or abundance. Seabed substrates can rapidly recover from temporary and localised impacts.

Local context

Waste accidently released to the marine environment may lead to injury or death to individual marine fauna through ingestion or entanglement. Impacts will be restricted in exposure and quantity and will be limited to individual fauna.

The operational area overlaps foraging BIAs for many seabird species. No habitat critical to the survival of birds occur within the operational area. Marine debris is identified as a threat in the National Recovery Plan for Threatened Albatrosses and Giant Petrels 2011-2016 (DSEWPaC, 2011a).

Three marine turtle species (or species habitat) may occur within the operational area though no BIAs or critical habitat to the survival of the species were identified. The Recovery Plan for Marine Turtles in Australia (Commonwealth of Australia, 2017b) identified marine debris as a threat.

Three seal species may occur within the operational area. A foraging BIA for the Australian sea lion is present within the EMBA. If they ingest waste, it may result in injury or death (depending on the type and amount of waste ingested).

Five whale species (or species habitat) may occur within the operational area. Foraging behaviours were identified for some species (sei, blue, fin and pygmy right whales); no other important behaviours were identified. The operational area intersects a foraging BIA for the pygmy blue whale and a distribution BIA for the southern right whale. The Conservation Management Plan for the blue whale and for the southern right whale and Conservation Advice for the sei whale, fin whale and humpback whale do not identify marine debris as threat.

The extent of the area of where the risk of unplanned waste being discharged to the marine environment is within the operational area and the risk is present for the duration of the activity (up to one week).

7.9.4 Risk Assessment

Table 7-12 presents the risk assessment for the overboard release of waste.

Table 7-12. Risk assessment for the overboard release of waste

Summary		
Summary of risk	Localised reduction in water quality. Contamination of marine environment including benthic habitats. Persistent contamination in the marine environment and can negatively impact on marine fauna (e.g., plastic ingested by marine fauna).	
Extent of risks	Non-buoyant waste may sink to the seabed near where it was lost. Buoyant waste may float long distances with ocean currents and winds.	
Duration of risks	Short-term to long-term, depending on the type of waste and location.	
Level of certainty of risk	HIGH – the effects of inappropriate waste discharges are well known.	
Risk decision framework context	A – nothing new or unusual, represents business as usual, well understood activity, good practice is well defined.	
Risk assessment (inherent)		
Consequence	Likelihood	Risk rating
Moderate	Possible	Medium
Environmental Controls and Performance Measurement		
EPO	EPS	Measurement criteria
The EPO, EPS and measurement criteria listed below are in addition to those for 'seabed disturbance'.		
No unplanned release of hazardous or non-hazardous solid wastes or materials.	In accordance with Marine Order 95 (Marine pollution prevention – garbage), the vessel will possess a Garbage Management Plan (GMP).	A GMP is in place and kept current.
	Waste is stored, handled and disposed of in accordance with the GMP. This may include 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.	Vessel inspection and Garbage Record Book (along with the activity-specific waste manifest) verifies that the GMP is implemented. Visual inspections (and associated completed checklists) verify that waste is stored and handled according to its waste classification. Visual inspections (and associated completed checklists) verify that waste receptacles are properly located, sized, labelled, covered and secured for the waste they hold. A licensed shore-based waste contract is in use for the management of onshore waste transport.

	• Correct segregation of solid and hazardous wastes.	
	Vessel crew and visitors are inducted into waste management procedures at the start of the activity to ensure they understand how to implement the GMP.	Induction and attendance records verify that all crew members have been inducted.
	Solid waste that is accidentally discharged overboard is recovered if reasonably practicable.	Incident records are available to verify that credible and realistic attempts to retrieve the materials lost overboard were made.

Risk assessment (residual)

Consequence	Likelihood	Risk rating
Moderate	Highly unlikely	Low

Alternative controls considered but not adopted

None identified.

Demonstration of ALARP

A ‘Low’ residual risk rating is considered to be ALARP and a ‘lower order’ impact. An ALARP analysis is therefore not required.

Demonstration of Acceptability

Policy compliance	Beach Environment Policy objectives are met.	
Management system compliance	The proposed management of the impact is aligned with the Beach Environment Policy. Activities will be undertaken in accordance with the Implementation Strategy (Chapter 8).	
Stakeholder engagement	Stakeholder consultation has been undertaken (see Chapter 9), with no concerns expressed regarding the accidental loss of waste.	
Legislative context	The performance standards outlined in this EP align with the requirements of: • *Navigation Act* 2012 (Cth): o Chapter 4 (Prevention of Pollution). o Marine Orders Part 94 (Marine pollution prevention – packaged harmful substances). o Marine Orders Part 95 (Marine pollution prevention – packaged garbage). • *Protection of the Sea (Prevention of Pollution from Ships) Act* 1983 (Cth): o Part III (Prevention of pollution by noxious substances). o Part IIIA (Prevention of pollution by packaged harmful substances). o Part IIIC (Prevention of pollution by garbage).	
Industry Practice	The consideration and adoption of the controls outlined in the below-listed codes of practice and guidelines demonstrates that BPEM is being implemented for this activity.	
	Environmental, Health and Safety Guidelines for Offshore Oil and Gas Development (World Bank Group, 2015)	Guidelines met with regard to: • Waste management (items 46). Materials should be segregated offshore and shipped to shore for reuse, recycling or disposal. A waste management plan should be developed and contain a mechanism allowing waste consignments to be tracked.

		• Hazardous materials management (item 72). Principles relate to the selection of chemicals with the lowest environmental and health risks.
	Environmental management in oil and gas exploration and production (UNEP IE, 1997)	The environmental protection measures listed for offshore seismic operations have been considered and adopted as necessary in the activity design and performance standards. This EP addresses the point of undertaking an environmental assessment to identify protected areas and local sensitivities.
	APPEA CoEP (2008)	Objectives regarding seabed disturbance from offshore drilling operations are: • To reduce the risk of release of substances into the marine environment to ALARP and to an acceptable level. • To reduce the volume of waste produced to ALARP and to an acceptable level, and ensure that any wastes produced are disposed of in appropriate onshore facilities. The EPS listed in this table meet these objectives.
	Waste management-specific	
	Guidelines for the Development of GMPs (IMO, 2012)	The vessel GMP is developed in accordance with these guidelines.
	International Dangerous Goods Maritime Code (IMO, 2014)	The storage and handling of dangerous goods on the vessel is managed in accordance with this code.
Environmental context	*Marine reserve management plans*	The South-east Commonwealth Marine Reserves Network Management Plan 2013-23 (DNP, 2013) 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.
	Species Conservation Advice/ Recovery Plans/ Threat Abatement Plans	Marine pollution is a threat identified in the National recovery plan for threatened albatross and giant petrels 2011-2016 (DSEWPC, 2011a). Population monitoring is the suggested action to deal with marine pollution. The risks posed by this hazard do not impact this action. The conservation advice for humpback whales (TSSC, 2015d) and the Conservation Management Plan for the Blue Whale (DoE, 2015d) identify marine debris as a threat, but there are no conservation management actions to counter this. The EPS listed in this table aim to minimise the generation of marine debris. The conservation advice for hooded plovers (DoE, 2014) identifies ingestion of marine debris as a threat that requires reducing inshore debris. The EPS listed in this table aim to minimise the generation of marine debris. The EPS listed in this table meet objective one of the Threat Abatement Plan for the Impacts of Marine Debris on Vertebrate Wildlife of Australia's coasts and oceans (DoEE, 2018b), which is to contribute to the long-term prevention of the incidence of harmful marine debris.

ESD principles	The EIA presented throughout this EP demonstrates that ESD principles (a), (b), (c) and (d) are met (noting that principle (e) is not relevant).
Statement of acceptability	*All relevant legislation and industry guidelines are met to minimise the risk of accidental waste releases overboard.* Beach believes it has demonstrated that the risks of accidental waste releases overboard are acceptable because it: • Is adhering to Beach's Environment Policy and EMS; • Has openly engaged with stakeholders to encourage concerns to be raised; • Is complying with relevant legislation; • Has taken relevant industry codes of practice and guidelines into account during activity planning and in formulating control measures; and • Has considered ESD principles.

Environmental Monitoring

- Waste tracking.

Record Keeping

- GMP.
- Garbage Record Book.
- Vessel crew induction and attendance records.
- Vessel inspection records/checklists.
- Vessel waste manifest.
- Incident reports.

7.10 RISK: Loss of Containment – Marine Diesel Oil

7.10.1 Hazards

MDO will be the fuel source for the AHTS vessel. An accidental release of fuel may occur. A collision between the AHTS vessel and a third-party vessel has the potential to result in a release of MDO. This may occur as a result of:

- Mechanical failure/loss of DP;
- Navigational error, or
- Foundering due to weather.

Grounding is not considered credible due to the water depths and absence of submerged features in the operational area.

7.10.1.1 Characteristics of diesel oils

Diesel oils are generally considered to be low viscosity, non-persistent oils, which are readily degraded by naturally occurring microbes.

Diesel oils are considered to have a higher aquatic toxicity in comparison to many other crude oils due to the types of hydrocarbon present and their bioavailability. They also have a high potential to bio-accumulate in organisms.

Marine diesel is a medium-grade oil (classified as a Group II oil) used in the maritime industry. It has a low density, a low pour point and a low dynamic viscosity (Table 7-13), indicating that this oil will spread quickly when spilled at sea and thin out to low thicknesses, increasing the rate of evaporation.

Due to its chemical composition, approximately 40% of MDO will generally evaporate within the first day, with the remaining volatiles evaporating over 3-4 days depending upon the prevailing conditions. MDO shows a strong tendency to entrain into the upper water column in the presence of moderate winds and breaking waves (>12 knots) but floats to the surface when conditions are calm, which delays the evaporation process. Table 7-14 shows the boiling point ranges for the MDO used in the spill modelling.

Table 7-13: Physical characteristics of MDO

Parameter	Characteristics
Density (kg/m^3)	829 at 15°C
API	37.6
Dynamic viscosity (cP)	4.0 at 25°C
Pour point (°C)	-14
Oil category	Group II
Oil persistence classification	Light-persistent oil

Table 7-14: Boiling point ranges of MDO

Characteristic	Volatiles (%)	Semi-volatiles (%)	Low volatiles (%)	Residual (%)
Boiling point (°C)	<180	180 – 265	265 – 380	>380
MDO	6.0	34.6	54.4	5
	Non-persistent			Persistent

On release to the ocean, MDO would evaporate and decay and be distributed over time into various components. Of these components, surface hydrocarbons, entrained hydrocarbons (non-dissolved oil droplets that are physically entrained by wave action) and dissolved aromatics (principally the aromatic hydrocarbons) have the most significant impact on the marine environment. These are discussed in further detail below.

7.10.1.2 Quantitative hydrocarbon spill modelling

Beach commissioned RPS Australia West Pty Ltd (RPS) to conduct quantitative spill modelling for a credible, yet hypothetical, worst-case hydrocarbon release scenario, this being a 300 m^3 surface release of MDO over 6 hours.

This scenario represents a loss of inventory from the largest fuel tank on an AHTS vessel due to a hypothetical vessel collision incident. The Artisan-1 well location has been used as a proxy to represent the worst-case scenario for the proposed development wells within the Otway Basin (given that Artisan-1 well is 35 km north of TN-1 and much closer to the Victorian coastline).

The calculation of discharge volume and timing aligns with the methodology recommended in the AMSA Technical guidelines for preparing contingency plans for marine and coastal facilities (Commonwealth of Australia, January 2015).

7.10.2 Hydrocarbon exposure thresholds

In the event of an oil pollution incident, the environment may be affected in several ways, depending on the concentration and duration of exposure of the environment to hydrocarbons. The hydrocarbon exposure thresholds presented in Table 7-1 are considered appropriate to:

- Predict potential hydrocarbon contact at conservative (low exposure) concentrations and inform the description of the environment (Section 0), inform the EPBC Act PMST report and identify the AMPs, MNPs, Marine Parks, and wetlands that may require monitoring in the event of a worst-case discharge based upon conservative (low exposure) in-water thresholds (Table 8-6 and Figure 7-1);
- Inform the oil spill impact and risk evaluation; and
- Inform oil spill response planning based upon potentially actionable concentrations of hydrocarbons (see OPEP) and potential monitoring requirements (see Section 8.15.2 and OSMP).

Table 7-13: Hydrocarbon exposure thresholds

Exposure type	Exposure threshold		
	Low exposure	Moderate exposure	High exposure
Surface	0.5 g/m^2	10 g/m^2	25 g/m^2
Shoreline	10 g/m^2	100 g/m^2	1,000 g/m^2
Entrained*	10 ppb	100 ppb	1,000 ppb
Dissolved*	6 ppb	50 ppb	400 ppb

** In-water (entrained & dissolved) hydrocarbon thresholds are based upon an instantaneous (1 hr) hydrocarbon exposure*

Beach also applies a time-based exposure (ppb.hrs) for in-water hydrocarbons to evaluate the potential consequences associated with hydrocarbon contact at various concentrations, considering potential exposure pathways for various receptor types. Time-based exposure is not used to inform the outer geographical extent of potential hydrocarbon contact to various receptors.

The quantitative spill modelling assessment was completed for two distinct periods, defined by the unique prevailing wind and general current conditions; summer (November–April) and winter (May–October). Given the proposed timing of the anchor laying activity, only the summer results are used here.

The spill modelling was performed using an advanced three-dimensional trajectory and fates model, SIMAP (Spill Impact Mapping Analysis Program). The SIMAP model calculates the transport, spreading, entrainment and evaporation of spilled hydrocarbons over time, based on the prevailing wind and current conditions and the physical and chemical properties.

The modelling study was carried out in several stages. Firstly, a five-year current dataset (2008–2012) that includes the combined influence of ocean currents from the HYCOM model and tidal currents from the HYDROMAP model was developed. Secondly, high-resolution local winds from the Climate Forecast System Reanalysis (CFSR) model and detailed hydrocarbon characteristics were used as inputs in the three-dimensional oil spill model (SIMAP) to simulate the drift, spread, weathering and fate of the spilled oils.

As spills can occur during any set of wind and current conditions, modelling was conducted using a stochastic (random or non-deterministic) approach, which involved running 100 spill simulations per season for each scenario initiated at random start times, using the same release information (spill volume, duration and composition of the oil). This ensured that each simulation was subject to different wind and current conditions and, in turn, movement and weathering of the oil.

7.10.2.1 Extent of potential hydrocarbon exposure

The extent of potential hydrocarbon exposure at moderate thresholds (including 48-hour time-based in-water dissolved and entrained) for the MDO spill scenario is presented in Figure 7-1.

Potential extent of hydrocarbon exposure to AMPs

Whilst Apollo AMP could potentially be exposed to moderate (instantaneous) thresholds of entrained hydrocarbons (up to 7% in summer), spill modelling indicates there in no potential for Apollo AMP to be impacted by moderate or high time-based in-water exposure thresholds.

No AMPs are predicted to be exposed to high (instantaneous or time-based) thresholds of dissolved or entrained hydrocarbons.

Potential extent of hydrocarbon exposure to surface waters

During summer conditions, moderate (10 g/m^2) exposure to surface hydrocarbons were predicted to travel a maximum distance of 12 km from the release location.

None of the receptors identified within the modelling report were exposed at or above the moderate or high (>25 g/m^2) thresholds. However, spill modelling indicates potential summer exposure to surface waters up to a maximum of 6 km from the release location of 48% probability.

Potential extent of hydrocarbon exposure to shorelines

No shoreline contact above the minimum threshold (>10 g/m^2) was predicted.

Potential extent of in-water dissolved hydrocarbon exposure

The averaged dissolved hydrocarbon concentrations over 48 hours was highest within open ocean surrounding the release location registered 8 ppb during summer conditions, based upon a 1% probability of exposure in open waters surrounding the release location. No identified receptors were exposed at or above the low 48-hour time-based dissolved hydrocarbon exposure threshold.

Based on the 1-hour (instantaneous) exposure window, the greatest predicted dissolved hydrocarbon concentration was 76 ppb during summer. Open waters surrounding the release location recorded a probability of 2% during summer conditions, based on the moderate instantaneous threshold. There was no predicted exposure to identified receptors at either moderate or high instantaneous thresholds.

Potential extent of in-water entrained hydrocarbon exposure

At the depths of 0-10 m, the maximum entrained hydrocarbon exposure (over a 48-hour window) during summer conditions was 2,182 ppb. While there is potential (1-2% probability) of low (10 ppb) exposure (over a 48-hour window) in open waters surrounding the release location, none of the identified receptors were exposed at or above the moderate (10-100 ppb) or high (>1,000 ppb) thresholds.

Within the 0-10 m depth layer, the maximum entrained hydrocarbon exposure (over 1 hour) for the open waters surrounding the release location was 5,933 ppb during summer conditions. For identified receptors, the probability of exposure to entrained hydrocarbons at or above the moderate threshold (100-1,000 ppb) ranged from 1% to 8% within Victorian State Waters during summer conditions. No receptors were exposed at or above the high threshold (>1,000 ppb).

7.10.3 Known and potential environmental impacts

The known and potential environmental impacts of a MDO 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; and
- Changes to the functions, interests or activities of other users.

7.10.4 Consequence evaluation

The potential environmental impacts to receptors within the EMBA are discussed in Table 7-14 to Table 7-17.

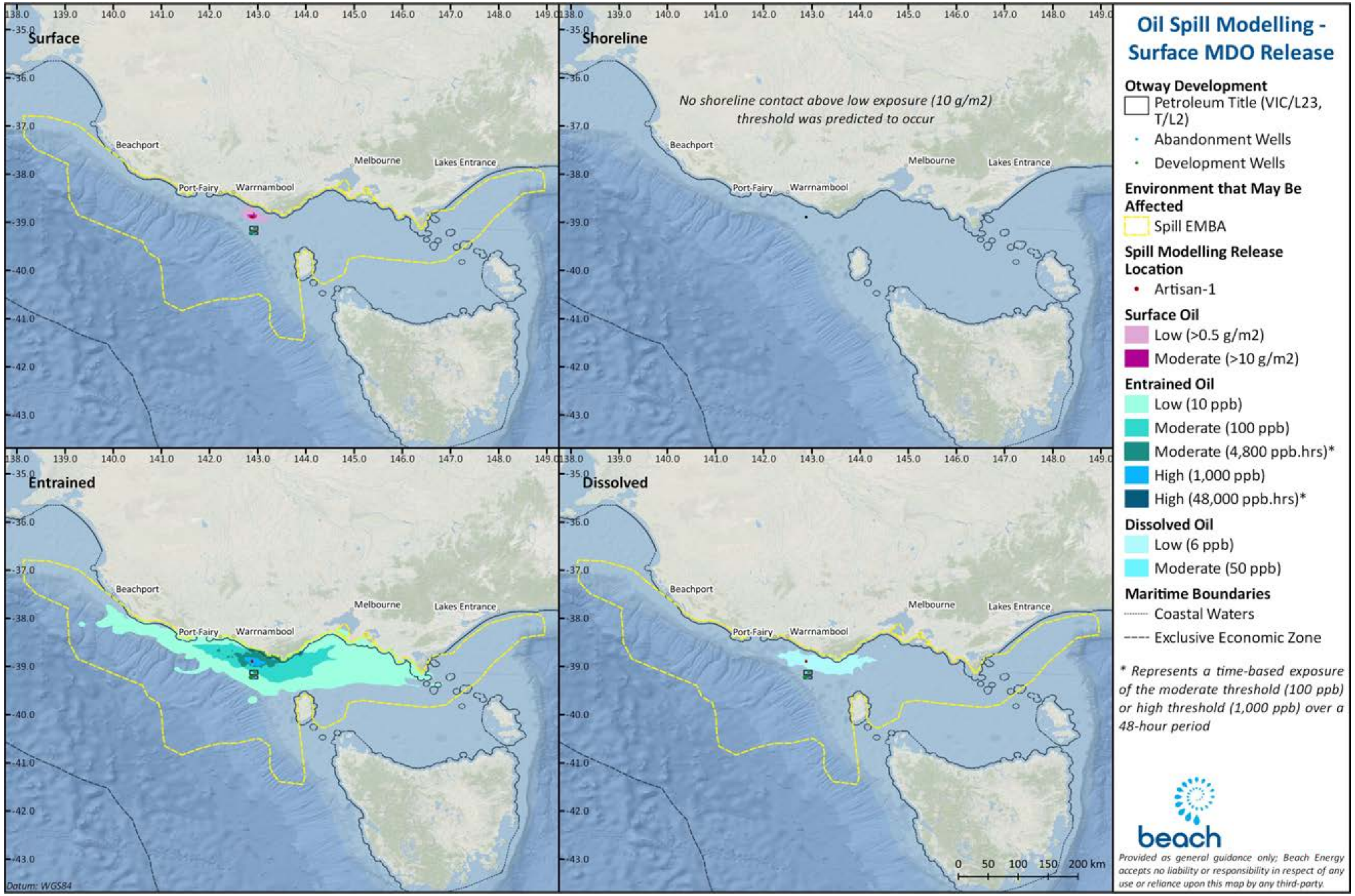


Figure 7-1: Environment potentially exposed to hydrocarbons from a hypothetical 300 m³ diesel spill at Artisan-1 over 6 hours

Table 7-14: Consequence evaluation to ecological receptors within the MDO spill EMBA – sea surface

Receptor Group	Receptor Type	Impact	Exposure Evaluation	Consequence Evaluation
Marine fauna	Seabirds	Change in fauna behaviour Injury or mortality	Several listed threatened, migratory and/or listed marine species have the potential to be rafting, resting, diving and feeding within the spill EMBA that may be exposed to moderate levels of surface hydrocarbons. Foraging BIAs for several albatross species, the wedge-tailed shearwater, common diving-petrel and short-tailed are present in the area predicted to be above threshold. Foraging and breeding BIAs for little penguins are within the EMBA, however are well beyond the predicted area of surface exposure at >10 g/m². Colonies of little penguins, without defined BIAs, are known to occur along parts of Port Campbell Bay area; therefore, it is possible that little penguins may be present in the area exposed to surface hydrocarbon >10g/m².	When first released, MDO has higher toxicity due to the presence of volatile components. Individual birds making contact close to the spill source at the time of the spill (i.e. areas of concentrations >10 g/m²) may be impacted; however, it is unlikely that many birds will be affected as volatile surface hydrocarbons are expected to evaporate over 3-4 days. Seabirds rafting, resting, diving or feeding at sea have the potential to encounter areas where hydrocarbons concentrations are greater than 10 g/m² and due to physical oiling may experience lethal surface concentrations. As such, acute or chronic toxicity impacts (death or long-term poor health) to birds are possible but unlikely for a MDO spill because of the limited period of exposure above 10 g/m². Sea surface oil >10 g/m² (10 µm) is only predicted for the first 36 hrs limiting the period when oiling may occur. Therefore, potential impact would likely be limited to individuals, however, impacts to aggregations may occur. Consequently, the potential impacts and risks to listed seabirds from a loss of MDO containment are considered to be **Serious**, as they could be expected to result in localised short-term impacts to formally managed species/habitats of recognised conservation value. Refer to management advice and evaluation of acceptability in Section 7.10.5.

Receptor Group	Receptor Type	Impact	Exposure Evaluation	Consequence Evaluation
	Marine reptiles	Change in fauna behaviour Injury or mortality	There may be marine turtles in the area predicted to be exposed to surface oil. However, there are no BIAs or habitat critical to the survival of the species within this area.	Marine turtles are vulnerable to the effects of oil at all life stages. Marine turtles can be exposed to surface oil externally (i.e. swimming through oil slicks) or internally (i.e. swallowing the oil). Ingested oil can harm internal organs and digestive function. Oil on their bodies can cause skin irritation and affect breathing. The number of marine turtles that may be exposed to surface diesel is expected to be low as there are no BIAs or habitat critical to the survival of the species present; however, turtles may be transient within the EMBA. Sea surface oil >10 g/m² (10 µm) is only predicted for the first 36 hrs limiting the period when oiling may occur. Therefore, potential impact would likely be limited to individuals, with population impacts not anticipated. Consequently, the potential impacts and risks to marine turtles are considered to be **Minor**, as they could be expected to result in localised short-term impacts to species of recognised conservation value Refer to management advice and evaluation of acceptability in Section 7.10.5.
	Pinnipeds (seals and sea lions)	Change in fauna behaviour Injury or mortality	The Australian and New Zealand fur-seals may occur within the area predicted to be exposed to surface hydrocarbons >10 g/m². No BIAs, breading colonies or haul outs areas are within the area of exposure. There is a foraging BIA for the Australian sea-lion but it is outside of the predicted area of surface exposure at >10 g/m².	Seals 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. Exposure to surface oil can result in skin and eye irritations and disruptions to thermal regulation. Fur seals are particularly vulnerable to hypothermia from oiling of their fur. The number of seals that may be exposed to surface MDO at >10 g/m² is expected to be low as there are no BIAs or habitat critical to the survival of the species present; however, seals may be transient in low numbers within areas of potential surface exposure at >10 g/m² . Sea surface oil >10 g/m² (10 µm) is only predicted for the first 36 hrs limiting the period when oiling may occur. Therefore, potential impact would be limited to individuals, with population impacts not anticipated. Consequently, the potential impacts and risks to seals are considered to be **Minor**, as they could be expected to result in localised short-term impacts to species of recognised conservation value. Refer to management advice and evaluation of acceptability in Section 7.10.5.

Receptor Group	Receptor Type	Impact	Exposure Evaluation	Consequence Evaluation
	Cetaceans (whales)	Change in fauna behaviour Injury or mortality	Several threatened, migratory and/or listed cetacean species have the potential to migrate through the area predicted to be exposed to surface hydrocarbons of >10 g/m^2 (up to 12 km from the release location). Surface exposure of >10 g/m^2 is a very small area compared to the overall distribution area of cetaceans. BIAs for foraging for pygmy blue whales and distribution for southern right whale are within the area predicted to be exposed to surface hydrocarbons >10 g/m^2.	Geraci (1988) found little evidence of cetacean mortality from hydrocarbon spills; however, some behaviour disturbance (including avoidance of the area) may occur. While this reduces the potential for physiological impacts from contact with hydrocarbons, active avoidance of an area may displace individuals from important habitat, such as foraging. If whales are foraging at the time of the spill, a greater number of individuals may be present in the area where sea surface oil is present, however sea surface oil >10 g/m^2 (10 µm) is only predicted for the first 36 hrs limiting the period when oiling may occur. Also, the area exposed by moderate levels of surface hydrocarbons (12 km from the release location) is relatively small compared to the overall distribution area of cetaceans. Given this is a relatively small area of the total foraging BIA for pygmy blue whales and distribution BIA for southern right whales, the risk of displacement to whales is considered low. The activity is scheduled to commence in Q1 or early Q2 2020, limiting the possibility of interaction with southern right whales (northern migration period of May-June, peak breeding in July-August and or southern migration period of September-November. The proposed timing of the anchoring activity overlaps with the blue whale season for migration and foraging in the operational area and EMBA. Visual and acoustic surveys suggest that blue whales are present in the Otway region between January and April, peaking in February and March. There is no population estimate for blue whales globally or in Australia and they are EPBC listed as endangered and migratory. Blue whales are highly mobile and widespread across the world's oceans. In the event of a spill, potential hydrocarbon exposure could contact aggregations of blue or other foraging whale species. Consequently, the potential impacts and risks to cetaceans are considered to be **Serious** as they could be expected to result in short-term impacts to formally managed species/habitats of recognised conservation value and local ecosystem functioning associated with seasonal upwelling events within the Otway region. Refer to management advice and evaluation of acceptability in Section 7.10.5.

Receptor Group	Receptor Type	Impact	Exposure Evaluation	Consequence Evaluation
	Cetaceans (dolphins)	Change in fauna behaviour Injury or mortality	There may be dolphins in the area predicted to be exposed to surface oil >10 g/m² (up to 12 km from the release location). However, there are no BIAs or habitat critical to the survival of the species.	Dolphins surface to breathe air and may inhale hydrocarbon vapours or be directly exposed to dermal contact with surface hydrocarbons. Direct contact with oil can result in direct impacts to the animal, due to toxic effects if ingested, damage to lungs when inhaled at the surface, and damage to the skin and associated functions such as thermoregulation (AMSA 2010). Dolphins are highly mobile and are considered to have some ability to detect and avoid oil slicks. Direct surface hydrocarbon contact may pose little problem to dolphins due to their extraordinarily thick epidermal layer which is highly effective as a barrier to the toxic, penetrating substances found in hydrocarbons. The number of dolphins exposed is expected to be low. If dolphins are foraging at the time of the spill, a greater number of individuals may be present in the area where sea surface oil is present, however due to the short duration of the surface exposure above the impact threshold (approximately 36 hours), this is not likely. Consequently, the potential impacts and risks to dolphins from a loss of MDO containment are considered to be **Minor**, as they could be expected to result in localised short-term impacts to species of recognised conservation value. Refer to management advice and evaluation of acceptability in Section 7.10.5.

Table 7-15: Consequence evaluation to socio-economic receptors within the EMBA – sea surface

Receptor Group	Receptor Type	Impact	Exposure Evaluation	Consequence Evaluation
Human systems	Recreation and tourism (including recreational fisheries)	Change in aesthetic value Changes to the functions, interests or activities of other users	Marine pollution can result in impacts to marine-based tourism from reduced visual aesthetic. The modelling predicts surface sheens (0.5 g/m^2) may occur up to 93 km from the release location. This oil may be visible as a rainbow sheen on the sea surface during calm conditions.	Visible surface hydrocarbons (i.e. a rainbow sheen) have the potential to reduce the visual amenity of the area for tourism and discourage recreational activities. However, the relatively short duration means there may be short-term and localised consequences, which are ranked as **Moderate.** Refer to management advice and evaluation of acceptability in Section 7.10.5.
	Industry (shipping)	Displacement of other marine users	Shipping occurs within the area predicted to be exposed to surface hydrocarbons >10 g/m^2 (12 km from the release location).	Vessels may be present in the area where sea surface oil is present, however, due to the short duration of the surface exposure (approximately 36 hours), the deviation of shipping traffic would be unlikely.
	Industry (oil and gas)	Displacement of other marine users	There are no non-Beach oil and gas operations or activities within the area predicted to be exposed to surface hydrocarbons >10 g/m^2 (12 km from the release location).	No impact as there are no non-Beach oil and gas platforms located within the area predicted to be exposed to surface hydrocarbons.

Table 7-16: Consequence evaluation to physical and ecological receptors within the EMBA – in water

Receptor Group	Receptor Type	Impact	Exposure Evaluation	Consequence Evaluation
Habitat	Algae	Change in habitat	Macroalgae communities may be within the overall area potentially exposed to moderate levels of in-water entrained hydrocarbons. Video surveys confirmed the presence of high density macroalgae dominated epibenthos in waters shallower than 20 m, however, it is not a dominant habitat feature in eastern Victoria. Note that the greater wave action and water column mixing within the nearshore environment will result in rapid weathering of MDO residue.	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). The effect of hydrocarbons however is largely dependent on the degree of direct exposure, and the presence of morphological features (e.g. a mucilage layer and/or fine 'hairs') will directly influence the amount of hydrocarbon that will adhere to the algae. Generally, the effects of oil on macroalgae, such as kelp and many other species which dominate hard substrata in shallow waters is small due to their mucilaginous coating that resists oil absorption. Hydrocarbons may contact the intertidal shores as the tide ebbs, but it would be expected that this would be flushed with each flood tide. Natural flushing is more likely to reduce impacts in exposed areas of shoreline. Consequently, the potential impacts to algae are considered to be **Minor**, as they could be expected to result in localised short-term impacts to species/habitats.
	Soft Coral	Change in water quality Change in habitat	Corals do not occur as a dominant habitat type within the EMBA, however their presence has been recorded around areas such as Cape Otway. In-water exposure (entrained) is only predicted to occur within intertidal or shallow nearshore waters. Note that the greater wave action and water column mixing within the nearshore environment will also result in rapid weathering of the hydrocarbon.	Exposure of entrained hydrocarbons to shallow subtidal corals has the potential to result in lethal or sub-lethal toxic effects, resulting in acute impacts or death at moderate to high exposure thresholds (Shigenaka, 2001). Contact with corals may lead to reduced growth rates, tissue decomposition, and poor resistance and mortality of sections of reef (NOAA, 2010). However, given the lack of coral reef formations, no predicted dissolved in-water hydrocarbon exposure and the sporadic cover of hard or soft corals in mixed nearshore reef communities along the Otway coast, such impacts are considered to be limited to smothering of isolated corals.

Receptor Group	Receptor Type	Impact	Exposure Evaluation	Consequence Evaluation
				Hydrocarbons may contact the intertidal shores as the tide ebbs, but it would be expected that this would be flushed with each flood tide. Natural flushing is more likely to reduce impacts in exposed areas of shoreline. Consequently, the potential impacts to corals are considered to be **Minor**, as they could be expected to result in localised short-term impacts to species/habitats.
	Seagrass	Change in habitat	In-water exposure (entrained) is only predicted to occur within the surface layers with the potential to contain seagrasses. Note that the greater wave action and water column mixing within the nearshore environment will result in rapid weathering of MDO. Seagrass may be present within the area predicted to be exposed to in-water hydrocarbons (e.g. seagrass is known to occur within Twelve Apostles Marine Park). Exposure in nearshore and intertidal areas is predicted to only be at moderate thresholds (e.g. instantaneous exposure >100 ppb for entrained hydrocarbons only).	There is the potential that entrained in-water hydrocarbon exposure could result in sub-lethal impacts from smothering, more so than lethal impacts, possibly because much of seagrasses' biomass is underground in their rhizomes (Zieman et al., 1984). Given the restricted range of exposure (shallow nearshore and intertidal waters only), no predicted dissolved in-water hydrocarbon exposure and the predicted moderate concentrations of entrained hydrocarbons expected to be in these waters, any impact to seagrass is not expected to result in long-term or irreversible damage. Consequently, the potential impacts to seagrass are considered to be **Moderate**, as they could be expected to result in localised short-term impacts to species/habitats of recognised conservation value.
Marine fauna	Plankton	Injury or mortality	Plankton would be exposed to entrained hydrocarbons. Effects will be greatest in the upper 10 m of the water column and areas close to the spill source where hydrocarbon concentrations are the highest.	Relatively low concentrations of hydrocarbon are toxic to both plankton [including zooplankton and ichthyoplankton (fish eggs and larvae)]. Plankton risk exposure through ingestion, inhalation and dermal contact. Impacts would predominantly result from exposure to dissolved fractions, as larval fish and plankton are pelagic, and are moved by seawater currents. Potential impacts would largely be restricted to planktonic communities, which would be expected to recover rapidly following a hydrocarbon spill.

Receptor Group	Receptor Type	Impact	Exposure Evaluation	Consequence Evaluation
				Plankton are numerous and widespread but do act as the basis for the marine food web, meaning that an oil spill in any one location is unlikely to have long-lasting impacts on plankton populations at a regional level. Once background water quality conditions have re-established, the plankton community may take weeks to months to recover (ITOPF, 2011a), allowing for seasonal influences on the assemblage characteristics. Additionally, with the elevated nutrient loading expected during seasonal upwelling events within the Otway region (November to April), plankton are likely to recover more rapidly than when upwelling of nutrient-rich waters is less prevalent. Consequently, given the limited area exposed by moderate levels of dissolved hydrocarbons, the potential impacts to plankton are considered to be **Minor**, as they could be expected to cause short-term and recoverable impacts.
	Marine invertebrates	Injury or mortality	In-water invertebrates of value have been identified to include squid, crustaceans (rock lobster, crabs) and molluscs (scallops, abalone). Impact by direct contact of in-water hydrocarbons to benthic species in the deeper areas of potential exposure are not expected. Species located in shallow nearshore or intertidal waters may be exposed to in-water hydrocarbons. Several commercial fisheries for marine invertebrates are within the area predicted to be exposed to moderate levels of entrained in-water hydrocarbons.	Acute or chronic exposure through contact and/or ingestion can result in toxicological risks. However, the presence of an exoskeleton (e.g. crustaceans) reduces the impact of hydrocarbon absorption through the surface membrane. Invertebrates with no exoskeleton and larval forms may be more prone to impacts. Localised impacts to larval stages may occur which could impact on population recruitment that year. Tainting of recreation or commercial species is considered unlikely to occur given exposure is limited to entrained hydrocarbons, however if it did it is expected to be localised and low level with recovery expected. Consequently, the potential impacts and risks to commercially fished invertebrates from a loss of MDO containment are considered to be **Minor**, as they could be expected to result in localised short-term impacts to species/habitats of recognised conservation value.

Receptor Group	Receptor Type	Impact	Exposure Evaluation	Consequence Evaluation
	Fish	Injury or mortality	Entrained hydrocarbon droplets can physically affect fish exposed for an extended duration (weeks to months). Effects will be greatest in the upper 10 m of the water column and areas close to the spill source where hydrocarbon concentrations are likely to be highest. Several fish communities in these areas are demersal and therefore more prevalent towards the seabed, which is not likely to be exposed. Therefore, any impacts are expected to be highly localised. The Australian grayling spends most of its life in fresh water, with parts of the larval or juvenile stages spent in coastal marine waters, therefore it is not expected to be present in offshore waters in large numbers. There is a known distribution and foraging BIA for the white shark in the EMBA, however, it is not expected that this species spends a large amount of time close to the surface where thresholds may be highest.	Pelagic free-swimming fish and sharks are unlikely to suffer long-term damage from oil spill exposure because dissolved/ entrained hydrocarbons in water are not expected to be sufficient to cause harm (ITOPF, 2011a). Subsurface hydrocarbons could potentially result in acute exposure to marine biota such as juvenile fish, larvae, and planktonic organisms, although impacts are not expected cause population-level impacts. There is the potential for localised and short-term impacts to fish communities; the consequences are ranked as **Moderate**. Impacts on fish eggs and larvae entrained in the upper water column are not expected to be significant given the temporary nature of the resulting change in water quality. As egg/larvae dispersal is widely distributed in the upper layers of the water column it is expected that current induced drift will rapidly replace any oil affected populations. Impacts are assessed as temporary and localised, and therefore considered to be **Moderate**. Refer to management advice and evaluation of acceptability in Section 7.10.5.
	Pinnipeds (seals and sea lions)	Injury or mortality Change in fauna behaviour	There are no identified BIAs for seals within the EMBA. Known breeding colonies for Australian fur-seals are on islands off the coast; Kanowna Island, Rag Island, West Moncoeur Island, Lady Julia Percy Island and Seal Rocks (Vic). Cape Bridgewater is also a known haul out site. Seal Rocks on King Island is also a New Zealand fur-seal breeding colony. A foraging BIA for the Australian sea-lion is located west and north-west of Beachport within the EMBA. This BIA overlaps both South Australian State waters and the Bonney Coast Upwelling KEF, therefore the predicted hydrocarbon exposure to these areas is likely to also contact with the foraging BIA. There is no predicted exposure to the Bonney Coast Upwelling	Exposure to moderate effect levels of hydrocarbons in the water column or consumption of prey affected by the oil may cause sub-lethal impacts to pinnipeds. However, due to the temporary and localised nature of the spill, their widespread nature, the low-level exposure zones and rapid loss of the volatile components of MDO in choppy and windy seas (such as that of the area exposed by moderate in-water hydrocarbon thresholds), impacts are assessed as temporary and localised and are considered **Moderate**. Refer to management advice and evaluation of acceptability in Section 7.10.5.

Receptor Group	Receptor Type	Impact	Exposure Evaluation	Consequence Evaluation
			KEF at the low (48-hour) threshold exposure. A maximum entrained hydrocarbon exposure for a 1-hour window is predicted to be 98 ppb with a 22% probability of low instantaneous exposure to the KEF. There is no predicted dissolved exposure to South Australian State waters and the maximum time entrained hydrocarbon exposure for a 48-hour window is 31 ppb and 26 ppb for a 1-hour window based upon a 2% probability of contact. Known breeding colonies of Australian fur-seals are unlikely to be exposed to moderate in-water exposure thresholds, and the foraging BIA for the Australian sea-lion is not within the predicted area of moderate in-water exposure. Given the mobility of pinnipeds, there may be small numbers of seals and sea-lions in the areas predicted to be temporarily exposed to moderate concentrations of in-water hydrocarbons in the water column, noting that in-water exposure (dissolved or entrained) is only predicted to occur within the upper layers of the water column.	
	Cetaceans (whales and dolphins)	Injury or mortality Change in fauna behaviour	Several threatened, migratory and/or listed marine cetacean species have the potential to be migrating, resting or foraging within an area predicted to be exposed to in-water hydrocarbons. Known BIAs are present for foraging for pygmy blue whales (foraging) and the southern right whale (distribution) in areas exposed to moderate in-water thresholds (i.e. >50 ppb for dissolved and >100 ppb for entrained).	Cetacean exposure to entrained hydrocarbons can result in physical coating as well as ingestion (Geraci and St Aubin, 1988). Such impacts are associated with 'fresh' hydrocarbon; the risk of impact declines rapidly as the MDO weathers. The potential for impacts to cetaceans and dolphins would be limited to a relatively short period following the release and would need to coincide with seasonal foraging or aggregation event to result in exposure to a large number of individuals, as may be the case during seasonal upwelling events within the Otway region. However, such exposure is not anticipated to result in long-term population viability effects. A proportion of the foraging or distributed population of whales could be affected in the relatively localised area and water depth of the total foraging BIA for pygmy blue whales and distribution

Receptor Group	Receptor Type	Impact	Exposure Evaluation	Consequence Evaluation
				BIA for southern right whales, the risk of displacement to whales is considered low. Displacement behaviours could result in temporary and localised consequences, which are ranked as **Moderate**. Refer to management advice and evaluation of acceptability in Section 7.10.5.

Table 7-17: Consequence evaluation to socio-economic receptors within the EMBA – in water

Receptor Group	Receptor Type	Impact	Exposure Evaluation	Consequence Evaluation
Human system	Commercial and recreational fisheries	Change in ecosystem dynamics Changes to the functions, interests or activities of other users	In-water exposure to entrained MDO may result in a reduction in commercially targeted marine species, resulting in impacts to commercial fishing and aquaculture. Actual or potential contamination of seafood can affect commercial and recreational fishing and can impact seafood markets long after any actual risk to seafood from a spill has subsided (NOAA, 2002) which can have economic impacts to the industry. Several commercial fisheries operate in the EMBA and overlap the spatial extent of the water column hydrocarbon predictions.	Any acute impacts are expected to be limited to small numbers of juvenile fish, larvae, and planktonic organisms, which are not expected to affect population viability or recruitment. Impacts from entrained exposure are unlikely to manifest at a fish population viability level. Any exclusion zone established would be limited to the immediate vicinity of the release point, and due to the rapid weathering of MDO would only be in place 1-3 days after release, meaning that physical displacement to vessels is unlikely to be a significant impact. The consequence to commercial and recreational fisheries is assessed as localised and short term and ranked as **Moderate**. Refer to management advice and evaluation of acceptability in Section 7.10.5
	Recreation and tourism	Change in ecosystem dynamics Changes to the functions, interests or activities of other users Change in aesthetic value Change in water quality	Tourism and recreation are also linked to the presence of marine fauna (e.g. whales), particular habitats and locations for recreational fishing. The area between Cape Otway and Port Campbell is frequented by tourists. It is a remote stretch of coastline dominated by cliffs with remote beaches subject to the high energy wave action. Recreation is also linked to the presence of marine fauna and direct impacts to marine fauna such as whales, birds, and pinnipeds can result in indirect impacts to recreational values. It is important to note that the impact from a public perception perspective may be even more conservative. This may deter tourists and locals from undertaking recreational activities. If this occurs, the attraction is temporarily closed, and economic losses to the business are likely to eventuate. The extent of these losses would be dependent on how long the attraction remains closed.	Any impact to receptors that provide nature-based tourism features (e.g. whales) may cause a subsequent negative impact to recreation and tourism activities. Refer also to: • Fish; • Birds; • Pinnipeds; • Cetaceans; • Marine invertebrates; and • Recreational fisheries. Any impact to receptors that provide nature-based tourism features (e.g. fish and cetaceans) may cause a subsequent negative impact to recreation and tourism activities. However, the relatively short duration, and distance from shore means there may be short-term and localised consequences, which are ranked as **Moderate**. Refer to management advice and evaluation of acceptability in Section 7.10.5

Receptor Group	Receptor Type	Impact	Exposure Evaluation	Consequence Evaluation
Natural system	State Marine Protected Areas	Change in ecosystem dynamics Change in aesthetic value Change in water quality	State marine protected areas (e.g. Twelve Apostles Marine Park) occur within the area predicted to be exposed to in-water hydrocarbons at the instantaneous screening level of 100 ppb (entrained). Conservation values for these areas include high marine fauna and flora diversity, including fish and invertebrate assemblages and benthic coverage (sponges, macroalgae).	Refer to: Marine invertebrates, Macroalgae The consequence to conservation values within the Twelve Apostles Marine Park is assessed as localised and short term and ranked as **Moderate**. Refer to management advice and evaluation of acceptability in Section 7.10.5.
	AMPs	Change in ecosystem dynamics Change in aesthetic value Change in water quality	Stochastic modelling indicates in-water hydrocarbons at the instantaneous screening level of 100 ppb (entrained) may extend to within the boundaries of the Apollo AMP. Conservation values for Apollo AMP include foraging habitat for seabirds, dolphins, seals and white sharks, and blue whales migrate through Bass Strait. A reduction in water quality will lead to a breach in management objectives for AMPs.	Refer to: Seabirds, Cetaceans and pinnipeds), Fish, Plankton The concentration at which the water column within Apollo AMP may be exposed is within the moderate thresholds for entrained hydrocarbons. Given the nature of the exposure to foraging habitats, and transient nature of migrating and foraging marine fauna, the consequence is ranked as **Moderate (2).** Refer to management advice and evaluation of acceptability in Section 7.10.5.
Conservation Values and sensitivities	KEFs	Change in water quality Injury / mortality to fauna Change in fauna behaviour. Change in ecosystem dynamics.	The Bonney Coast Upwelling is the only KEF predicted to be exposed to in-water hydrocarbons from a potential MDO spill. MDO is classified as a light persistent oil, has a low specific gravity (and will therefore tend to remain afloat) and has a high proportion (~95%) of volatile components and only a small (5%) residual component. Due to this volatility most of this oil will evaporate from the water surface; depending on wind conditions the proportion of evaporated oil may vary between approximately 40% within the first day, with the remaining volatiles evaporating over 3-4 days depending upon the prevailing conditions. Under moderate winds, oil will begin to entrain into the water	Stochastic modelling indicates potential low-level and very short-term hydrocarbon exposure to the Bonney Coast Upwelling KEF resulting in a low-level reduction in water quality. This contact is predicted to be below the conservative environmental impact threshold for pelagic species (i.e. moderate thresholds). At the low instantaneous entrained exposure thresholds predicted, there is potential for chronic-level exposure to juvenile fish, larvae and planktonic organisms that might be entrained (or otherwise moving) within the entrained plumes. Given the seasonal upwelling event supports regionally high productivity and high species diversity along the Bonney coast extending between Cape Jaffa, South Australia and Portland, Victoria. (DoE, 2015a) and the potential exposure is limited to low threshold contact to the eastern

Receptor Group	Receptor Type	Impact	Exposure Evaluation	Consequence Evaluation
			column. Entrained oil can persist for extended periods of time, however if it re-floats it is subject to evaporation and is also subject to dissolution and natural degradation within the water column. There is no predicted surface or dissolved hydrocarbon exposure to any KEF from an MDO spill. The maximum time-entrained hydrocarbon exposure for a 48-hour window is predicted to be 125 ppb at the Bonney Coast Upwelling with no predicted low (48-hour) threshold exposure. The maximum entrained hydrocarbon exposure for a 1-hour window is predicted to be 98 ppb at the Bonney Coast Upwelling with a 22% probability of low instantaneous exposure.	boundary of the Bonney Coast Upwelling, some impairment of ecosystem functioning during an upwelling event could occur. Given the details above, the consequence of an MDO release causing short-term effects including a potential regional decline in water quality during the upwelling season associated with the Bonney Coast KEF has been conservatively assessed as **Serious**. Refer to management advice and evaluation of acceptability in Section 7.10.5.
	Wetlands	Change in water quality Change in ecosystem dynamics	Marine waters adjacent to the Port Phillip Bay and Bellarine Peninsula Ramsar site may be exposed to maximum time-entrained (for a 48-hour window) MDO of 7 ppb with no exposure at low thresholds, and a maximum instantaneous exposure of 10 ppb with a 1% probability of exposure at low thresholds. No other wetlands of international importance identified within the EMBA are predicted to be exposed to hydrocarbons from an MDO spill at any threshold. Nationally important wetlands, with a coastal interface, also occur within the EMBA and may be exposed to in-water hydrocarbons above low thresholds.	There is predicted low probabilities of low-level in-water hydrocarbon contact with marine waters adjacent to some wetlands (including Ramsar and nationally important wetlands). Specifically, there is potential for a temporary decline in water quality that may impact on the ecological character of the following Ramsar sites: Port Philip Bay (Western shoreline) and Bellarine Peninsula. Wetland habitat can be of particular importance for some species of birds, fish and invertebrates. As such, in addition to direct impacts on wetland vegetation communities, oil that reaches wetlands may also affect these fauna utilising wetlands during their life cycle. Refer to other to receptor evaluations for in-water hydrocarbons, including: Seagrass, Fish, Marine invertebrates. At the predicted low exposure levels for dissolved and entrained in-water contact there is unlikely to be lethal ecological impacts on any of the values (receptors) that contribute to the ecological character of wetlands, however, a conservative consequence of **Moderate** has been applied given the cultural significance and international and national importance of the wetlands.

Receptor Group	Receptor Type	Impact	Exposure Evaluation	Consequence Evaluation
				Refer to management advice and evaluation of acceptability in Section 7.10.5

7.10.5 Risk Assessment

Table 7-18 presents the risk assessment for an MDO spill.

Table 7-18. Risk assessment for an MDO spill

Summary			
Summary of risks	Localised and temporary reduction in water quality. Potential toxicity impacts to marine life. Potential temporary fisheries closures.		
Extent of risks	The EMBA is defined in Figure 7-8.		
Duration of risks	Short-term (several days, depending on level of contact, location and receptor).		
Level of certainty of risks	HIGH - spill source volumes can be limited in size though the environmental impacts of spilled hydrocarbons are well understood.		
Risk decision framework context	B – new to the organisation or geographical area, infrequent or non-standard activity, some uncertainty, some partner interest, may attract media attention.		
Risk assessment (inherent)			
Risk	Consequence	Likelihood	Risk rating
Benthic fauna	Minor	Highly unlikely	Low
Macroalgal communities	Minor	Highly unlikely	Low
Plankton	Minor	Highly unlikely	Low
Pelagic fish	Minor	Highly unlikely	Low
Cetaceans	Minor	Highly unlikely	Low
Pinnipeds	Minor	Highly unlikely	Low
Marine reptiles	Minor	Highly unlikely	Low
Seabirds	Moderate	Highly unlikely	Low
Shorebirds	Minor	Highly unlikely	Low
Sandy beaches	Minor	Highly unlikely	Low
Commercial fisheries	Minor	Highly unlikely	Low
Public amenity	Serious	Highly unlikely	Medium

Environmental Controls and Performance Measurement		
EPO	EPS	Measurement criteria
Preparedness		
Prevent an MDO spill by preventing a ship collision	The AHO will be notified of the activity two weeks prior to the activity commencing to enable the promulgation of Notice to Mariners and AusCoast navigational warnings.	Notice to Mariners listing the vessel name and location is publicly available.
		AusCoast warnings list the vessel location.
	The vessel is readily identifiable to third-party vessels.	Visual inspection verifies that the anti-collision monitoring equipment (e.g., 24-hour radar watch, Global Maritime Distress Safety System [GMDSS] and

		Automatic Identification System [AIS]) is functional and in use.
	Visual and radar watch is maintained on the bridge of the support vessels at all times. The Vessel Masters and deck officers have valid SCTW certificates in accordance with AMSA Marine Order 70 (seafarer certification) (or equivalent) to operate radio equipment to warn of potential third-party spatial conflicts (e.g. International Convention on Standards of Training, Certification and Watch- keeping for Sea-farers [STCW95], GDMSS proficiency).	Appropriate qualifications are available to verify the competence of the Vessel Master and deck officers.
	The Vessel Master issues warnings (e.g., radio warning, flares, lights/horns) to third-party vessels approaching the AHST vessel in order to prevent a collision.	Radio communications/ bridge log verifies that warnings to third-party vessels have been issued as necessary.
Vessel crews are prepared to respond to a spill.	The vessel has an approved SMPEP that is implemented in the event of a fuel tank rupture and spill.	A current SMPEP is available.
		Spill incident report verifies that the actions taken were in accordance with the SMPEP.
	Vessel crew members are inducted into spill response procedures.	Induction and attendance records verify all crew have been inducted.
	Vessel crew is trained in spill response techniques in accordance with the SMPEP and vessel training matrix.	Training records verify that all marine crew are trained in spill response.
Reporting		
Reporting and monitoring of an MDO spill will take place in accordance with the EP and OPEP.	Beach will report the spill to regulatory authorities (see Section 8.8) within 2 hours of becoming aware of the spill.	Incident reports verify that contact with regulatory agencies was made within 2 hours of Beach becoming aware of the spill.
Response		
Vessel Master will initiate action to reduce fuel loss in the event of a tank rupture.	The Vessel Master will authorise actions in accordance with the vessel-specific SMPEP and the Beach Offshore Victoria Otway Basin OPEP to limit the release of MDO.	Daily operations reports verify that the SMPEP and OPEP were implemented.
Collect operational monitoring data to support the spill response and collect scientific monitoring data to characterise environmental impacts.	Beach will undertake operational and scientific monitoring in accordance with the Beach OSMP (Offshore Victoria).	Daily operations reports and overall study reports verify that the OSMP was implemented.
Risk assessment (residual)		

Receptor	Consequence	Likelihood	Risk rating
Benthic fauna	Minor	Remote	Low
Macroalgal communities	Minor	Remote	Low
Plankton	Minor	Remote	Low
Pelagic fish	Minor	Remote	Low
Cetaceans	Minor	Remote	Low
Pinnipeds	Minor	Remote	Low
Marine reptiles	Minor	Remote	Low
Seabirds	Minor	Remote	Low
Shorebirds	Minor	Remote	Low
Sandy beaches	Minor	Remote	Low
Commercial fisheries	Minor	Remote	Low
Public amenity (beaches, recreational fishing)	Serious	Remote	Low

Alternative controls considered but not adopted

Eliminate or substitute the use of MDO.	The use of MDO to fuel vessels cannot be eliminated. Substituting for another fuel (i.e. HFO or bunker fuel oil), would have a higher environmental impact than MDO.
Apply for a temporary petroleum safety zone (PSZ) around the vessel during the activity.	Given the short-term nature of this activity and the large size of the AHTS vessel, Beach considered that there would not be any benefit, additional to those outlined in this table, of applying for a temporary PSZ.

Demonstration of ALARP

A 'Low' residual risk rating is considered to be ALARP and a 'lower order' impact. An ALARP analysis is therefore not required.

Demonstration of Acceptability

Policy compliance	Beach Environment Policy objectives are met.
Management system compliance	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).
Stakeholder engagement	Stakeholder consultation has been undertaken (see Chapter 9), with no concerns expressed regarding MDO spills.
Legislative context	The performance standards outlined in this EP align with the requirements of: • *OPGGS Act* 2006 (Cth): ○ Section 280 – requires that a person carrying on activities in an offshore area under the permit, lease, licence, authority or consent must carry on those activities in a manner that does not interfere with navigation or fishing (among others). ○ Section 572A-F (Polluter pays for escape of petroleum).

<table>
<tr><td></td><td colspan="2">

- *Protection of the Sea (Prevention of Pollution from Ships) Act* 1983 (Cth):
  - Section 11A (Shipboard oil pollution emergency plan) (for Australian-registered vessels).
  - AMSA Marine Orders Part 91 (Marine pollution prevention – oil).
- *Navigation Act 2012 (Cth):*
  - Chapter 2 (Seafarers).
  - Chapter 6 (Safety of navigation), particularly Part 3 (Prevention of collisions).
  - AMSA Marine Orders: Part 27 (Safety of Navigation and Radio Equipment).
  - AMSA Marine Orders: Part 30 (Prevention of Collisions), particularly Part 9.
  - AMSA Marine Orders: Part 70 (Seafarer Certification).
- *OPGGS Act* 2010 (Vic):
  - Section 29 (Notifying reportable incidents).
- *POWBONS Act* 1986 (Vic):
  - Section 10 (Duty to report certain incidents involving oil and oily mixtures).
- State Environment Protection Policy (Waters of Victoria):
  - Clause 38 (Spills, illegal discharges and dumping of waste).

</td></tr>
<tr><td rowspan="4">Industry Practice</td><td colspan="2">The consideration and adoption of the controls outlined in the below-listed codes of practice and guidelines demonstrates that BPEM is being implemented for this activity.</td></tr>
<tr><td>Environmental, Health and Safety Guidelines for Offshore Oil and Gas Development (World Bank Group, 2015)</td><td>

Guidelines met with regard to:

- Section 75 (Spills): Conducting a spill risk assessment, implementing personnel training and field exercises, ensuring spill response equipment is available.
- Sections 76-79 (Spill response planning): A spill response plan should be prepared.
- Ship collisions (item 120). Offshore facilities should be equipped with navigational aids that meet national and international requirements, including radar and lights on support vessels.

</td></tr>
<tr><td>APPEA CoEP (2008)</td><td>

Objectives regarding third-party vessel disturbance are:

- To reduce the impacts from events such as spills and loss of equipment to ALARP and to an acceptable level.
- To reduce the risk of collision with other vessels in accordance with maritime standards.

The EPS listed in this table meet these objectives.

</td></tr>
<tr><td>Environmental management in oil and gas exploration and production (UNEP IE, 1997)</td><td>The environmental protection measures listed for offshore drilling operations have been considered and adopted as necessary in the activity design and performance standards. This EP addresses the point of undertaking an environmental assessment to identify protected areas and local sensitivities.</td></tr>
</table>

Environmental context	*Marine reserve management plans*	Oil spills are a threat identified in all of the management plans for the MNP and sanctuaries within the EMBA of the Victorian coast. The EPS listed in this table and the development and implementation of an OPEP aim to prevent a spill, and where this is not possible, minimise fuel loss and impacts to sensitive receptors.
	Species Conservation Advice/ Recovery Plans/ Threat Abatement Plans	Marine pollution is a threat identified for albatross and giant-petrels in the National recovery plan for threatened albatross and giant petrels 2011-2016 (DSEWPC, 2011). Population monitoring is the suggested action to deal with marine pollution. The conservation advice and management plans for cetaceans for blue, humpback, sei and fin whales identify hydrocarbon spill as threats, though there are no specific aims to address this. The EPS listed in this table aim to prevent such spills.
ESD principles	The EIA presented throughout this EP demonstrates that ESD principles (a), (b), (c) and (d) are met (noting that principle (e) is not relevant).	
Statement of acceptability	*All relevant legislation and industry guidelines are met to minimise the risk of an MDO spill.* Beach believes it has demonstrated that the risks of an MDO spill are acceptable because it: • Is adhering to Beach's Environment Policy and EMS; • Has openly engaged with stakeholders to encourage concerns to be raised; • Is complying with relevant legislation; • Has taken relevant industry codes of practice and guidelines into account during activity planning and in formulating control measures; and • Has considered ESD principles.	

Environmental Monitoring

- As per the OSMP.

Record Keeping

- Vessel crew induction presentation.
- Vessel crew training records.
- SMPEP.
- OPEP.
- OSMP.
- Incident reports.

7.11 RISK: Oil Spill Responses

This section presents the risk assessment for oil spill response options as required by the OPGGS(E)R.

7.11.1 Response option selection

Not all response options and tactics are appropriate for every oil spill. Different oil types, spill locations and volumes require different response options and tactics, or a combination of response options and tactics, to form an effective response strategy.

Table 7-19 provides an assessment of the available oil spill response options, their suitability to the potential MDO spill scenario and their recommended adoption for the identified events.

7.11.2 Hazards

The following activities have been identified for responding to a spill event:

- Mobilisation, use and demobilisation of spill response personnel, plant and equipment; and
- Handling, treatment and/or relocation of affected fauna (oiled wildlife response).

Response option feasibility, effectiveness, capability needs analysis and capability assessment is detailed in Table 7-19.

Table 7-19: Response option feasibility, effectiveness, ALARP identified risks and capability needs analysis for an MDO spill

Response Option	Response Description	Feasibility, Effectiveness & ALARP Analysis	Net Environmental Benefit	Capability Needs Analysis (See OPEP and OSMP for details)
Monitor and evaluate	Visual – aerial and vessel	Effective - MDO rapidly spreads to thin layers on surface waters. Monitoring is used to inform both response planning and monitoring requirements. Aerial surveillance is considered more effective than vessel to inform spill response and identify if oil has contacted shoreline or wildlife. Vessel surveillance limited in effectiveness in determining spread of oil. Scientific monitoring implemented to inform extent of impact and remediation requirements. Both vessel and aerial monitoring capability in place. Trained aerial observers available via AMOSC Core Group and available for deployment. Vessel and aircraft contracts in place. No further benefit gained by having additional monitoring capability.	Yes	Actionable on-water hydrocarbon thresholds limited to immediate vicinity of well site. Up to 8 km of coastline subject to moderate oiling. 1 x plane & observer required and/or 1 x vessel & observer and/or 5 x vessels and OSMP study teams Remote oil spill trajectory modelling (OSTM)
Source control	Right stricken vessel Transfer MDO to secure tank	Effective – primary response strategy for all spills in accordance with vessel SMPEP/SOPEP. Given AMSA is the Control Agency in the event of a stricken vessel in Commonwealth waters, and their access to NatPlan resources, not further controls are considered.	Yes	Project support vessels
Offshore containment and recovery	Booms and skimmers	Not feasible. MDO spreads rapidly to <10 g/m^2 and suitable thicknesses for recovery are only present for the first 36 hours for a large offshore spill, and there is insufficient mobilisation time to capture residues. In general, this method only recovers approximately 10-15% of total spill residue, creates significant levels of waste, requires significant manpower and suitable weather conditions (calm) to be deployed.	No	No
Protection and deflection	Booms and skimmer	No shoreline contact predicted from an MDO spill.	N/A	N/A
Shoreline clean-up	The active removal and/or treatment of oiled sand and debris	No shoreline contact predicted from an MDO spill.	N/A	N/A
Oiled wildlife response (OWR)	Capture, cleaning and rehabilitation of oiled wildlife.	Feasible. Effective. Unlikely to require shoreline OWR given no predicted shoreline loading. Potential that individual birds could become oiled in the offshore environment.	Yes	Personnel Equipment Triage and waste facilities

Response Option	Response Description	Feasibility, Effectiveness & ALARP Analysis	Net Environmental Benefit	Capability Needs Analysis (See OPEP and OSMP for details)
Chemical dispersant application	Application of chemical dispersants either surface or subsea	Feasible. Although "conditional" for Group II oil, the size of potential spill volume and the natural tendency of spreading into very thin films is evidence that dispersant application will be an ineffective response. The dispersant droplets will penetrate through the thin oil layer and cause 'herding' of the oil which creates areas of clear water and should not be mistaken for successful dispersion (see ITOPF – Technical Information Paper No. 4: The Use of Chemical Dispersants to Treat Oil Spills).	No	N/A

7.11.3 Known and potential environmental impacts

Impacts and risks associated with monitoring and evaluation and source control strategies (in responding to a hydrocarbon spill) are the same as those discussed for routine vessel operations in Section 7. This section covers detailed impact and risk evaluations for oiled wildlife response.

Untrained resources capturing and handling native fauna may cause distress, injury and death of the fauna. AMSA is the Control Agency for a vessel spill in Commonwealth waters and will manage any OWR; Beach will only undertake OWR if and as directed by AMSA. Potential impacts are:

- Injury or mortality of fauna; and
- Change in fauna behaviour.

7.11.4 Consequence evaluation

OWR includes pre-emptive techniques such as hazing, capturing and relocating of un-oiled fauna as well as post-oiling techniques such cleaning and rehabilitation. Deliberate disturbance of wildlife from known areas of ecological significance (e.g. resting, feeding, breeding or nesting areas) to limit contact of individuals with hydrocarbons may result in inhibiting these species from accessing preferred habitats or food sources. This approach may also result in additional disturbance/handling stress to the affected species with little benefit as many species tend to display site fidelity and return to the location from which they have been moved.

The incorrect handling of oiled fauna has also the potential to result in increased stress levels that may result in increased fauna mortality. Although fauna interactions from oiled wildlife response and shoreline clean-up techniques are expected to be limited to the duration of the response, there is the potential that these effects may result in longer term impacts to local populations where a large proportion of the local population may be exposed to oil and subsequently oiled wildlife response.

Oiled wildlife preparedness and response shall be undertaken in accordance with the relevant EPOs and EPSs detailed within the Offshore Victoria – Otway Basin Oil Pollution Emergency Plan (CDN/ID S4100AH717907).

Oiled wildlife surveillance and wildlife impact studies are detailed within the Offshore Victoria Operational and Scientific Monitoring Plan (CDN/ID S4100AH717908).

7.11.5 Environmental Impact and Risk Assessment

Table 7-20 presents the impact and risk assessment for OWR.

Table 7-20. Impact and risk assessment for OWR

Summary	
Summary of risks	Distress, injury or death of fauna through inappropriate handling and treatment. Hazing of target fauna may result in disruption to feeding, resting, breeding activities of non-target species.
Extent of risk	Localised - OWR limited to areas where shoreline hydrocarbon loadings may have ecological effects.
Duration of risk	Short-term (days to weeks).
Level of certainty of risks	HIGH - the impacts associated with OWR are well understood, with trained AMSA personnel in place to manage this activity.
Risk decision framework context	A - for AMSA personnel, this represents nothing new or unusual, represents business as usual, well understood activity, good practice is well defined.

Risk assessment (inherent)			
Receptor	Consequence	Likelihood	Risk rating
Fauna injury	Minor	Possible	Medium
Fauna death	Minor	Unlikely	Low

Environmental Controls and Performance Measurement		
EPO	EPS	Measurement criteria
Preparedness		
AMSA maintains capability to undertake OWR in a Level 2 or 3 MDO spill event.	Access to operational response capabilities is maintained through the NatPlan.	AMSA inspections/audits verify that they have ready access to operational response capabilities.
Response		
AMSA implements OWR resources appropriate to the nature and scale of event.	An operational NEBA is undertaken to determine the net benefits of undertaking OWR.	Operational NEBA is available, approved and was undertaken prior to OWR commencing.
	If an operational NEBA identifies that OWR is required, the Incident Action Plan includes measures to guide the response, with personnel and equipment deployed to relevant locations.	The IAP is available and daily reports verify it is implemented.

Impact Consequence (residual)			
Risk	Consequence	Likelihood	Risk rating
Fauna injury	Minor	Highly unlikely	Low
Fauna death	Minor	Highly unlikely	Low

Alternative controls considered but not adopted	
Monitor and evaluate: AUVs	This control measure is not expected to provide significant environmental benefit as the operational area is in close proximity to shore 100 km), and mobilisation of in-field monitoring or aerial surveillance may be implemented rapidly via existing contracts.
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.
OWR: Pre-positioning of oiled wildlife response resources.	OWR equipment containers for first strike activities are positioned in Geelong. 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 3 of the spill, therefore there is adequate time to deploy equipment 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.

<table>
<tr><td>Shoreline protection and clean up: Tactical Response Plans</td><td colspan="2">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 Tactical Response Plans.</td></tr>
<tr><th colspan="3">Demonstration of ALARP</th></tr>
<tr><td colspan="3">A 'Low' residual risk rating is considered to be ALARP and a 'lower order' impact. An ALARP analysis is therefore not required.</td></tr>
<tr><th colspan="3">Demonstration of Acceptability</th></tr>
<tr><td>Policy compliance</td><td colspan="2">Beach Environment Policy objectives are met.</td></tr>
<tr><td>Management system compliance</td><td colspan="2">Chapter 8 describes the EP implementation strategy to be employed for this activity, which is largely reliant on the implementation of Beach's HSE Management System, OPEP and OSMP.</td></tr>
<tr><td>Stakeholder engagement</td><td colspan="2">Stakeholder consultation has been undertaken (see Chapter 9), with no concerns expressed regarding oil spill response activities.</td></tr>
<tr><td>Legislative context</td><td colspan="2">The performance standards outlined in this EP align with the requirements of:
• OPGGS Act 2006 (Cth) and OPGGS(E):
o Part 6.2 – directs the polluter to take actions in response to an incident and to clean up and monitor impacts.
o Regulation 13(5) (Risk assessment undertaken to demonstrate ALARP).
• OPGGS Regulations 2011 (Vic):
o Regulation 15(3) (Risk assessment undertaken to demonstrate ALARP).
• Emergency Management Act 2013 (Vic).
• Flora and Fauna Guarantee Act 1988 (Vic):
o Section 47 (Offences relating to protected flora).
o Section 48 (Authorisation to take, trade in, keep, move or process protected flora).
• Wildlife Act 1975 (Vic):
o Section 41, 42, 43 (Hunting, taking or destroying endangered, notable or protected wildlife).
• Environmental Protection Act 1970 (Vic):
o Environmental Protection (Industrial Waste Resource) Regulations 2009.</td></tr>
<tr><td rowspan="3">Industry Practice</td><td colspan="2">The consideration and adoption of the controls outlined in the below-listed codes of practice and guidelines demonstrates that BPEM is being implemented for this activity.</td></tr>
<tr><td>Environmental, Health and Safety Guidelines for Offshore Oil and Gas Development (World Bank Group, 2015)</td><td>Guidelines met with regard to:
• Sections 76-79 (Spill response planning): A spill response plan should be prepared.</td></tr>
<tr><td>APPEA CoEP (2008)</td><td>Objectives met regarding offshore drilling operations are:</td></tr>
</table>

		• To reduce the impacts from events such as spills and loss of equipment to ALARP and to an acceptable level.
	Environmental management in oil and gas exploration and production (UNEP IE, 1997)	The environmental protection measures listed for offshore seismic operations have been considered and adopted as necessary in the activity design and performance standards. This EP addresses the point of undertaking an environmental assessment to identify protected areas and local sensitivities.
	Spill-response specific guidelines	Wildlife response preparedness (IPIECA/OGP, 2014c).
Environmental context	*Marine reserve management plans*	The EPS listed in this table aim to provide the OWR team with information to implement the most suitable response. OWR aims to protect the values of this protected area.
	Species Conservation Advice/ Recovery Plans/ Threat Abatement Plans	Numerous bird and cetacean recovery plans and conservation advices identify pollution and/or habitat degradation as a key threat. OWR aims to protect individual fauna.
ESD principles	The EIA presented throughout this EP demonstrates that ESD principles (a), (b), (c) and (d) are met (noting that principle (e) is not relevant).	
Statement of acceptability	*All relevant legislation and industry guidelines are met to minimise the risks associated with OWR activities.* Beach believes it has demonstrated that the risks associated with OWR activities are acceptable because it: • Is adhering to Beach's Environment Policy and EMS; • Has openly engaged with stakeholders to encourage concerns to be raised; • Is complying with relevant legislation; • Has taken relevant industry codes of practice and guidelines into account during activity planning and in formulating control measures; and • Has considered ESD principles.	

Environmental Monitoring

- As per the OSMP.

Record Keeping

- Incident Action Plan.
- Operational NEBA.
- Briefing records.
- Daily operations reports.
- Incident reports.

8 Implementation Strategy

Regulation 14 of the OPGGS(E)R requires that the EP must contain an implementation strategy for the activity. The Lattice Health, Safety and Environment Management System (HSEMS) will be used for this activity. The Lattice HSEMS is consistent with Beach's Environmental Policy (Figure 8-1).

The Implementation Strategy described in this section provides a summary of the Lattice HSEMS and how it will be applied to effectively implement the control measures detailed in this EP. Specifically, it describes:

- The HSEMS;
- Environment-specific roles and responsibilities;
- Arrangements for monitoring, review and reporting of environmental performance;
- Preparedness for emergencies; and
- Arrangements for ongoing consultation.

8.1 Health, Safety, Environmental Management System

The Lattice HSEMS documents the Environmental Policy, HSE Standards, HSE Directives and the key HSE processes and requirements for activities where Lattice is the titleholder. It provides a management framework for achieving the requirements in a systematic way but allows flexibility to achieve this in a manner which best suits the business. The HSEMS is aligned with the requirements of recognised international and national standards including:

- ISO 14001 (Environmental Management);
- OHSAS 18001 (Occupational Health and Safety);
- ISO 31000 (Risk Management); and
- AS 4801 (Occupational Health and Safety Management Systems).

At the core of the HSEMS are 20 performance standards that detail specific performance requirements for the implementation of the HSE Environmental Policy and management of potential HSE impacts and risks (Table 8-1). Integral to each Performance Standard are a series of HSE Management Commitments and Processes including Directives, Procedures and other support documents which provide detailed information on requirements for implementation along with specific responsibilities. At the business level the system is complemented by asset and site procedures and plans such as this EP.

The application of HSEMS Performance Standards relevant to the activity are described in the following sections.

Table 8-1: Lattice HSEMS Performance Standards

No	Standard	No	Standard
1	Leadership and Commitment	11	Management of Change
2	Organisation, Accountability, Responsibility and Authority	12	Facilities Design, Construction, Commissioning and Decommissioning
3	Planning, Objectives and Targets	13	Contractors, Suppliers, Partners and Visitors
4	Legal Requirements, Document Control and Information Management	14	Crisis and Emergency Management
5	Personnel, Competence, Training and Behaviours	15	Plant and Equipment
6	Communication, Consultation and Community Involvement	16	Monitoring the Work Environment
7	Hazard and Risk Management	17	Health and Fitness for Work
8	Incident Management	18	Environmental Effects and Management
9	Performance Measurement and Reporting	19	Product Stewardship, Conservation and Waste Management
10	Operational Control	20	Audits, Assessments and Review

8.2 Leadership and Commitment (HSEMS Standard 1)

The leadership and commitment standard states that the Board and Executive Management establish the HSE Policy, set expectations and provide resources for successful implementation of the HSE Policy and HSEMS.

All employees are expected to demonstrate commitment to HSE in all facets of their work. An effective method of showing leadership and commitment is by example. An explicit part of this process is to comply with Directive and Procedures associated with the HSEMS Standards and develop and implement effective HSE plans. These plans are aimed at driving the process of continual improvement in HSE performance.

Demonstratable compliance with this EP is a key commitment for Beach.

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 Health, Safety and Environment 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.

Matt Kay
Managing Director and CEO
December 2019

Figure 8-1: Beach's Environmental Policy

8.3 Organisation, Accountability, Responsibility and Authority (HSEMS Standard 2)

This standard states that for Directors, Managers, Supervisors and employees and contractors at all levels, their accountabilities, roles, responsibilities and authority relating to HSE are clearly defined, documented, communicated and understood.

The Beach Energy CEO has the ultimate responsibility for ensuring that Beach Energy has the appropriate organisation in place to meet the commitments established within this EP. However, the General Manager Well Engineering and Construction has the responsibility and delegated authority to ensure that adequate and appropriate resources are allocated to comply with the HSEMS and this EP.

The roles responsibilities for the implementation, management and review of this EP are detailed in Table 8-2.

Responsibility in the event of an oil pollution emergency is dependent on the response category level. For a Level 1 Vessel spill, Vessel Master has the immediate responsibility. Roles and responsibilities for an oil pollution emergency response are clearly described in the OPEP.

The roles and responsibilities for the implementation, management and review for this EP are detailed in Table 8-2.

Table 8-2: Roles and responsibilities

Role	Responsibilities
Chief Executive Officer	Ensures: • Beach has the appropriate organisation in place to be compliant with regulatory and other requirements and this EP. • The HSEMS continues to meet the evolving needs of the organisation.
Community Relations Manager	• Undertakes stakeholder consultation for the activity. • Records and reports to the Activity Manager and Principal Environment Advisor any objections or claims raised by relevant stakeholders. • Maintains a stakeholder consultation log.
Principal Environment Advisor	• Communicates regulatory requirements to the vessel contractor. • Develops the environmental component of the activity induction. • Provides support in relation to incident management and reporting as per Section 8.9. • Prepares the EP environmental performance report. • Reviews and documents any new or change to an environmental impact or risk or a change that may impact the EP. • Provides support to ensure audits and inspections are undertaken and any actions from non-conformances or improvement suggestions tracked. • Reviews and revises the EP as required.
Vessel Master	Ensures: • Vessel operations are carried out in accordance with regulatory requirements and this EP. • Vessel adheres to the distances and vessel management practices for whales and dolphins as per the EPBC Regulations (Part 8). • Environmental incidents are reported to the Environment Advisor within required timeframes as per Section 8.9 . • Oil spill response arrangements are in place and tested as per the vessel's SMPEP or equivalent.
Vessel personnel	• Complete project induction. • Report hazards and/or incidents via company reporting processed. • Stop any task that they believe to be unsafe or will impact on the environment.

8.4 Planning, Objectives and Targets (HSEMS Standard 3)

This standard recognises that a systematic risk-based approach to the management of HSE is in place as an integral part of business planning, with HSE goals, objectives and targets established and measured. A philosophy of continuous improvement is applied to HSE.

EPOs and EPSs have been established to continually reduce potential environmental impacts and risks to ALARP and an acceptable level.

8.5 Legal Requirements, Document Control and Information Management (HSEMS Standard 4)

This standard specifies that relevant legal and regulatory requirements and voluntary commitments are identified, documented, made accessible, understood and complied with. Effective HSE document control systems are in place to ensure clarity of company expectations and to facilitate efficient and accurate information management.

8.5.1 Legal requirements

Section 3 of this EP details the legislation applicable to the activity and how it has been applied within this EP.

8.5.2 Document control and information management

In accordance with Regulation 27 of the OPGGS(E)R, documents and records relevant to the EP implementation will be stored and maintained for a period of five years in a way that makes retrieval practicable.

8.6 Personnel, Competence, Training and Behaviours (HSEMS Standard 5)

This standard recognises that employees' competence and appropriate behaviours are critical for the safe control of operations and general company success.

Each employee or contractor with responsibilities pertaining to the implementation of this EP shall have the appropriate competencies to fulfil their designated role.

To ensure that personnel are aware of the EP requirements for the activity all offshore personnel will complete an induction, as a minimum. Records of completion of the induction will be recorded and maintained as per Section 8.5.2. The induction 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 ALARP and of an acceptable level;
- 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.
- Overview of emergency response and spill management plans; and
- Fauna sighting and vessel interaction procedures.

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.

8.7 Communication, Consultation and Community Involvement (HSEMS Standard 6)

This standard specifies that effective, transparent and open communication and consultation with stakeholders is valued and undertaken across the company.

The Vessel masters have responsibility for ensuring that systems are in place to facilitate the communication of HSE issues this is typically via the daily report and daily pre-start meetings. These pre-start (toolbox meetings) will have an HSE component and any relevant environmental issues will be discussed. All workers that participate in a job must attend a pre-start meeting. These workers must sign attendance at these meetings. Any worker not at the pre-start meeting may not work on that job until suitable training has been undertaken. During these pre-start meetings any worker can identify areas of HSE risk and are encouraged to consider areas where HSE performance can be improved.

Stakeholder consultation specific to the activity is detailed in Section 9.

8.8 Hazard and Risk Management (HSEMS Standard 7)

This standard specifies that HSE hazards and risks associated with the company's activities are identified, assessed and managed to prevent or reduce the likelihood and consequence of incidents.

Chapter 7 details the impact and risk assessment undertaken to identify and assess the environmental impacts and risks associated with the activity and the control measures that will be implemented to prevent or reduce the likelihood and consequence of incidents.

Risk management processes associated with environmental hazards are manged in accordance with the Environmental Related Risk Procedure and the Risk Management Directive.

As detailed in Section 8.21.2, Beach will undertake a review of this EP to ensure that any changes to activities, controls, regulatory requirements and information from research, stakeholders, industry bodies or any other sources to inform the EP are assessed using risk management tools nominated. The review will ensure that the environmental impacts and risks of the activity continue to be identified and reduced ALARP and an acceptable level.

Environmental risks and Major Environmental Events are assessed through project HAZIDs. These ensure that all risks are identified, and suitable operational barriers are put in place. These also form part of the projects Standard Operating Procedures (SOPs) and Job Hazard Analyses.

If revision of this EP is trigged though change in risk or controls, the revision process shall be managed in accordance with Section 8.12 Management of Change.

8.9 Incident Management (HSEMS Standard 8)

The incident management standard requires that all HSE incidents, including near misses, are reported, investigated, and analysed to ensure that preventive actions are taken, and learnings are shared throughout the organisation. Incidents shall be managed in accordance with the Incident Management Directive.

Incident reports and corrective actions are managed using the Beach Enterprise Incident Management System.

Notifiable incidents will be reported as detailed in Section 8.9.1.

8.9.1 Incident reporting

Notification and reporting requirements for environmental incidents to external agencies are provided in Table 8-3.

Table 8-3: 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 recordable 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. Regulation 26B of 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	Principal Environmental Advisor
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: • any vessel collision resulting in a loss of containment or otherwise. • introduction of marine pests to the operational area.			
Verbal 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.	Within two hours of becoming aware of incident	• NOPSEMA – 1300 674 472 • DJPR – 0409 858 715	Principal Environmental Advisor

Requirement	Timing	Contact	Responsible Person
Written notification Verbal 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.	Within 3 days of notification of incident	• NOPSEMA – submissions@nopsema.gov.au	Principal Environmental Advisor
Written incident reports to be submitted to NOPTA and DJPR (for incidents in Commonwealth waters).	Within 7 days of written report submission to NOPSEMA	• DJPR – marine.pollution@ecodev.vic.gov.au • NOPTA – reporting@nopta.gov.au	Principal Environmental Advisor
Vessel spill to marine environment All 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
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 and include: • titleholder details; • time and location of the incident (including name of marine park likely to be affected); • proposed response arrangement; • confirmation of providing access to relevant monitoring and evaluation reports when available; and • contact details for the response coordinator.	EMT Lead (or delegate)

Requirement	Timing	Contact	Responsible Person
Vessel strike with cetacean	Within 72 hours	• DAWE – online National Ship Strike Database https://data.marinemammals.gov.au/report/shipstrike	Principal Environmental Advisor
	ASAP for cetacean injury assistance	• DELWP (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.	Principal Environmental Advisor
Injury to or death of EPBC Act-listed species	Within seven days	• DAWE – 1800 803 772 • EPBC.Permits@environment.gov.au	Principal Environmental Advisor
Suspected or confirmed introduction of IMS	Verbal notification ASAP	• DELWP – 136 186	Principal Environmental Advisor

8.10 Performance Measurement and Reporting (HSEMS Standard 9)

The performance measurement and reporting standard specifies that HSE performance data is collected, analysed and reported to monitor and evaluate ongoing HSE performance and drive continual improvement.

8.10.1 Annual performance report

In accordance with OPGGS(E) Regulation 14(2), Beach will submit a report on the environmental performance of the activity to NOPSEMA. Performance will be measured against the EPOs and EPSs described in this EP. The report will be submitted not more than three months after the EP acceptance date.

8.10.2 Emissions and discharge records

In accordance with OPGGS(E) Regulation 14(7), emissions and discharges shall be recorded for the duration of the activity. Table 8-4 details the types of emissions and discharges that shall be recorded including the monitoring method and frequency of reporting.

Table 8-4: Emissions and discharges monitoring requirements

Emission / Discharge	Monitoring parameter	Recording method	Reporting frequency	Responsibility
Fuel – vessel	Volume used	Daily report	Monthly	Vessel Operator
Bilge	Volume discharged	Daily report	Monthly	Vessel Operator
Sewage	Volume discharged	Daily report	Monthly	Vessel Operator
Putrescible food	Volume discharged	Daily report	Monthly	Vessel Operator
Spills to sea	Hydrocarbon type Volume discharged	Daily report	As occurs	Vessel Master

Emission / Discharge	Monitoring parameter	Recording method	Reporting frequency	Responsibility
Waste lost to the marine environment	Material lost	Daily report	As occurs	Vessel Master
Whale sighting	Species, number, behaviour and any actions taken by vessel	Daily report DAWE sighting sheets	As occurs	Vessel master

8.11 Operational Control (HSEMS Standard 10)

The intent of this standard is that all activities that have the potential to cause harm to the health and safety of people or the environment are carried out in accordance with plans and procedures to ensure safe work practices.

The activity will be carried out in accordance with this implementation strategy and the EPOs and EPSs detailed in Chapter 7.

8.12 Management of Change (HSEMS Standard 11)

This standard requires that all temporary and permanent changes to the organisation, personnel, systems, critical procedures, equipment, products and materials are identified and managed to ensure HSE risks arising from these changes remain at an acceptable level.

Changes to equipment, systems and documentation is in accordance with the Management of Change (MoC) Directive to ensure that all proposed changes are adequately defined, implemented, reviewed and documented by suitably competent persons. This 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. The MOC process includes not just plant and equipment changes but also critical documented procedures where there is an HSE impact, regulatory documents and organisational changes that impact personnel in safety critical roles.

Not all changes will require a MoC; each change will be assessed on a case-by-case basis. The potential environmental impacts will be reviewed by the Environment Manager (or delegate) to see if they warrant a full MoC process. This review will be documented and recorded. It will either for part of the MoC or will document why an MoC was not considered appropriate for managing the environmental risk.

Where risk and hazard review processes as nominated in Section 8.8 identify a change in hazards, controls, or risk and triggers a regulator requirement to revise this EP, the revision shall be defined, endorsed, completed and communicated in accordance with the MoC Directive.

8.13 Facilities Design, Construction, Commissioning and Decommissioning (HSEMS Standard 12)

The intent of this standard is to ensure that the assessment and management of HSE risks is an integral part of project design, construction and commissioning to enable sound HSE performance throughout the construction and operational life of the facility. Decommissioning plans were not developed for this project due to the limited scope (one exploration well). The wellhead will either be removed (decommissioned) or left suspended for future use. This forms part of the 'facility' design and construction.

Chapter 7 details the assessment and management of environmental impacts and risks for the activity how the activity will be managed to ensure that the impacts and risks are ALARP and an acceptable level.

8.14 Contractors, Suppliers, Partners and Visitors (HSEMS Standard 13)

The intent of this standard is that contractors, suppliers and partners are assessed for their capabilities and competencies to perform work on behalf of Beach, and to ensure their HSE performance is aligned with these Standards.

Section 8.21.1 details how the contractors will be assessed to ensure they have the capabilities and competencies to implement the control measures identified in Chapter 7.

All suppliers go through a detailed procurement process to ensure that they are capable of meeting the requirements of this project. This includes a review of their HSE performance.

8.15 Crisis and Emergency Management (HSEMS Standard 14)

The intent of the crisis and emergency response management standard is to ensure that plans, procedures and resources are in place to effectively respond to crisis and emergency situations, to protect the workforce, the environment, the public and customers, and to preserve the company's assets and reputation.

The Beach Crisis and Emergency Management Framework consists of a tiered structure whereby the severity of the emergency triggers the activation of emergency management levels. The emergency response framework contains three tiers based on the severity of the potential impact, as outlined in

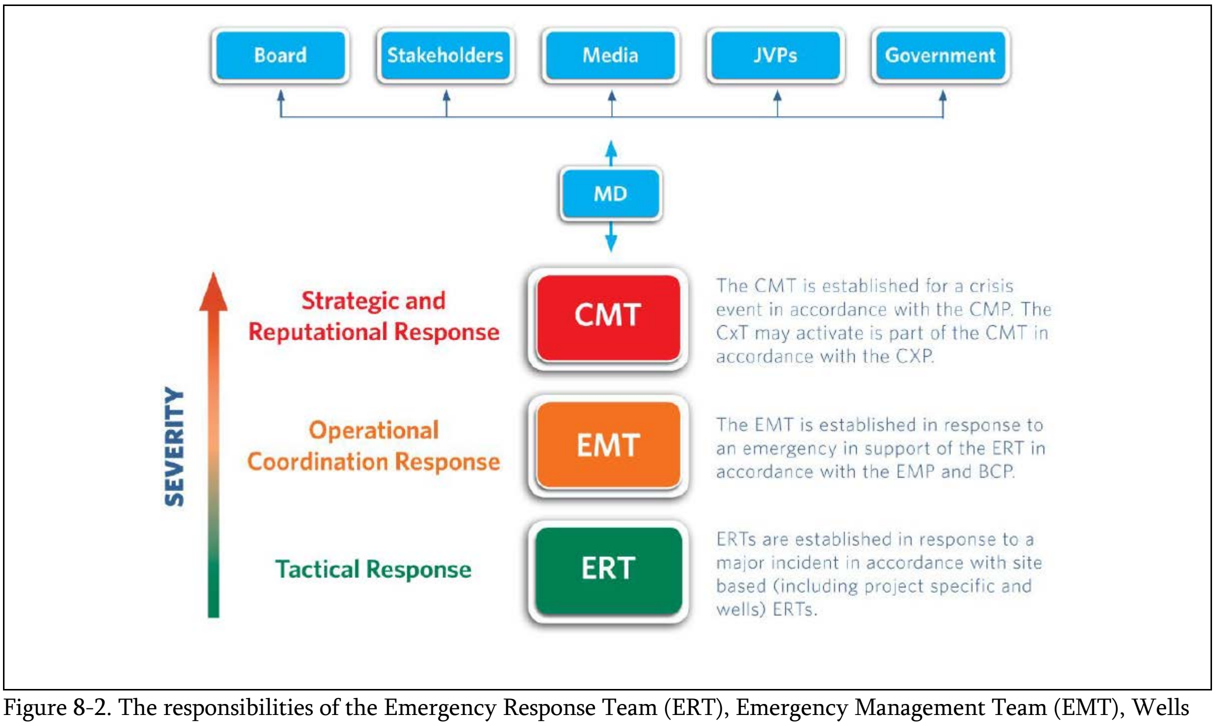


Figure 8-2. The responsibilities of the Emergency Response Team (ERT), Emergency Management Team (EMT), Wells Emergency Team (WET) and Crisis Management Team (CMT) are outlined in Table 8-5.

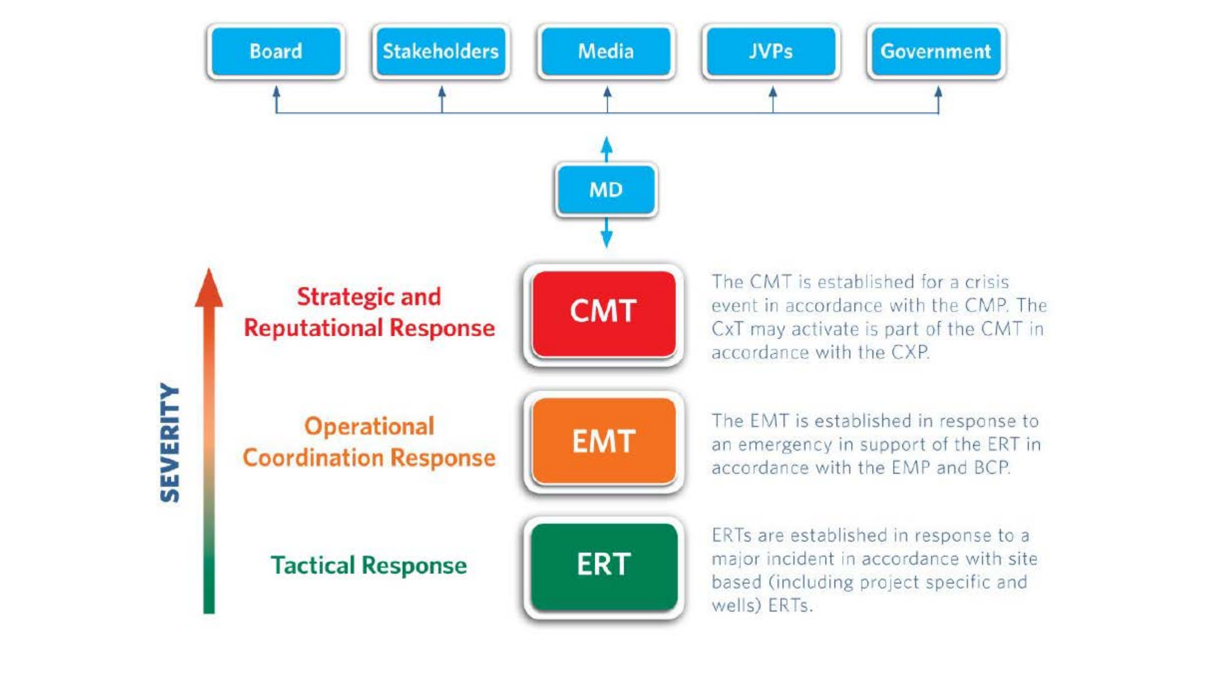


Figure 8-2: Beach crisis and emergency management framework

Table 8-5: Responsibilities of the Beach CMT, EMT, WET & ERT

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 Communication Team if required.
EMT	Adelaide, Melbourne	• Provide operational management support to the ERT 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.
WET	Adelaide	• The WET interface with the Vessel and implement Beach source control procedures in the event of a LOWC.
ERT	Site	• Respond to the emergency in accordance with the site-specific ERP.

8.15.1 Oil Pollution Emergency Plan

Oil spill response arrangements associated with this activity are detailed within the Offshore Victoria – Otway Basin OPEP (CDN/ID S4100AH717907).

8.15.2 Operational and Scientific Monitoring Plan

Operational and scientific monitoring arrangement associated with this activity are detailed within the Offshore Victoria OSMP (CDN/ID S4100AH717908).

Table 8-6 details particular values and sensitivities that may require monitoring in the event of an MDO release during the summer metocean season based upon conservative (low exposure) in-water thresholds. There is no shoreline contact at low exposure thresholds predicted.

Surface exposure was typically restricted to the immediate vicinity of the release location, however a low probability (1%) of exposure to the Apollo MP was predicted. These identified values and sensitivities are not exhaustive, as other receptors may also require monitoring in the event of a Level 2 or Level 3 hydrocarbon spill but provide an indication of the potential extent of hydrocarbon contact to formally managed areas.

Table 8-6: Potential exposure to receptors from low in-water thresholds during the summer season – MDO release from Artisan-1 well location

Receptor type	Receptor name	Probability (%) of instantaneous dissolved >6 ppb	Maximum instantaneous dissolved hydrocarbon exposure (ppb)	Probability (%) of instantaneous entrained >10 ppb	Maximum instantaneous entrained (ppb)
AMP	Apollo	3	22	25	406
	Beagle	-	-	-	-
MNP	Discovery Bay	-	-	3	25
	Point Addis	-	-	-	-
	Port Philip Heads	-	-	-	-
	Twelve Apostles	-	-	26	278
	Wilsons Promontory	-	-	-	-
MP	Lower South East	-	-	2	22
Ramsar wetland	Port Philip Bay and Bellarine Peninsula	-	-	-	-

8.15.3 Testing of spill response arrangements

In accordance with Regulation 14(8A)(8C) of the OPGGS(E)R and HSEMS Standard 16: Crisis and Emergency Preparedness and Response, the response arrangements will be tested:

- When they are introduced;
- When they are significantly amended; and
- Not later than 12 months after the most recent test.

Prior to commencing the activities, spill response arrangements will be tested as per Table 12-1 of the Offshore Victoria - Otway Victoria OPEP. The outcomes of the test will be documented to assess the effectiveness of the exercise against its objectives and to record any lessons and actions. Any actions will be recorded and tracked to completion.

8.16 Plant and Equipment (HSEMS Standard 15)

The intent of this performance standard is that Beach's facilities, plant, equipment, machinery and tools are purchased, designed, constructed, commissioned, operated, maintained, modified and decommissioned in a manner that ensures HSE risks are effectively managed.

Plant and equipment that have been identified as a control measure for the purposed of managing potential environmental impacts and risks from the activity have an associated EPS that details the performance required of the plant and/or equipment as detailed in Chapter 7.

8.17 Monitoring the Work Environment (HSEMS Standard 16)

The intent of this performance standard is that HSE risks to personnel associated within the working environment are eliminated or reduced to ALARP. See section 8.23.1.

8.18 Health and Fitness for Work (HSEMS Standard 17)

Beach encourages a healthy lifestyle for its employees and provides formal programs to promote health and fitness.

8.19 Environment Effects and Management (HSEMS Standard 18)

The intent of this performance standard is that potential adverse environmental effects resulting from Beach's operations and activities are identified, assessed and monitored and as far as is reasonably practicable, eliminated or minimised.

Chapter 7 details the assessment undertaken of the activity to identify and assess potential impacts and risks and apply control measure to manage the impacts and risks to ALARP and an acceptable level.

8.19.1 Beach Energy Domestic IMS Biofouling Risk Assessment Process

Scope

All vessels and submersible equipment mobilised from domestic waters to undertake offshore petroleum activities within the operational area must complete the Beach Domestic IMS Biofouling Risk Assessment Process prior to the initial mobilisation into the operational area.

This domestic IMS biofouling risk assessment process does not include an evaluation of potential risks associated with ballast water exchange given all vessel operators contracted to Beach must comply with the most recent version of the Australian Ballast Water Management Requirements.

Purpose

- Validate compliance with regulatory requirements (Commonwealth and State) in relation to biosecurity prior to engaging in petroleum activities within the operational area;
- Identify the potential IMS risk profile of 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; and
- Prevent the translocation and potential establishment of IMS into non-affected environments (either to or from the operational area).

Screening Assessment

Prior to the initial mobilisation of the vessels or submersible equipment to the operational area, a screening assessment must be undertaken considering:

- All relevant IMO and regulatory requirements under the *Biosecurity Act* 2015 and/or relevant State or Territory legislation must be met;
- If mobilising from a high or uncertain risk area, the vessel must have been within that area for fewer than 7 consecutive days or inspected and deemed low-risk by an independent IMS expert, within 7 days of departure from the area;
- Vessels must have valid anti-fouling coatings based upon manufacturers specifications;
- Vessels must have a biofouling control treatment system in use for key internal seawater systems; and
- Vessels must have a Biofouling Management Plan and record book consistent with the International Maritime Organization (IMO) 2011 Guidelines for the control and management of ships' biofouling to minimize the transfer of invasive aquatic species (IMO Biofouling Guidelines).

Where relevant criteria have been met, no further management measures are required, and the vessel may be deployed into the operational area.

Where relevant criteria have not been met, or there is uncertainty if these criteria have been met, Beach must engage an independent IMS expert to undertake a detailed biosecurity risk assessment, and the vessel must be deemed low-risk prior to mobilisation into the operational area.

Basis of Detailed IMS Biofouling Risk Assessment

The basis by which an independent IMS expert evaluates the risk profile of a vessel includes:

- The age, type and condition of the vessel;
- Previous cleaning and inspection undertaken and the outcomes of previous inspections;
- Assessment of internal niches with potential to harbour IMS;
- The vessel history since previous inspection;
- The origin of the vessel including potential for exposure to IMS;
- Translocation risk based upon source location in relation to activity location – both in relation to the water depth/proximity to land at the point of origin and the potential survivorship of IMS from the point of origin to the operational area;
- The mobilisation method – whether dry or in-water (including duration of low-speed transit through high or uncertain risk areas);

- The application, age and condition of antifouling coatings;
- The presence and condition of internal seawater treatment systems;
- Assessment of Biofouling Management Plan and record book against IMO Biofouling Guidelines; and
- Where appropriate, undertake in-water inspections.

8.20 Product Stewardship, Conservation and Waste Management (HSEMS Standard 19)

This standard requires that the lifecycle HSE impacts of Beach's products and services are assessed and communicated to customers and users to enable responsible usage management. Consumption of resources and materials is minimised as far as reasonably practicable. Wastes are eliminated, reduced, recycled and/or reused as far as reasonably practicable or disposed of appropriately.

General and hazardous waste streams generated during the activity are backloaded to port for disposal to a licenced waste facility by a licenced waste handling contractor. Wastewater and putrescible wastes are managed as per MARPOL requirements as detailed in Chapter 7.

8.21 Audits, Assessments and Review (HSEMS Standard 20)

The audits, assessment and review standard ensures that HSE performance and systems are monitored and assessed through periodic reports and audits to identify trends, measure progress, assess conformance and drive continual improvement. Management system reviews are conducted to ensure the continuing suitability, adequacy and effectiveness of the HSEMS.

8.21.1 Audits and Assessments

Environmental performance will be reviewed in several ways to ensure:

- EPSs to achieve the EPOs are being implemented and reviewed.
- Potential non-compliances and opportunities for continuous improvement are identified.
- Environmental monitoring and reporting requirements have been met.

For offshore activities undertaken by the vessel, the following will be undertaken:

- Pre-mobilisation inspection of each vessel (desktop or site) to confirm the requirements of the EP will be met.

Non-compliances and opportunities for improvements identified via inspection, audits or other means are communicated to the appropriate supervisor and/or manager to report and action in a timely manner. Tracking of non-compliances and audit actions will be undertaken using Beach's incident management system which includes assigning a responsible person for ensuring the action is addressed and closed out.

Non-compliances are communicated via the daily report and pre-start meetings.

8.21.2 Environment Plan Review

Beach may determine that a review of the EP is required when one or more of the following occurs:

- Changes to impacts and risks and/or controls identified during the activity.
- Annual environmental performance reporting identifies issues in the EP that require review and/or updating.
- Implementation of corrective actions to address internal audits findings or external inspection recommendations.

- An environmental incident and subsequent investigation identify 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 to risk and controls identified through the Risk Management Processes as per Section 8.8.
- New information or changes in information from stakeholders, legal and other requirements. This shall be achieved by:
  - Subscription to regulator and relevant industry distribution lists (such as APPEA and IOGP);
  - Annual review of the EP inclusive of relevant regulatory requirements (when in force for longer than 12 months); and
  - Ongoing stakeholder communications

Where the EP is revised, the changes are to be logged in the EP Revision Change Register. Any revisions to the EP are to be assessed against the criteria for submission of a revised EP to NOPSEMA as detailed in Table 8-7 and MoC as per Section 8.12 shall be evaluated.

8.21.3 Environment Plan Revision

In accordance with Regulation 17 of the OPGGS(E)R, a revision of this EP shall be submitted to NOPSEMA as per the regulatory requirements in Table 8-7.

Table 8-7: Regulatory requirements for submission of a revised EP

OPGGS(E)R	EP Revision Submission Requirements
17(1)	With the regulator’s approval before the commencement of a new activity.
17(5)	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.
17(6)	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.
17(7)	A change in titleholder that results in a change in the manner in which the environmental impacts and risks of an activity are managed.

9 Stakeholder Consultation

Stakeholder consultation has been undertaken in accordance with current NOPSEMA guidelines on consultation requirements under the OPGGS(E)R.

Beach is committed to open, on-going and effective engagement with the communities in which it operates and providing information that is clear, relevant and easily understandable. Beach welcomes feedback and is continuously endeavouring to learn from experience in order to manage our risks.

9.1 Regulatory Requirements

Section 280 of the OPGGS Act states that a person carrying out activities in an offshore permit area should not interfere with other users of the offshore area to a greater extent than is necessary for the reasonable exercise of the rights and performance of the duties of the first person.

In relation to the content of an EP, more specific requirements are defined in the OPGGS (E) Regulation 11(A). This regulation requires that the titleholder consult with ‘relevant persons’ in the preparation of an EP. A relevant person is defined as:

a) Each Department or agency of the Commonwealth to which the activities to be carried out under the environment plan, or the revision of the environment plan, may be relevant;

b) Each Department or agency of a State or the Northern Territory to which the activities to be carried out under the environment plan, or the revision of the environment plan, may be relevant;

c) The Department of the responsible State Minister, or the responsible Northern Territory Minister;

d) A person or organisation whose functions, interests or activities may be affected by the activities to be carried out under the environment plan, or the revision of the environment plan;

e) Any other person or organisation that the titleholder considers relevant.

Regulation 9(8) of the OPGGS(E)R requires all sensitive information (if any) in an environment plan, and the full text of any response by a relevant person to consultation under regulation 11A in the course of preparation of the plan, must be contained in the sensitive information part of the plan and not anywhere else in the plan.

Regulation 9AB of the OPGGS(E)R requires the Regulator must publish the EP on the Regulator’s website.

Regulation 14(9) of the OPGGS(E)R also defines a requirement for ongoing consultation to be incorporated into the Implementation Strategy. In addition, Regulation 16(b) of the OPGGS(E)R requires that the EP contain a summary and full text of this consultation. It should be noted that the full text is not made publicly available for privacy reasons.

9.2 Stakeholder consultation objectives

The objectives of Beach’s stakeholder consultation in preparation of the EP were to:

- Identify all relevant persons for stakeholder consultation;
- Engage with stakeholders and the community in an open, transparent, timely and responsive manner;
- Minimise community and stakeholders concern where practicable;
- Build and maintain trust with stakeholders and the local community; and
- Demonstrate that stakeholders have been consulted in line with the requirements of the relevant regulations.

The objectives were achieved by:

- Identifying stakeholders whose functions, interests or activities may be affected by the activity;
- Confirming, through consultation, 'relevant persons' (stakeholders) and engaging them at the earliest opportunity;
- Providing sufficient information to allow relevant persons to make an informed assessment of the possible consequences of the activity on their functions, interests or activities;
- Ensuring relevant persons are informed about the process for consultation and their feedback is considered in the development of the EP;
- Ensuring that issues raised by relevant persons are adequately assessed, and where requested or relevant, responses to feedback are communicated back to them;
- Providing a copy of this EP to NOPSEMA for publication on the NOPSEMA website as per regulation 11B of the OPGGS(E)R; and
- Ensuring that relevant person sensitive information is not made publicly available.

9.3 Consultation approach

The approach Beach undertook for the activities was:

- Identify stakeholders that may be affected by the activities by reviewing its stakeholder database and consulting with existing stakeholders to identify other relevant stakeholders. As Beach, through its subsidiary Lattice Energy, has operated in the area since the early 2000s, an extensive database of stakeholders has been built, and engagement has been undertaken in relation to both the current operating assets and in executing projects such as the Enterprise 3D Transition Zone Seismic survey in 2017 and the Crowes Foot Marine Seismic Survey in 2016.
- Determine the possible consequences of the activities on each stakeholders' functions, interests or activities from previous knowledge, reviewing any public statements by the stakeholder as to how they want to be engaged by oil and gas companies and/or consulting with stakeholders.
- Provide sufficient information, based on possible consequences and the way they would like to be consulted, for the stakeholder to be able to make an informed assessment of the possible consequences of the activity on their functions, interests or activities.
- Allow a reasonable period of time for the stakeholder to review and respond to any information provided, typically two to four weeks.
- Provide further information requested by the stakeholder or that became available during the consultation period and allowed a reasonable time for the stakeholder to review and respond. Depending on the information provided this was between one to four weeks.
- Ensure relevant stakeholders were informed about the consultation process and how their feedback, questions and concerns were considered in the EP.

9.3.1 Fishery specific consultation approach

the main stakeholder group for the activity is commercial fishers. Beach, through its subsidiary Lattice Energy, has a substantial history of engagement with local fisheries. For the drilling activity (for which this anchoring activity relates to) the consultation strategy for potentially impacted fishers is as follows:

- Engage with SIV to identify how best to consult with commercial fishers.

- Provide a short information sheet to SIV to mail to their members, including groups such as Victorian Rock Lobster Association and Port Campbell Professional Fishers association. The cover letter requested that fishers identify themselves to SIV if they thought they could be impacted by Beach's activities. The information sheet covered both seabed assessment and drilling programs and a more detailed version was published on Beach's website at https://www.beachenergy.com.au/vic-otway-basin/.

- The mailout was issued on 29 March 2019, with a request that fishers respond by 19 April 2019. To date four fishers have contacted SIV in relation to the Beach activities information.

- Beach also provided information to fishery groups and has been contacted directly by two fishers.

- Where fishers have identified that they may be potentially impacted by the activity the following is undertaken:

    - For fishers who have contacted SIV, Beach will meet with SIV to gather information about the fishers fishing patterns and locations and to establish contact for ongoing consultation throughout the project.

    - For fishers who have contacted Beach directly, Beach engaged its Fisheries Liaison Officer to meet with them and gather information about their fishing patterns and locations and to establish contact for ongoing consultation throughout the project.

    - Where fishers are providing Beach with sensitive fishing data Beach will provide them Beach's privacy policy and obligations.

    - A Commercial Fisher Operating Protocol (Appendix B) was developed and provided to fishers who have identified that they may be potentially impacted and other relevant stakeholders for their information. The protocol details pre-activity and on-water communication processes, including SMS messages and radio communication on Channel 16, data confidentiality and Beach's claim process. The protocol was developed based on feedback from consultation with the fishers who have identified they could be potentially impacted and SIV who have been contacted by fishers who have identified they could be potentially impacted.

- Once the drilling schedule and final well locations are confirmed (minimum of 4 weeks prior to commencement of the activity) they will be provided to fishers who have identified they fish in the area, SIV, VFA and other relevant fishing groups who have requested further information.

- Beach is conscious that the duration of drilling may change slightly (subject to operations), and this will be assessed by Beach to determine if it would materially change the information provided to fishers to identify if they would be potentially impacted by the activity. If there is no material change, in order to minimise confusion for fishers and the time required for engagement, Beach will inform relevant stakeholders of any changes a minimum will be 4 weeks prior to the commencement of the activity. If the changes are material, then updated information will be provided to relevant stakeholders.

- The drill rig exclusion zone (500 m) and cautionary zone (2 km) will be communicated via Notice to Mariners. Fishers are able to contact the rig via channel 16 rig at any time. The drill rig will be stationary until it is required to move to the next location.

- Beach will seek permission from the identified fishers to include them in their SMS messaging system. Once the activity commences, Beach will provide SMS messaging system updates 2 days prior to the rig moving to a new location detailing the new location and the expected duration at the location so Fishers can plan their fishing activities with the least disruption.

- Beach's position is that the commercial fisheries cover a vast area and the drilling activity only requires access to a relatively small area (500 m rig safety zone and 2 km cautionary zone) over a short period of time and so we aim to minimise impact to each other's activities. However, Beach has a stated position that fishers should not suffer an economic loss as a result of our activities. Should a fisher incur additional costs in order to work around our activities, or if they have lost catch or have damaged equipment Beach will assess the claim and ask for evidence of past fishing history and the loss incurred and, where the claim is genuine, will provide compensation. Beach will also ensure that the evidence required is not burdensome on the fisher while ensuring genuine claims are processed.

9.4 Stakeholder Identification

Relevant stakeholders were identified by reviewing:

- Social receptors identified in the existing environment section;
- Existing stakeholders within Beach's stakeholder register;
- Reviewing consultation record for previous Otway Basin activities undertaken by Beach and Lattice;
- Commonwealth and State fisheries jurisdictions and fishing effort in the region; and
- The Australian Government Guidance Offshore Petroleum and Greenhouse Gas Activities: Consultation with Australian Government agencies with responsibilities in the Commonwealth Marine Area.

The Otway Development commenced production in late February 2008. Woodside Energy, the titleholder at the time, undertook significant consultation with the community, non-government organisations and Government departments. Consultation has been ongoing through the change of titleholders to Origin and then Lattice.

Lattice has also undertaken three marine seismic surveys between 2014 and early 2017 and has had regular and detailed engagement with both fishing industry associations and individual fishers over this period. In 2017, Lattice commenced consultation in relation to the Otway Development Phase 4 and associated seabed assessment and drilling activities. Beach then commenced consultation with stakeholders in early 2019 when they decided to progress with the Otway Development Phase 4. Consequently, Beach considers that it has effectively identified relevant stakeholders and has a good understanding of issues and areas of concern within the Otway Development area.

Table 9-1 details the relevant stakeholders identified and groups them by the categories listed under OPGGS(E) Regulation 11A. It should be noted that no fishing effort by Tasmanian fisheries occurs within the operational area.

9.5 Provision of Information

The OPGGS(E)R require titleholders to 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. This EP is published on the NOPSEMA website as per regulation 11B of the OPGGS(E)R.

To determine the type of information to provide to a stakeholder an Information Category was developed and is detailed in Table 9-2.

This anchoring activity is part of the broader Beach Otway Offshore Gas Development Information, with anchoring addressed as part of this consultation. As such, Beach has determined that a separate round of stakeholder consultation is not warranted for this short-term activity that has been addressed throughout 2019's consultation activities. Information about the drilling activity has been made available via:

- A community information session held in Port Campbell on 13 February 2019.
- Information sheets and information available on the Beach website: https://www.beachenergy.com.au/our-communities/. Information sheets are available in Sensitive Information document.

9.6 Summary of Stakeholder Consultation

Table 9-4 provides a summary of the stakeholder consultation undertaken as part of the development of the Otway Offshore Gas Development EP (this anchoring activity is part of the development). The summary provides details of the information sent to stakeholders and any response received. It also details the assessment undertaken of any objection or claims. Where an objection or claim was substantiated via evidence such as publicly available credible information and/or scientific or fishing data, this were assessed as per the risk assessment process detail in Section 9.2 and controls applied where appropriate to ensure impacts and risks are managed to ALARP and an acceptable level.

Where an objection or claim was raised by a stakeholder, they were provided feedback as to 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 ALARP and an acceptable level or if not substantiated why.

Table 9-1: Relevant stakeholders for the activity (refer to Table 9-2 for information category definition)

Stakeholder	Relevance	Information category*
Department or agency of the Commonwealth to which the activities to be carried out under the EP may be relevant		
Australian Fisheries Management Authority (AFMA)	Australian Government agency responsible for the efficient management and sustainable use of Commonwealth fish resources. Activity is within a Commonwealth fishery area. AFMA expects petroleum operators to consult directly with fishing operators or via their fishing association body about all activities and projects which may affect day to day fishing activities.	1
Australian Hydrological Office (AHO)	Australian Government agency responsible for issuing notices to mariners.	2
AMSA JRCC	Australian Government agency responsible for maritime safety, adherence to advice, protocols, regulations. Issue Auscoast warnings.	2
DAWE – Director of National Parks	Australian Government agency responsible for MNES and AMPs.	1
Each Department or agency of a State or the Northern Territory to which the activities to be carried out under the EP may be relevant		
Victorian Fishery Authority	Activity is within a Victorian fishery area or will impact or potentially impact a Victorian fishery area or resource.	1
The Department of the Responsible State or Northern Territory Minister		
Tasmanian DPIPWE	Regulatory body for oil and gas activities in Tasmanian waters. Required to be notified of reportable incidents. Commencement and cessation notifications are only required for drilling and seismic surveys.	2
DJPR - Earth Resources Regulation	Regulatory body for oil and gas activities in Victorian waters. Required to be notified of reportable incidents. Commencement and cessation notifications are only required for drilling and seismic surveys.	2
A person or organisation whose functions, interests or activities may be affected by the activities to be carried out under the EP		
Commonwealth Fisheries Association (CFA)	Peak association representing commercial fishing in Commonwealth fisheries. Industry Association for the following Commonwealth fisheries that have catch effort within the operational area: • SESSF (Commonwealth South East Trawl Sector, Scalefish Hook Sector and the Shark Hook and Shark Gillnet Sectors).	1

Stakeholder	Relevance	Information category*
	• Southern Squid Jig Fishery.	
Port Campbell Professional Fisherman's Association	Association representing Port Campbell fishers, primarily rock lobster around Port Campbell and Peterborough. Engagement via SIV see Consultation Record #SIV 07.	1
Portland Professional Fishermen's Association	Association representing Portland fishermen.	1
South East Trawl Fishing Industry Association (SETFIA)	SETFIA represents businesses with a commercial interest in the SETF and the East Coast Deepwater Trawl Sector. SETFIA represent the following fisheries that have catch effort within the operational area: • SESSF (Commonwealth South East Trawl Sector, Scalefish Hook Sector and the Shark Hook and Shark Gillnet Sectors).	1
Seafood Industries Victoria (SIV)	Peak body representing professional fishing, seafood processors and exporters in Victoria. SIV primary contact for State fishers.	1
Southern Rock Lobster Limited South Australian Rock Lobster Advisory Council Inc. South Eastern Professional Fishermen's Association Inc. Tasmanian Rock Lobster Fishermen's Association	Associations representing state-based commercial rock lobster fishers. Associations are represented by one consultancy and are therefore grouped.	1
Victorian Rock Lobster Association (VRLA)	VRLA represents Victorian rock lobster licence holders. Engagement via SIV see Consultation Record #SIV 07.	1
Warrnambool Professional Fishermen's Association	Association represents Warrnambool fishermen, primarily rock lobster on strip from Warrnambool to Port Campbell. Engagement via SIV see Consultation Record #SIV 07.	1
Any other person or organisation that the titleholder considers relevant		
Otway Gas Plant Community Reference Group	Community Reference Group established for the Otway Gas Plant. No impact to stakeholders' functions, interests or activities due to distance offshore. However, Beach maintains engagement in relation to activities within the Otway area.	3
Tasmanian Rock Lobster Fisherman's Association	The Tasmanian Rock Lobster Fishermen's Association is the peak commercial fishing body recognised under the Act for the rock lobster fishery. The Development Area does not overlap any Tasmanian rock lobster fishery where there is catch effort. However, Beach maintain engagement in relation to activities within the Otway area.	3
Tasmanian Seafood Industry Council (TSIC)	The TSIC is the peak body representing the interests of wild capture fishers, marine farmers and seafood processors in Tasmania. The Development Area does not overlap any Tasmanian fisheries where there is catch effort.	3

Stakeholder	Relevance	Information category*
	However, Beach maintain engagement in relation to activities within the Otway area.	

* *See Table 9-2 for information category definition*

Table 9-2: Information category to determine information provided stakeholder

Information Category	Description	Information Type
1	Organisations or individuals whose functions, interests or activities may be impacted by the activity. Representative body for fishers who provide information to their members.	Information Sheet and/or provision of information as per organisations consultation guidance Provision of further information where required Meeting or phone call where required
2	Organisation who receive activity commencement and cessation notices.	Commencement and cessation notices.
3	Organisations or individuals whose functions, interests or activities will not be impacted by the activity but are kept up to date with Beach's activities in the Otway area.	Information Sheet

9.7 Ongoing Stakeholder Consultation

Beach will continue to consult with stakeholders to keep them informed of activities as necessary as part of the broader Otway Offshore Gas Development. This will be done via ongoing consultation including commencement and cessation notifications and updates in relation to the drilling activity and via one-on-one communications, mail outs and provision of information on the Beach website. Beach will use a message media system to provide regular information on the drilling activity to stakeholders that have requested this service.

Any objections or claims raised from ongoing consultation will be managed as per Section 9.7.2.

Table 9-4 details the ongoing stakeholder consultation requirements. Records of ongoing stakeholder engagement will be maintained as per Section 8.5.2 Records Management.

9.7.1 Ongoing Identification of Relevant Persons

New or changes to relevant persons will be identified through ongoing consultation with stakeholders including peak industry bodies and the environment plan review process detailed in Section 8.21.2. Should new relevant persons be identified they will be contacted and provided information about the activity relevant to their functions, interests or activities. Any objections or claims raised will be managed as per Section 9.7.2.

9.7.2 Management of Objections and Claims

If any objections or claims are raised during ongoing consultation, these will be substantiated via evidence such as publicly available credible information and/or scientific or fishing data. Where the objection or claim is substantiated it will be assessed as per the risk assessment process detail in Chapter 6 and controls applied where appropriate to manage impacts and risks to ALARP and an acceptable level. Stakeholders will be provided with feedback as to whether their objection or claim was substantiated, and if not why, and if it was substantiated how it was assessed and if any controls were put in place to manage the impact or risk to ALARP and an acceptable level. If the objection or claim triggers a revision of the EP, this will be managed as per Section 8.21.2 and 8.21.3. This will also be communicated to the stakeholder.

Table 9-3: Ongoing stakeholder consultation requirements

Stakeholder	Ongoing stakeholder requirement	Timing
Relevant stakeholders	Ongoing engagement including: • Stakeholder communication of information and addressing queries and concerns via email, phone or meeting; and • Updates to the Beach website.	As required
General	Public notice in local newspapers (i.e. Warrnambool Standard and The Cobden Timboon Coast Time). To include: • Activity description; • Activity location; • Timing; • How to access the EP and project information; and • Beach contact details.	4 weeks prior to activity commencing
Relevant stakeholders	Stakeholder notification of activity commencement. Notification to include: • Type of activity; • Location of activity, coordinates and map; • Timing of activity: expected start and finish date and duration; • Sequencing of locations if applicable; • MODU and support vessel details including call sign and contact; • 500 m rig safety exclusion zone and 2 km cautionary zone and requested clearance from other vessels; and • Beach contact details. Note: coordinates to be provided as degrees and decimal minutes referenced to the WGS 84 datum.	4 weeks prior to activity commencing
AHO	Vessel Contractor to issue notification of activity for publication of Notice to Mariners. Only need to update AHO of changes including if activity start or finish date changes. Do not need to provide cessation notification as long as NTM covers period of activity.	3 weeks prior to activity commencing
AMSA - JRRC	Vessel Contractor to issue notification of activity for publication of AusCoast warning. Only need to update JRCC of changes including if activity start of finish date changes. Do not need to provide cessation notification as long as AusCoast warning covers period of activity.	48 – 24 hrs prior to activity commencing
NOPSEMA DJPR DPIPWE	Regulatory notification of start of activity.	10 days prior to activity commencing
Relevant stakeholders who have requested	SMS messaging system updates 2 days prior to the rig moving to a new location detailing the new location and the expected duration at the location.	During activity

Stakeholder	Ongoing stakeholder requirement	Timing
MODU location information.		
NOPSEMA DJPR DPIPWE	Regulatory notification of cessation of activity.	Within 10 days of activity completion
DAWE	To be notified in the instance of an impact to an AMP or for emergency responses.	New impact identified and/or oil pollution emergency

Table 9-4: Summary of stakeholder consultation records and Beach assessment of objections and claims

Information sheets OP19IS#1 - Otway Offshore Program 2019 2pp Info Sheet #1, OP19IS#2 - Otway Offshore Program 2019 10pp Info Sheet, OPOG19IS#1, OPOG19IS#2 and OP19-USAIS-P2/7 are available in Sensitive Information document

Stakeholder name	Date	Record #	Description	Assessment of objection or claim
Australian Communications and Media Authority (ACMA)	27/03/2019 to 17/04/2019	ACMA 01 to ACMA 11	Request for Indigo Central submarine cable coordinates. ACMA provided coordinates and a map showing that the cable is ~ 50 km from the Thylacine platform. Beach acknowledge information and note that the planned activities will not interfere with the cable.	Indigo Central Submarine Cable is ~ 50 km from the closest well location (Thylacine) and therefore out of the operational areas for the drilling activity.
AFMA	18/04/2019	AFMA 01 OP19IS#1 - Otway Offshore Program 2019 2pp Info Sheet #1 Link to: OP19IS#2 - Otway Offshore Program 2019 10pp Info Sheet #2	Email: Introducing Beach Energy and provision of information on the 'Otway Offshore Project and a summary of Beach's review of Commonwealth fisheries in the project area. A review of the AFMA website identified that the operational area where the seabed assessments and drilling activities are planned to occur over the following Commonwealth fisheries: • Bass Strait Central Zone Scallop Fishery; • Eastern Tuna and Billfish Fishery; • Skipjack Tuna Fishery (Eastern); • Small Pelagic Fishery (Western sub-area); • SESSF (Commonwealth South East Trawl Sector, Scalefish Hook Sector and the Shark Hook and Shark Gillnet Sectors); • Southern Bluefin Tuna Fishery; and • Southern Squid Jig Fishery. However, a review of the ABARES Fishery Status Reports 2014 to 2018 identified that only the following have catch effort within the operational area: • SESSF (Commonwealth South East Trawl Sector, Scalefish Hook Sector and the Shark Hook and Shark Gillnet Sectors); and • Southern Squid Jig Fishery. Information has been provided to AFMA and the following fishing associations: • Scallop Fisherman's Association Inc.; • SIV – SIV have sent out the information sheet attached to their members; • Tuna Australia (ETBF Industry Association); and • SETFIA. The main concerns raised by commercial fishers are sound from the seabed assessment and displacement while the activities occur. Sound from the seabed assessment equipment is of significantly lower intensity than for seismic surveys. Sound modelling identified that the sound threshold level for fish was reached at a maximum distance of 1.6 m from the equipment and did not reach the impact threshold for invertebrates at the seafloor. The seabed assessment areas will take up to 12 days for the largest area. Drilling at each location will range from 35 to 90 days with fishers not being able to access a 500 m area around the MODU. Thus, the area of displacement is small and not for a significant period of time.	Provision of information. No reply.
AFMA	24/06/2019 27/06/2019	AFMA 02	Beach request for licensing information for any Commonwealth fishers who are active within the Beach Otway Development operating area. Provided AFMA the coordinates for the operating area. AFMA replied: Our Vessel Monitoring Team checked the area you outlined and there are currently no vessel's active in that area.	Appendix B4.7 Commonwealth Managed Fisheries updated with the information that there is currently no active Commonwealth fishing vessels within the operational area.
AHO	29/03/2019	AHO 01	Rang AHO to clarify requirement for notice to mariners (NTM) requirements. Requirement to notify AHO a minimum of 3 week prior to commencement of the activity information needs to include activity location or area, vessel/rig details including contact details and calls signs, period that NTM will cover (start and finish date). Only need to update AHO if activity start of finish date changes. Do not need to provide cessation notification as long as NTM covers period of activity.	Section 9.7 Ongoing Consultation updated to include AHO requirements.
Commonwealth Fisheries Association	18/04/2019	CFA 01 OP19IS#1 - Otway Offshore Program 2019 2pp Info Sheet #1 Link to: OP19IS#2 - Otway Offshore Program 2019 10pp Info Sheet #2	Email: Introducing Beach Energy and provision of information on the 'Otway Offshore Project and a summary of Beach's review of Commonwealth fisheries in the project area. A review of the AFMA website identified that the operational area where the drilling activity is planned to occur over the following Commonwealth fisheries: • Eastern Tuna and Billfish Fishery; • Small Pelagic Fishery (Western sub-area); • SESSF (Commonwealth South East Trawl Sector, Scalefish Hook Sector and the Shark Hook and Shark Gillnet Sectors); • Southern Bluefin Tuna Fishery; and	Provision of information. No reply. Drilling is expected to take approximately 64 to 90 days at each well location, depending on the final work program and potential operational delays – within the period relayed to CFA.

Stakeholder name	Date	Record #	Description	Assessment of objection or claim
			• Southern Squid Jig Fishery. However, a review of the ABARES Fishery Status Reports 2014 to 2018 identified that only the following have catch effort within the operational area: • SESSF (Commonwealth South East Trawl Sector, Scalefish Hook Sector and the Shark Hook and Shark Gillnet Sectors); and • Southern Squid Jig Fishery. Information has been provided to AFMA and the following fishing associations: • Scallop Fisherman's Association Inc.; • SIV – SIV have sent out the information sheet attached to their members; • Tuna Australia (ETBF Industry Association); and • SETFIA. The main concerns raised by commercial fishers are sound from the seabed assessment and displacement while the activities occur. Sound from the seabed assessment equipment is of significantly lower intensity than for seismic surveys. Sound modelling identified that the sound threshold level for fish was reached at a maximum distance of 1.6 m from the equipment and did not reach the impact threshold for invertebrates at the seafloor. Drilling at each location will range from 35 to 90 days with fishers not being able to access a 500 m area around the MODU. Thus, the area of displacement is small and not for a significant period of time.	
Commercial Rock Lobster and Crab Fisher	17/04/2019	CRLF 01	Commercial Rock Lobster and Crab Fisher rang as fishes around the Thylacine platform and in that region. He is concerned about the impact on his fishing during drilling as he fishes in the 40-50 fathoms (73 – 91) region in the deeper water west of the platform. Is often there around January to February. He stops fishing in mid-September (when the rock lobster season ends). The season re-starts on 15th Nov. Beach explained that for the seabed assessments the vessel will be moving around and won't be in a particular area for very long. Beach can engage with him at the time and tell him the vessels location and where we are going to be so we can work around one another. Stakeholder is more concerned around the drill periods because we will be in the one spot for longer and he thinks the exclusion zone will be a few kilometres. Would like to meet with Beach to show where he fishes. Beach said there was time to catch up as the seabed assessments won't start before September and drilling until December.	Stakeholder raised concerns about impacts from exclusion to his fishing areas specifically in relation to drilling due to the period when he fishes (January and February and again starting 15th Nov. This period coincides with the proposed drilling activity.
Commercial Rock Lobster and Crab Fisher	18/04/2019 21/04/2019	CRLF 02 CRLF 03	Phones calls to arrange for Beach FLO to meet with stakeholder.	See Stakeholder Record CRLF 05
Commercial Rock Lobster and Crab Fisher	24/04/2019	CRLF 04	Meeting with FLO and stakeholder. Stakeholder and FLO covered Mapping of fishing grounds and seasonal pattern compared with planned works and transit routes by support vessels, displacement and financial loss concerns, neighbouring works by Cooper Energy, exclusion and advisory clearance zones, other fishing operators in area.	See Stakeholder Record CRLF 05 and 06 of letter to stakeholder of record of meeting and details of Beach's arrangements to manage impact to stakeholder to ALARP and an acceptable level.
Commercial Rock Lobster and Crab Fisher	9/05/2019	CRLF 05 CRLF 06	Letter from Beach to stakeholder detailing: • Beach's confidentiality/privacy policy. • That in future any coordinates supplied would be expressed in degrees and decimal minutes referenced to the WGS 84 datum, so they can immediately be entered on your GPS plotter. • When Beach activities plotted over the locations the stakeholder fished there is potential for interaction between Thylacine and La Bella. • In order to minimise impacts to your fishing, Beach will let fishers know expected timings and more precise location coordinates closer to the start of each activity and will also update fishers on a regular (possibly daily) basis of project status and vessel movement. • Beach's aim is to work together to minimise impacts on each other's operational plans, however, should you or any fisher wish to make a claim for loss as a result of our activities to contact Beach – contact details provided. • Beach would validate that the fisher regularly works in that area as well as evidence of the additional costs they have incurred or the loss they have suffered. Beach will then work with them to validate the claim and assess any compensation required. Validation procedures will necessarily involve access to fishing records and other relevant information. • Beach are aware of the issue you raised regarding your colleague's engagement with another Oil & Gas Company's vessel. When our project becomes operational Beach will undertake discussions with our vessel masters so that impacts on fishing and vice versa are as low as reasonably practicable. Beach's FLO will contact you shortly to discuss access to your fishing data and confirm that you would like to be included on our updates about the location of our activities while we are operational.	Beach aims to undertake the activity in a manner that does not unduly impact on fishers. This EP has been updated in response to the claims from this stakeholder as per the following: • Table 9-3 Ongoing stakeholder consultation requirements updated to note that for notifications to stakeholder where coordinates are supplied coordinates are to be expressed in degrees and decimal minutes referenced to the WGS 84 datum. • Stakeholder provided with Beach contact person should they wish to make a claim for loss as a result of Beach's activities. How Beach will deal with any claims is details in Section 9.3.1 Fishery specific consultation approach and was provided to stakeholder as part of the Beach's Commercial Fisher Operating Protocol (Stakeholder Record CRFL 08 – 09). • Section 8.6 Personnel, Competence, Training and Behaviours updated to include requirements for interactions with fishers and/or fishing equipment in the activity induction that will be required to be undertaken by all vessel personnel. • Engagement will be ongoing with stakeholder to ensure any impacts can be management to ALARP and an acceptable level.

Stakeholder name	Date	Record #	Description	Assessment of objection or claim
Commercial Rock Lobster and Crab Fisher	09/06/2019	CRLF 07	Meeting between stakeholder and FLO regarding seabed assessments and drilling to ascertain potential impacts and mitigations. Fisher discussed fishing pattern and the ability to work around Beach's operations in the area, noting the duration of assessment and drilling events. • Real time on water communications between project vessels and fisher best way to avoid adverse incidents as opposed to SMS message service. Stakeholder happy to receive text messages. • FLO informed stakeholder that due to anchors and cables around well site during drilling a 2km cautionary zone shall be established in addition to the 500m rig safety zone. • Stakeholder advised that timing the occurrence of drilling operations when fisher is not in these locations would be ideal. • The undertaking by Beach (9 May 2019) that fishers may claim for any validated loss was noted as was confidentiality of catch and effort information. • Advance notice of drilling: it takes up to a week to harvest from the reefs and so given the short duration of fishers need for access, advance notice of drilling will provide the opportunity to catch the annual harvest before drilling commences on these fields.	Beach aims to undertake the activity in a manner that does not unduly impact on fishers. This EP has been updated in response to the claims from this stakeholder as per the following: • Table 9-3 Ongoing stakeholder consultation requirements updated to note that for notifications to AHO to issue NTM will specifically include: o geographical coordinates of the well location; and o the 500 m rig safety exclusion zone & 2 km cautionary zone and requested clearance from other vessels • Stakeholder provided with Beach contact person should they wish to make a claim for loss as a result of Beach's activities. How Beach will deal with any claims is details in Section 9.3.1 Fishery specific consultation approach and was provided to stakeholder as part of the Beach's Commercial Fisher Operating Protocol (Stakeholder Record CRFL 08 – 09. • Stakeholder advised to contact channel 16 if they wish to communicate with the rig at any time. Rig will be stationary until moved to next location. • Rescheduling drilling operations to avoid times when fisher may be in the area is not a practicable option for the drilling program given the long lead times and detailed planning required to undertake the drilling activity. Stakeholder has the ability to fish in broader area irrespective of drilling activity.
Commercial Rock Lobster and Crab Fisher	2/07/2019	CRLF 08 - 09 OP19-USAIS-P2/7 OPOG19IS#2	Beach email: Providing updated information on the seabed assessment areas and timings. Also provided an overview of Beach's Commercial Fisher Operating Protocol for seabed assessments and drilling operations. Please note, there have been no changes to the Drilling Information Sheet, which we have also re-attached for your convenience. This email was follow-up with a phone call from Beach in relation to the seabed assessment areas. No issues were raised by the stakeholder in relation the drilling program.	Provision of Beach's Commercial Fisher Operating Protocol for seabed assessments and drilling operations.
Commercial Shark and Lobster Fisher	28/04/2019	CSF 01	Stakeholder rang Beach 1800 number. Stakeholder confirmed they were aware of Beach's upcoming activities. Fisher raised that a boat operating in the Otway area that had asked a shark fisher to pull his nets last week.	Beach provided information to the stakeholder in relation to the vessel that was not a Beach vessel. See Stakeholder Record CSF 02.
Commercial Shark and Lobster Fisher	29/04/2019	CSF 02	Beach called stakeholder to provide an update on their comments about a boat operating in the Otway area that had asked a shark fisher to pull his nets last week. Beach informed stakeholder that Beach's vessel has not been operating in the region since April 15 and is now located near Wilson's Promontory. Another vessel was operating in the area but was not chartered by Beach. Beach informed stakeholder they had asked their Fisheries Liaison Officer (FLO) to meet with them to understand their fishing patterns and how they may overlap with Beach's proposed activities. Beach can't confirm specific locations and times as yet, but it will be helpful to understand where they fish and when. Stakeholder was comfortable with this as knew the FLO and had met with them before. FLO expected to be able to contact stakeholder by the end of this week (May 3).	Claim in relation to issue with boat operating in the Otway area was not relevant to Beach's activities. See Stakeholder Record CSF 05 for meeting details.
Commercial Shark and Lobster Fisher	30/04/2019	CSF 03 CSF 04	Meeting coordinated between stakeholder and FLO for 3/05/2019.	See Stakeholder Record CSF 05.
Commercial Shark and Lobster Fisher	3/05/2019	CSF 05	Meeting with FLO and stakeholder. Stakeholder concern is that Beach's activities would limit access to where he fishes and cause financial loss. If Beach wanted him to shift his fishing activities, Beach should pay him and he would stay out of their way. FLO explained that both Beach's and fishing activities across the same area was legal and that each were obliged under the Offshore Petroleum and Greenhouse Gas Storage Act 2006, to reduce their impact on each other to as low as reasonable practicable. Stakeholder said that to work around each other; good on water communications between his vessel and project vessels, and a common understanding of mandatory exclusion zones and advisory clearance distances around sites was needed. These were sometimes confused by support vessel masters and caused unnecessary displacement of fishing activities. Stakeholder asked does Beach have any arrangements so that he could claim and evidence a loss if that happened? The map in the information he received (BE_OFFSHORE Project 2pp_March_2019) showed the footprint of Beach's proposed work sites across the project lifetime, reference about the duration at each site and a preliminary calendar of events. More precise detail on start-up timing for each site would enable fisher to better assess likely impacts and fishing options at the time the work is taking place. An image of fisher's activities was provided to Beach.	See Stakeholder Record CSF 07 and 08 of letter to stakeholder of record of meeting and details of Beach's arrangements to manage impact to stakeholder to ALARP and an acceptable level.
Commercial Shark and Lobster Fisher	3/05/2019	CSF 06	Stakeholder provided information to Beach in relation to the Electronic Catch Log System	NA

Stakeholder name	Date	Record #	Description	Assessment of objection or claim

Commercial Shark and Lobster Fisher	10/05/2019	CSF 07
		CSF 08
			Letter from Beach to stakeholder detailing:
			• Beach's confidentiality/privacy policy.
			• That in future any coordinates supplied would be expressed in degrees and decimal minutes referenced to the WGS 84 datum, so they can immediately be entered on your GPS plotter.
			• When Beach activities plotted over the locations the stakeholder fished there is potential for interaction.
			• In order to minimise impacts to your fishing, Beach will let fishers know expected timings and more precise location coordinates closer to the start of each activity and will also update fishers on a regular (possibly daily) basis of project status and vessel movement.
			• Beach's aim is to work together to minimise impacts on each other's operational plans, however, should you or any fisher wish to make a claim for loss as a result of our activities to contact Beach – contact details provided.
			• Beach would validate that the fisher regularly works in that area as well as evidence of the additional costs they have incurred or the loss they have suffered. Beach will then work with them to validate the claim and assess any compensation required. Validation procedures will necessarily involve access to fishing records and other relevant information.
			• Beach are aware of the issue you raised regarding your colleague's engagement with another Oil & Gas Company's vessel. When our project becomes operational Beach will undertake discussions with our vessel masters so that impacts on fishing and vice versa are as low as reasonably practicable. Transit routes between project sites and Portland are unlikely as our vessel will not be stationed there.
			• Beach's FLO will contact you shortly to discuss access to your fishing data and confirm that you would like to be included on our updates about the location of our activities while we are operational.
				Beach aims to undertake the activity in a manner that does not unduly impact on fishers. This EP has been updated in response to the claims from this stakeholder as per the following:
				• Table 9-3 Ongoing stakeholder consultation requirements updated to note that for notifications to stakeholder where coordinates are supplied coordinates are to be expressed in degrees and decimal minutes referenced to the WGS 84 datum.
				• Table 9-3 Ongoing stakeholder consultation requirements updated to note that for notifications to AHO to issue NTM will specifically include:
				  o Geographical coordinates of the well location; and
				  o The 500 m rig safety exclusion zone & 2 km cautionary zone and requested clearance from other vessels
				• Stakeholder provided with Beach contact person should they wish to make a claim for loss as a result of Beach's activities. How Beach will deal with any claims is details in Section 9.3.1 Fishery specific consultation approach and was provided to stakeholder as part of the Beach's Commercial Fisher Operating Protocol (Stakeholder Record CSF 10 -11).
				• Section 8.6 Personnel, Competence, Training and Behaviours updated to include requirements for interactions with fishers and/or fishing equipment in the activity induction that will be required to be undertaken by all vessel personnel.
				• Engagement will be ongoing with stakeholder to ensure any impacts can be management to ALARP and an acceptable level.

Commercial Shark and Lobster Fisher	09/06/2019	CSF 09
		OPOG19IS#1
		&
		OPOG19IS#2
			Meeting between stakeholder and FLO regarding seabed assessments and drilling to ascertain potential impacts and mitigations.
			Fisher discussed fishing pattern and the ability to work around Beach's operations in the area, noting the duration of assessment and drilling events.
			Stakeholder informed FLO shark mesh netting favours smooth seafloor i.e., where drilling likely to occur. The general pattern has been to fish in between Warrnambool and Port Campbell in the summer in 35 fathoms (64 m) depth and shallower. Other areas are targeted later in the year, for example in waters of 70-80 fathoms (128 – 146 m) between western Victoria and the south east of South Australia.
			FLO informed stakeholder that due to anchors and cables around well site during drilling a 2km cautionary zone shall be established in addition to the 500m rig safety zone.
			Stakeholder advised FLO an estimated 80% of a stakeholder's trip consists of shortened duration "try" shots until higher catches were found. Fishers concern was if higher catches were found that continued targeting of the aggregation might be blocked by one of Beach's operations and cause an adverse financial result. In discussion with FLO it was recognised that the spatial constraints on Beach in the Otway Basin area were more than that of shark fishers. Whether or not an aggregation of shark continued on the other side of one of Beach's operations could not be determined until the event, however correspondence from Beach on 10 May 2019 that said fishers may claim for any validated loss was noted.
			Stakeholder advised FLO there would be some difficulty receiving texts advising of operational plans as the fishing vessel's phone did not take texts. Communications are usually achieved via "Messenger" to skippers personal phone. Sometimes it is possible to talk if in range, but the reach of "Messenger" is beyond that of talk on this service. For real time on-water communications, FLO advised stakeholder to call up on Ch 16 HF then go to a nominated working channel or with phone range ring up either of the numbers provided.
				Beach aims to undertake the activity in a manner that does not unduly impact on fishers. This EP has been updated in response to the claims from this stakeholder as per the following:
				• Table 9-3 Ongoing stakeholder consultation requirements updated to note that for notifications to AHO to issue NTM will specifically include:
				  o Geographical coordinates of the well location; and
				  o The 500 m rig safety exclusion zone & 2 km cautionary zone and requested clearance from other vessels
				• Stakeholder provided with Beach contact person should they wish to make a claim for loss as a result of Beach's activities. How Beach will deal with any claims is details in Section 9.3.1 Fishery specific consultation approach and was provided to stakeholder as part of the Beach's Commercial Fisher Operating Protocol (Stakeholder Record CSF 10 -11).
				• Stakeholder advised to contact channel 16 if they wish to communicate with the rig at any time. Rig will be stationary until moved to next location. As per Beach's Commercial Fisher Operating Protocol Beach will provide SMS messaging system updates 2 days prior to the rig moving to a new location detailing the new location and the expected duration at the location so Fishers can plan their fishing activities with the least disruption.
				The area where the stakeholder fishes, between Warrnambool and Port Campbell in the summer in 35 fathoms (64 m) depth and shallower, does not overlap the Geographe and Thylacine well locations which are in water depths > 84 m. During winter the stakeholder fishes between western Victoria and the south east of South Australia.

Commercial Shark and Lobster Fisher	2/07/2019	CSF 10 - 11 OP19-USAIS-P2/7 OPOG19IS#2	Beach email: Providing updated information on the seabed assessment areas and timings. Also provided an overview of Beach's Commercial Fisher Operating Protocol for seabed assessments and drilling operations. Please note, there have been no changes to the Drilling Information Sheet, which we have also re-attached for your convenience. This email was follow-up with a phone call from Beach in relation to the seabed assessment areas. Stakeholder referred to Beach activities in depths shoreward of Geographe as having the potential to affect his shark fishing activities, but this can only be dealt with at the time, when and if he is following a trend in shark abundance and that should this occur he would be in touch for relevant discussions.	Provision of Beach's Commercial Fisher Operating Protocol for seabed assessments and drilling operations. The area where the stakeholder fishers, in depths shoreward of Geographe, are unlikely to overlap the drilling locations.
Corporate Alliance Enterprises	09/04/2019	CAE 01 OP19IS#1 - Otway Offshore Program 2019 2pp Info Sheet #1	Beach email providing information on Beach's Otway Offshore Project including drilling activities. Drilling is expected to start around December 2019. Attached is a brief information sheet and further details are available on the Otway Basin Victoria web page at beachenergy.com.au/vic-otway-basin/ and clicking on the 'Otway Offshore Project Information Sheet' link.	Provision of information.

Stakeholder name	Date	Record #	Description	Assessment of objection or claim
		Link to: OP19IS#2 - Otway Offshore Program 2019 10pp Info Sheet #2	As part of our consultation we are engaging with commercial fishing associations on arrangements to ensure each other's operational plans are understood, helping to minimise any impacts to fishing activities and to Beach's offshore development program. In preparation of our Environment Plan we are keen to understand if you have any questions, concerns or feedback or require any further consultation. Please don't hesitate to contact me.	
Corporate Alliance Enterprises	07/06/2019	CAE 02 OPOG19IS#1 & OPOG19IS#2	Beach email to CAE: As previously mentioned, the Otway Offshore Project will see up to 9 wells drilled offshore, consisting of exploration and production wells. Further activities in the Otway Basin will be carried out to ensure continued production at the Otway Gas Plant, including seabed site assessments, pre-drill activities, drilling of offshore gas wells, and subsea infrastructure installation. The first phase of the Seabed Site Assessments for the Otway Offshore Project will commence in September 2019. Please find attached an information sheet with the proposed seabed assessment locations and coordinates. The order in which each location will be accessed will be confirmed as the activities progress. All dates are subject to fair sea state conditions. The drilling component of the Otway Offshore Project will commence between December 2019 and February 2020. Please find attached an information sheet with the proposed drilling locations and coordinates, including an update exclusion zones for vessels. The order in which each location will be accessed will be confirmed as the activities progress. All dates are subject to fair sea state conditions. If you would like to be kept in touch via text message of confirmed locations, start dates and durations just prior to and during the activities, please let us know and we will add you to our distribution list. We will need you to provide your mobile phone number so we can include it on our list. Further details on the Otway Offshore Project are available by visiting our Otway Basin Victoria web page at beachenergy.com.au/vic-otway-basin/ and clicking on the 'Otway Offshore Information Sheet' link. We are consulting with commercial fishing associations on arrangements to ensure each other's operational plans are understood, helping to minimise any impacts to fishing activities and to Beach's offshore development program. In preparation of our Environment Plan we are keen to understand if you have any questions, concerns or feedback or require any further consultation. Please don't hesitate to contact us.	Provision of information.
Corporate Alliance Enterprises	02/07/2019	CAE 03 OPOG19IS#1 & OPOG19IS#2	Beach email: Providing updated information on the seabed assessment areas and timings. Also provided an overview of Beach's Commercial Fisher Operating Protocol for seabed assessments and drilling operations. Please note, there have been no changes to the Drilling Information Sheet, which we have also re-attached for your convenience. As mentioned previously, unless otherwise requested, we will be in touch with confirmed locations, start dates and durations of Seabed Site Assessments and Drilling activities closer to the time. If you would like to be kept in touch via text message of confirmed locations, start dates and durations just prior to and during the activities, please let us know and we will add you to our distribution list. We will need you to provide your mobile phone number so we can include it on our list.	Provision of Beach's Commercial Fisher Operating Protocol for seabed assessments and drilling operations.
DoEE (now DAWE) – Director of National Parks	23/09/2019 23/10/2019	DOEE 01 DOEE 02	Beach email: Introduction to Beach Energy. Information provided regarding worst case hydrocarbon discharge scenarios for proposed activities in the Otway Basin incorporating tables outlining environment potentially exposure to low in-water thresholds from both a hypothetical diesel release from Artisan-1 well location and condensate release from Artisan-1 well location to Australian Marin Parks. Beach provide offer to supply any additional information upon request. Beach sought feedback on the above information and any potential controls required regarding hydrocarbon spill monitoring and/or notification protocols/contact details. Email received from DOEE confirming: Correct contact for these emails. Noted potential impacts of unplanned activities. Referenced guidance notes available for marine parks. "I can confirm that we do not require further notification of progress made in relation to this activity unless details regarding the activity change and result in an overlap with a marine park or new impact, or for emergency responses"	Provision of information and clarification. No additional information required. DAWE to be notified in the instance of an overlap with a marine park or new impact, or for emergency responses.
DJPR: Earth Resources Regulation	26/04/2019 18/04/2019	DJPR-ERR 01 DJPR-ERR 02 OP19IS#1 - Otway Offshore Program 2019 2pp Info Sheet #1 Link to: OP19IS#2 - Otway Offshore Program 2019 10pp Info Sheet #2	Beach email providing information on Beach's Otway Offshore Project including drilling activities. Drilling is expected to start around December 2019. Attached is a brief information sheet and further details are available on the Otway Basin Victoria web page at beachenergy.com.au/vic-otway-basin/ and clicking on the 'Otway Offshore Project Information Sheet' link. As part of our consultation we are engaging with commercial fishing associations on arrangements to ensure each other's operational plans are understood, helping to minimise any impacts to fishing activities and to Beach's offshore development program. In preparation of our Environment Plan we are keen to understand if you have any questions, concerns or feedback or require any further consultation. Please don't hesitate to contact me.	Provision of information.

Stakeholder name	Date	Record #	Description	Assessment of objection or claim
DJPR: Earth Resources Regulation	2/07/2019	DJPR-ERR 03 OP19-USAIS-P2/7 OPOG19IS#2	Beach email: Providing updated information on the seabed assessment areas and timings. Also provided an overview of Beach's Commercial Fisher Operating Protocol for seabed assessments and drilling operations. Please note, there have been no changes to the Drilling Information Sheet, which we have also re-attached for your convenience. As mentioned previously, unless otherwise requested, we will be in touch with confirmed locations, start dates and durations of Seabed Site Assessments and Drilling activities closer to the time. If you would like to be kept in touch via text message of confirmed locations, start dates and durations just prior to and during the activities, please let us know and we will add you to our distribution list. We will need you to provide your mobile phone number so we can include it on our list.	Provision of Beach's Commercial Fisher Operating Protocol for seabed assessments and drilling operations.
DJPR: Marine Pollution	03/04/2019 – 03/05/2019	DJPR MP 01 DJPR MP 02 DJPR MP 03 DJPR MP 04	Meeting and OPEP assessment coordination between Beach and DJPR	See record DJPR MP 05
DJPR: Marine Pollution	09/05/2019 & 13/05/2019	DJPR MP 05 DJPR MP 06 OP19IS#1 - Otway Offshore Program 2019 2pp Info Sheet #1	Beach email following meeting held between Beach and DJPR: As discussed, we are planning to commence petroleum activities in Commonwealth waters from August/September this year with the drilling rig arriving in December 2019 (subject to regulatory approvals). I have attached an electronic copy of the information sheet provided at the meeting which includes a project timeline. Some of the key points from the meeting from our perspective are as follows: - DJPR Emergency Management Branch (EMB) Incident notification and contact email marine.pollution@ecodev.vic.gov.au and 24h phone is 0409 858 715 - Incident management room email semdincidentroom@ecodev.vic.gov.au - DJPR planning to consult with industry on a draft guidance note after Spillcon - DJPR EMB prefer to receive OPEPs prior to submission to NOPSEMA and will coordinate a response on behalf of government - Beach to provide a draft of the revised Otway OPEP for review this week with the aim of receiving comments from DJPR by 31 May - DJPR would like to participate in a Beach exercise with State content - Beach's incident management team based on an AIIMS structure - Beach are willing to participate or observe a State based training exercise coordinated by Victorian government - Beach have contracted the Diamond Ocean Onyx MODU which is to be dry towed from Singapore and offloaded in Pt Phillip Bay. DJPR interested in how biosecurity of the rig will be managed in particular biofouling. Let me know if you have any further comments.	Provision of information. Beach have included DJPR EMB contact details within OPEP. Beach have committed to provide EMLO familiar with AIIMS structure to interface with DJPR in the event of a marine pollution incident. Beach provided a copy of draft OPEP to DJPR for coordination of State review (see DJPR MP 07). Biosecurity (including biofouling) managed by: • the Diamond Ocean Onyx MODU being dry-docked and cleaned and inspected in Singapore; • the Diamond Ocean Onyx MODU will be dry-towed to Australian Commonwealth / State waters, removing the potential for in-transit biofouling to occur; • Diamond Offshore to adhere to Australian Ballast Water Management Requirements Rev 7; and • Diamond Offshore to obtain Department of Agriculture clearance to enter Australian waters.
DJPR: Marine Pollution	21/05/2019	DJPR MP 07 DJPR MP 08	Beach email providing copy of updated Offshore Victoria – Otway Basin Oil Pollution Emergency Plan (CDN/ID S4100AH717907) Rev D to DJPR for coordination of Vic State review. Beach requested response by 11th June 2019.	Provision of information.
DJPR: Marine Pollution	07/06/2019	DJPR MP 09 DJPR MP 10 OPOG19IS#1 & OPOG19IS#2	The drilling component of the Otway Offshore Project will commence between December 2019 and February 2020. Please find attached an information sheet with the proposed drilling locations and coordinates, including exclusion zones for vessels. The order in which each location will be accessed will be confirmed as the activities progress. All dates are subject to fair sea state conditions. Unless otherwise requested, we will be in touch with confirmed locations, start dates and durations of Seabed Site Assessments and Drilling activities closer to the time. If you would like to be kept in touch via text message of confirmed locations, start dates and durations just prior to and during the activities, please let us know and we will add you to our distribution list. We will need you to provide your mobile phone number so we can include it on our list. Further details on the Otway Offshore Project are available by visiting our Otway Basin Victoria web page at beachenergy.com.au/vic-otway-basin/ and clicking on the 'Otway Offshore Information Sheet' link. In preparation of our Environment Plan we are keen to understand if you have any questions, concerns or feedback or require any further consultation. Please don't hesitate to contact us.	Provision of information.
DJPR: Marine Pollution	09/06/2019 – 11/06/2019	DJPR MP 11 DJPR MP 12 DJPR MP 13	OPEP assessment coordination between Beach and DJPR.	See record DJPR MP 14
DJPR: Marine Pollution	13/06/2019	DJPR MP 14 DJPR MP 15	DJPR provided consolidated comments on Offshore Victoria – Otway Basin OPEP (CDN/ID S4100AH717907) Rev D received from: • DELWP • DJPR ERR	All comments received from Victorian State government (via coordinated review) have been incorporated into the subsequent revision of the Offshore Victoria – Otway Basin OPEP (CDN/ID S4100AH717907) prior to submission to NOPSEMA for assessment.

Stakeholder name	Date	Record #	Description	Assessment of objection or claim
			• DJPR Emergency Management Branch • EPA • Parks Victoria Comments received related to: State expectations for joint industry and State oil spill response based upon draft guidance (yet to be published by DJPR); updated contact information; scientific monitoring requirements; and oiled wildlife response arrangements. Beach confirmed comments received and OPEP would be amended as required.	
DJPR: Marine Pollution	26/09/2019	DJPR MP 18	Beach email: regarding worst case hydrocarbon discharge scenarios for proposed activities in the Otway Basin incorporating tables outlining environment potentially exposure to low in-water thresholds from both a hypothetical diesel release from Artisan-1 well location and condensate release from Artisan-1 well location. Beach provide offer to supply any additional information upon request. Beach sought feedback on the above information and any potential controls required regarding hydrocarbon spill monitoring and/or notification protocols.	Provision of information and clarification. No response received from DJPR to date.
DJPR: Victorian Gas Project	07/06/2019	VGP 01 VGP 02 OP19IS#1 - Otway Offshore Program 2019 2pp Info Sheet #1 & OP19IS#2 - Otway Offshore Program 2019 10pp Info Sheet #2	We would like to inform you that we're planning further development of our Otway offshore natural gas reserves within existing Commonwealth offshore exploration permits and production licenses. The Otway Offshore Project will see up to 9 wells drilled offshore, consisting of exploration and production wells. Further activities in the Otway Basin will be carried out to ensure continued production at the Otway Gas Plant, including seabed site assessments, pre-drill activities, drilling of offshore gas wells, and subsea infrastructure installation. The project is expected to start around September 2019, depending on regulatory approvals, weather windows and availability of contractors. Please find attached an information sheet summarising details on the project. Further details on the Otway Offshore Project are available by visiting our Otway Basin Victoria web page at https://www.beachenergy.com.au/vic-otway-basin/ and clicking on the 'Otway Offshore Project Information Sheet' link. In preparation of our Environment Plans we are keen to understand if you have any questions, concerns or feedback or require any further consultation on the above projects. Please don't hesitate to contact us.	Provision of information.
3D Oil	02/08/2019	3D 04 3D_04_Important Update Regarding the 3D Oil Limited Dorrigo 3D Marine Seismic.pdf	Email received: This notice refers to the 3D Oil Dorrigo 3D Marine Seismic Survey, planned for West of King Island. We wish to inform all stakeholders that The Dorrigo project will not proceed during 2019. 3D Oil intends to delay the activity to 2020. 3D Oil will endeavour to notify stakeholders as plans develop. 3D Oil adopts the following standard notifications timeframes for stakeholders, unless stakeholders have specific notification requirements: • At any changes to the activity plan or scope; • At least one month prior to planned survey commencement; • At least five days prior to survey equipment deployment; • At the commencement of survey acquisition activities; and • Within 10 days of survey completion. 3D Oil would like to thank all stakeholders that have provided feedback for the Dorrigo Project. If you would like to provide additional comment, please contact us on the details below.	Information received.
Otway Gas Plant Community Reference Group	18/04/2019	CRG 01 OP19IS#1 - Otway Offshore Program 2019 2pp Info Sheet #1& Link to: OP19IS#2 - Otway Offshore Program 2019 10pp Info Sheet #2	Beach email providing information on Beach's Otway Offshore Project including drilling activities. Drilling is expected to start around December 2019. Attached is a brief information sheet and further details are available on the Otway Basin Victoria web page at beachenergy.com.au/vic-otway-basin/ and clicking on the 'Otway Offshore Project Information Sheet' link. As part of our consultation we are engaging with commercial fishing associations on arrangements to ensure each other's operational plans are understood, helping to minimise any impacts to fishing activities and to Beach's offshore development program. In preparation of our Environment Plan we are keen to understand if you have any questions, concerns or feedback or require any further consultation. Please don't hesitate to contact me.	Provision of information.
Otway Gas Plant Community Reference Group	26/06/2019	CRG 02 OP19IS#2 - Otway Offshore Program 2019 10pp Info Sheet #2	At CRG meeting 2019 Beach provided an update on all projects, including the offshore project. Also provided to members the long information sheet. • Engagement with all stakeholders undertaken and ongoing. • Direct engagement with fishing sector undertaken and ongoing. • Awaiting project approvals before confirming dates.	Provision of information.
Portland Professional	17/04/2019	PPFA 01 PPFA 02	Beach email providing information on Beach's Otway Offshore Project including drilling activities. Drilling is expected to start around December 2019. Attached is a brief information sheet and further details are available on the Otway Basin Victoria web page at beachenergy.com.au/vic-otway-basin/ and clicking on the 'Otway Offshore Project Information Sheet' link.	Provision of information.

Stakeholder name	Date	Record #	Description	Assessment of objection or claim
Fishermen's Association		OP19IS#1 - Otway Offshore Program 2019 2pp Info Sheet #1& Link to: OP19IS#2 - Otway Offshore Program 2019 10pp Info Sheet #2	As part of our consultation we are engaging with commercial fishing associations on arrangements to ensure each other's operational plans are understood, helping to minimise any impacts to fishing activities and to Beach's offshore development program. In preparation of our Environment Plan we are keen to understand if you have any questions, concerns or feedback or require any further consultation. Please don't hesitate to contact me.	
Schlumberger	18/10/2019	SLB 15	Update received from Schlumberger regarding Otway Basin 2DMC Seismic survey ingress agreement informing Beach of a potential November 2019 commencement of activities.	Information received. No control required in relation to development drilling as 2DMC Seismic survey commencement date earlier than proposed Beach drilling program.
Schlumberger	02/12/2019	SLB_20 SLB_20_4 Week Pre-Survey Notification Otway 2DMC Seismic Survey email.pdf SLB_20_Schlumberger_Stakeholders_4Week_Pre-Survey Notification_2nd Dec 2019.pdf	Update received from Schlumberger regarding Otway Basin 2DMC Seismic survey ingress agreement informing Beach of the planned activity to commence in approximately 4 weeks.	Information received. No control required in relation to development drilling as 2DMC Seismic survey commencement date earlier than proposed Beach drilling program
Schlumberger	10/01/2020	SLB_22 SLB_22_1 Week Pre-Survey Notification-Schlumberger Otway Basin 2DMC Marine Seismic Survey.pdf SLB_22_Schlumberger_Stakeholders_1Week_Pre-Survey Notification_10th Jan 2019.pdf	Update received from Schlumberger regarding Otway Basin 2DMC Seismic survey ingress agreement informing Beach of the planned activity to commence in approximately 1 week.	Information received. No control required in relation to development drilling as 2DMC Seismic survey commencement date earlier than proposed Beach drilling program.
Schlumberger	01/02/2020	SLB_23 SLB_23_48 Hour lookahead -Schlumberger Otway 2DMC Marine Seismic Survey email.pdf SLB_23_Nordic_Explorer_48hour_Lookahead_01-02-2020_v1.pdf	Update received from Schlumberger regarding Otway Basin 2DMC Seismic survey ingress agreement informing Beach of the activities 48-hour look ahead plan.	Information received.
Schlumberger	07/02/2020	SLB_25 SLB_25_48 Hour lookahead-Schlumberger Otway 2DMC Marine Seismic Survey email.pdf SLB_25_Nordic_Explorer_48hour_Lookahead_07-02-2020_v1.pdf	Update received from Schlumberger regarding Otway Basin 2DMC Seismic survey ingress agreement informing Beach of the activities 48-hour look ahead plan.	Information received.
Seafood Industries Victoria (SIV)	19/02/2019	SIV 01 OP19IS#1 - Otway Offshore Program 2019 2pp Info Sheet #1 and Otway Offshore Map Link to: OP19IS#2 - Otway Offshore Program 2019 10pp Info Sheet #2	Beach and SIV meeting. Beach presented 2-page information on the upcoming Otway Offshore Project. Beach explained there would be a seabed assessment phase commencing in approx. September 2019 followed by a drilling phase which was expected to commence towards the end of the year and continue for approx. 18 months. Beach showed map to SIV and discussed locations. Beach asked what SIV's preferred way to consult with fishers was. SIV said if Beach provided the Information sheet SIV would arrange for it to be mailed to SIV members, under a cover letter. The letter would ask fishers who were affected or required further consultation to respond within 2 weeks so SIV can validate that they fish in the area and allow Beach to respond to any questions.	Provision of information and agreement to send information to SIV members via SIV.
SIV	7/03/2019	SIV 02 OP19IS#1 - Otway Offshore Program 2019 2pp Info Sheet #1 Link to: OP19IS#2 - Otway Offshore Program 2019 10pp Info Sheet #2	Beach email of discussion at meeting held on the 19/02/2019 in relation to Beach's upcoming Offshore campaign. Beach presented a 2-page information on the upcoming Otway Offshore Project and explained there would be a seabed assessment phase commencing in approx. September 2019 followed by a drilling phase which was expected to commence towards the end of the year and continue for approx. 18 months. Map was shown and briefly discussed locations. Beach asked what SIV's preferred way to consult with fishers was. SIV said if Beach provided the Information sheet, they would arrange for it to be mailed to SIV members with a cover letter. SIV stated they would ask fishers who were affected or required further consultation to respond within 2 weeks so SIV can validate that they fish in the area and allow Beach to respond to any questions. Agreed that SIV would do a mailout of the attached 2-page information sheet and cover letter to SIV members. Beach provided 2-page information sheet and requested that cover letter ask fishers to contact Beach if they fish in the areas where we will be operating. Also, to let them know that further information will be available on our website at beachenergy.com.au/vic-otway-basin/. SIV recommenced two weeks for fishers to respond. Asked to review SIV cover letter prior to mailout.	Provision of information to SIV for mail out to members.
SIV	19/03/2019	SIV 03 SIV 04	SIV provided cover letter for Beach to review. Beach provided feedback on letter and asked to add a comment about 2 weeks to respond. Also requested to hold off mail out as information sheet was being updated.	Provision of information to SIV for mail out to members.

Stakeholder name	Date	Record #	Description	Assessment of objection or claim
SIV	19/03/2019	SIV 05 SIV 06	SIV reply: will include a comment about the 2 weeks but need to know when we are sending. SIV concern about two weeks and putting a specific timeframe on it is that this needs to be an open communication and ongoing consultation - it does not just stop. But we also have 3 other consultation processes going on - so if possible, for more time, then this will be crucial. Beach reply: We also expect the consultation to be open and ongoing. The 2-week timeframe is to allow us to get initial feedback and understand who may be fishing in the areas so that if we need to undertake more specific consultation with them, we understand who they are. We will provide further information closer to the time of the seabed assessments and again prior to commencing drilling. And of course, we will consult with any fisher that requires it during the life of the project.	Two-week timeframe is to allow for initial feedback and understand who may be fishing in the areas so that if required more specific consultation can be undertaken. Beach agrees that stakeholder consultation will be ongoing and stakeholders any issues or concerns raised prior or during the activity will be addressed as per Section 9.7. EP Section 9.7 details ongoing stakeholder engagement for the activity.
SIV	22/03/2019	SIV 07	Beach update on status of the information sheet.	Provision of information to SIV for mail out to members.
SIV	27/03/2019	SIV 08	Beach call to provide update on status of information sheet and also that there were now some additional survey areas, which were for potential tie-ins of wells to the seabed pipeline. SIV asked what this would cover - was VSP included? Beach said the surveys would use equipment such as echo sounders, may take seabed grabs and take core samples 6m below the seabed surface. VSP was not included in these surveys. Beach asked if Beach needed to separately email the information sheet to VRLA, Port Campbell Professional Fishers Association or similar organisations. SIV confirmed that they will handle this engagement.	Drilling activity does not include vertical seismic profiling (VSP).
SIV	27/03/2019	SIV 09	Beach email to confirm delivery of the information sheets and if in the cover letter you can ask members to let us know if they want further consultation or fish in the affected area by 19th April. We will continue engagement after that time, but we'd like to understand who specifically may be impacted or has concerns so we can plan further engagement with them, and SIV.	Provision of information to SIV for mail out to members.
SIV	28/03/2019	SIV 10 SIV 11 SIV 12	Organisation of information sheet for mail out to SIV members.	Provision of information to SIV for mail out to members.
SIV	29/03/2019	SIV 14 OP19IS#1 - Otway Offshore Program 2019 2pp Info Sheet #1 Link to: OP19IS#2 - Otway Offshore Program 2019 10pp Info Sheet #2	Letter and information sheet sent to approximately 300 SIV members. Dear Victorian Licence Holder and Operators RE: UPCOMING BEACH ENERGY OFFSHORE PROJECTS I am writing to you regarding recent discussions between Seafood Industry Victoria (SIV) and Beach Energy regarding a proposed Seabed Assessment and Drilling Program from 2019 – 2021. Beach Energy have provided SIV with the attached 2-page information sheet which provides detailed information on the activities proposed, the areas they intend to operate and timeframes for the proposed works. There is also further information available at: www.beachenergy.com.au/vic-otway-basin/. Beach Energy have sought SIV to correspond with you to seek your views and issues on the proposed areas, and their interaction with areas in which you operate. If you have any concerns, questions, comments or seek any further information please contact Beach Energy at community@beachenergy.com.au by the 19th April. Alternatively let us know at SIV and we can pass your comments through to Beach Energy. Thank you for your time reading and understanding this information and please do not hesitate to contact me if there are any queries.	Provision of information to SIV for mail out to members.
SIV	2/04/2019	SIV 15 SIV 16	Emails between Beach and SIV confirming mail out sent.	NA
SIV	16/04/2019	SIV 17	Beach phone call to see if any response to member mail out. Four fishers have stated they would be fishing out deeper this year, as a result of discussions in the quota meetings held recently. Can Beach provide information on where and when they will be operating? Beach replied it is too early for this information to be available, it will not be available until closer to the time of the activities. Seabed assessments will be undertaken in September and again in about March, with drilling scheduled to commence in December. Are fishers able to inform us of their plans so we can feed that into our planning – it may not be able to be considered but it's good to know so we are aware. SIV replied that could be arranged. The purpose of sending out the flyer was so we can work together, so this is what we expected. Beach - we would expect that, closer to the time, we would send the interested fishers text messages of where our activities are occurring on a regular basis. SIV – I'll discuss with them and come back to you with their plans.	Four fishers had contacted SIV in relation to the information sheet mail-out. These fishers will be fishing deeper this year and seek further information regarding location and timings. Beach met with SIV 3/05/2019 Record VFA 25 to further discuss Beach's activities. Beach will continue ongoing engagement with SIV and any affected fishers as per Section 9.7.1 Fishery specific consultation approach to ensure impacts to fishers are ALARP and an acceptable level.
SIV	29/04/2019 1/5/2019	SIV18 – SIV 21	Emails to obtain copy of cover letter sent to SIV members.	NA
SIV	3/05/2019	VFA 25	Meeting between Beach, VFA and SIV. Beach provided VFA with an extract of the current draft of the Seabed Assessment EP chapters related to noise modelling and the identification of fisheries. Beach stepped VFA through the noise modelling at a high level and the conclusions that there was no unacceptable impact to marine fauna. VFA said it was good to have the report and that they would review it in more detail. Beach explained the consultation approach with fishers; engagement had been via SIV who undertook a mailout of a 2-page	Whilst Beach provided SIV with an extract of the current draft of the Seabed Assessment EP chapters related to noise modelling and the identification of fisheries, the provision of this information was not relevant to the scope of the development drilling EP.

Stakeholder name	Date	Record #	Description	Assessment of objection or claim
			information sheet (which had also been provided to VFA) to their approx. 300 members. A cover letter had asked for fishers to identify if they felt they would be impacted by the activities. SIV had reported that 4 fishers had come forward and 2 others had contacted Beach directly. Beach will engage with these fishers and SIV as part of on-going consultation and specifically when details of the exact locations and timing of the seabed assessments and drilling were available. Beach would also provide regular/ daily information on the location of vessels and MODUs to those who wanted to receive that information. VFA was comfortable with this approach. VFA asked about any permanent restrictions on fishing grounds, such as permanent exclusion zones, as this would reduce the available area for fishing. Beach explained that there may be a requirement for some wells to have exclusion zones around the infrastructure that will be installed on the seabed. At this stage the requirements for which wells and any details of the exclusion zones were not yet known. SIV joined the meeting and Beach gave a recap on the consultation that had been undertaken with commercial fishers. SIV was also provided with a copy of the draft Seabed Assessment EP extract. SIV informed VFA that they were happy with the way that Beach had undertaken the consultation and their plans for on-going consultation. Beach discussed with SIV a time when they could catch up to discuss the impacts on the four fishers that had identified themselves but no date was chosen due to current availability. SIV and VFA reviewed the fishing effort maps in the draft Seabed Assessment EP extract and queried the fishing activity for the giant crab map, in the grids located close to shore. Beach informed that the data had been provided by VFA.	Beach will continue ongoing engagement with SIV and any affected fishers as per Section 9.7.1 Fishery specific consultation approach to ensure impacts to fishers are ALARP and an acceptable level. Beach has engaged directly with the fishers that contacted them. See Records for CRLF and CSF. VFA had raised concerns about loss of fishing area from permanent exclusion zones. During drilling activities, a temporary 500 m rig safety zone will be established, coinciding with the activity timing and duration (approximately 64 to 90 days per well). Additionally, a 2 km cautionary zone will be relayed to fishers via the AHO NTM process. A permanent PSZ shall be maintained at or sought for each well location Updated rock lobster and giant crab fishery maps were sent to VFA and SIV. See Record SIV 22 and VFA 27.
SIV	10/05/2019	SIV 22 – see VFA 27 for email record. SIV 23	Beach email providing updated information as discussed at meeting on 3/5/2019 Record VFA 25. In the extract of the Seabed Assessment EP Beach provided VFA and SIV commented on the fishing effort maps. Beach have reviewed the maps we discussed and are including revised versions in the EP we are submitting shortly. The updated maps were provided which show only the areas where there has been catch effort for rock lobsters and giant crabs within the seabed survey operational area. We have also firmed up the sizes of the seabed assessment survey areas which vary slightly to what was communicated in the Otway Offshore Information Sheet we published. The revised areas were provided. Don' hesitate to let me know if you have any questions. I will contact you next week about setting up a time to meet to discuss in more detail the program and the impacts on the fishers who have come forward as fishing in the area.	Updated rock lobster and giant crab fishery maps showing overlap of fishery effort with the operational area that are presented in this EP where provided to SIV and VFA. All matters relating to the intersection of commercial fisheries and survey locations have been addressed within the Site Survey EP and are not relevant to the drilling activity. Meeting will be set up with SIV to discuss the fishing effort of the four fishers who have raised with SIV that they fish in the area. Beach will continue ongoing engagement with SIV and any affected fishers as per Section 9.7.1 Fishery specific consultation approach to ensure impacts to fishers are ALARP and an acceptable level.
SIV	21/05/2019 – 11/06/2019	SIV 24 SIV 25 SIV 26	Emails and phone communications between Beach and SIV to arrange meetings to discuss ongoing fisher engagement for the offshore program and confirm Fisher activity within the area. Meeting arranged for the 11/06/2019 and subsequently rescheduled for 13/06/2019.	NA
SIV	12/06/2019	SIV 27 OPOG19IS#1 & OPOG19IS#2	Beach email providing two information sheets, one of which included details of proposed drilling locations and timing and raising an agenda for a forthcoming meeting. Agenda items relevant to development drilling included: Ongoing engagement with Fishers during the drilling program including lines of communication and frequency of updates; and The potential establishment of Petroleum Safety Zones for subsea infrastructure.	Provision of information for meeting (Stakeholder Record SIV 28).
SIV	13/06/2019	SIV 28 OPOG19IS#1 & OPOG19IS#2	Phone meeting conducted between Beach and SIV: Beach explained the information sheets (1 for seabed assessments and 1 for drilling) that had been emailed to SIV. SIV informed Beach that information sheets would be distributed to fishers who had come forward and have discussions with them regarding the impacts. Beach noted that two fishers had contacted Beach directly and they had been provided with the information sheets and Beach had met with them to discuss impacts. Names were exchanged so SIV could ensure no overlap with the fishers SIV engaging with. For the drilling program, Beach confirmed a 500m exclusion zone around the rig, overlaid with a 2km cautionary zone. Beach committed to ongoing engagement with fishers by providing the location of the rig when it moves and on a regular basis and asked SIV what timing/interval was appropriate. SIV confirmed a weekly update would be appropriate. SIV expects Beach to undertake normal on-water communications as had happened in the past. Beach informed SIV that Artisan, located at depth of approximately 71m would be the first well to be drilled followed by the Geographe wells. SIV to await fisher's response once information relayed via SIV. Beach informed SIV that when wells were ready for production seabed infrastructure would be installed to tie the well back to the pipeline or Thylacine platform. These will be protected by a Petroleum Special Zone - a 500m exclusion zone. Beach noted that each zone is approx. 500m radius and Beach were mapping the potential zones against the various fisheries in the area to see what percentage of the overall fishery is impacted. Beach noted that for Artisan-1 the PSZ would be by itself,	Ongoing stakeholder engagement includes weekly updates to fishers on MODU location. During drilling activities, a temporary 500 m rig safety zone will be established, coinciding with the activity timing and duration (approximately 64 to 90days per well). Additionally, a 2 km cautionary zone will be relayed to fishers via the AHO NTM process. A permanent PSZ shall be maintained at or sought for each well location

Stakeholder name	Date	Record #	Description	Assessment of objection or claim
			the Geographe wells would most likely fit within the existing PSZ and the Thylacine wells are located closer together. SIV deferred discussion relating to PSZ.	
SIV	17/06/2019 – 20/06/2019	SIV 29 SIV 30 SIV 31 SIV 32	Series of communication between Beach and SIV regarding four fishers with potential to fish in development area. No contact made to date.	Follow-up.
SIV	28/06/2019	SIV 33	Beach email: Did you get any feedback from the four fishers regarding Beach's Otway Offshore Project? Are you able to tell me what type of fishing they do – all rock lobster and giant crab or do they fish for other species too?	Follow-up.
SIV	2/07/2019	SIV 34 - 35	SIV email: They hold multiple licences, so unsure of which species they are fishing in these Areas. Haven't heard yet, shall follow up today. Beach: Thanks.	Follow-up.
SIV	2/07/2019	SIV 36 – 37 OP19-USAIS-P2/7 & OPOG19IS#2	Beach email: Providing updated information on the seabed assessment areas and timings. Also provided an overview of Beach's Commercial Fisher Operating Protocol for seabed assessments and drilling operations. Please note, there have been no changes to the Drilling Information Sheet, which we have also re-attached for your convenience. We have also developed a Commercial Fisher Protocol which is outlined in the attached letter that we have drafted for you to use when sending the updated seabed assessment information to fishers. Let me know if you have any questions or concerns on this. Note that there is no change to the drilling locations we sent to you a few weeks ago. I've re-attached that information sheet for your convenience.	Provision of overview of Beach's Commercial Fisher Operating Protocol for seabed assessments and drilling operations.
SIV	20/08/2019	SIV 41	Beach email: Beach will soon be submitting an Environment Plan for the Thylacine and Geographe development wells, part of the Otway Offshore Project, to NOPSEMA. Have you had any feedback from the four fishers that identified themselves to you as fishing in the area? If you have any information from them, either about the potential impacts, or what fishing they undertake, I'd appreciate it if you could let me know.	Follow-up
SETFIA, SSIA, SPF Stakeholder groups represented by Atlantis Fisheries Group	17/04/2019	SETFIA, SSIA, SPF 01 SETFIA, SSIA, SPF 02 OP19IS#1 - Otway Offshore Program 2019 2pp Info Sheet #1 Link to: OP19IS#2 - Otway Offshore Program 2019 10pp Info Sheet #2	Beach email providing information on Beach's Otway Offshore Project including drilling activities. Drilling is expected to start around December 2019. Attached is a brief information sheet and further details are available on the Otway Basin Victoria web page at beachenergy.com.au/vic-otway-basin/ and clicking on the 'Otway Offshore Project Information Sheet' link. As part of our consultation we are engaging with commercial fishing associations on arrangements to ensure each other's operational plans are understood, helping to minimise any impacts to fishing activities and to Beach's offshore development program. Can you confirm that you are representing SETFIA, SSIA and Small Pelagic Fishery? I would also like to discuss with you whether you would like us to engage with any of members of the associations you represent and will call you tomorrow to discuss this. In preparation of our Environment Plan we are keen to understand if you have any questions, concerns or feedback or require any further consultation. Please don't hesitate to contact me.	Provision of information.
SETFIA, SSIA, SPF Stakeholder groups represented by Atlantis Fisheries Group	18/04/2019	SETFIA, SSIA, SPF 03 SETFIA, SSIA, SPF 04	Follow-up phone call and email.	No response.
SETFIA, SSIA, SPF Stakeholder groups represented by Atlantis Fisheries Group	04/06/2019 – 13/06/2019	SETFIA, SSIA, SPF 05 SETFIA, SSIA, SPF 06 OPOG19IS#1 OPOG19IS#2 SETFIA, SSIA, SPF 07	Follow-up phone call and email. Beach email providing information: The drilling component of the Otway Offshore Project will commence between December 2019 and February 2020. Please find attached an information sheet with the proposed drilling locations and coordinates, including an update exclusion zones for vessels. The order in which each location will be accessed will be confirmed as the activities progress. All dates are subject to fair sea state conditions. If you would like to be kept in touch via text message of confirmed locations, start dates and durations just prior to and during the activities, please let us know and we will add you to our distribution list. We will need you to provide your mobile phone number so we can include it on our list. Further details on the Otway Offshore Project are available by visiting our Otway Basin Victoria web page at beachenergy.com.au/vic-otway-basin/ and clicking on the 'Otway Offshore Information Sheet' link.	Provision of information. No response.

Stakeholder name	Date	Record #	Description	Assessment of objection or claim
			We are consulting with commercial fishing associations on arrangements to ensure each other's operational plans are understood, helping to minimise any impacts to fishing activities and to Beach's offshore development program. In preparation of our Environment Plan we are keen to understand if you have any questions, concerns or feedback or require any further consultation. Please don't hesitate to contact us.	
SETFIA, SSIA, SPF Stakeholder groups represented by Atlantis Fisheries Group	13/06/2019	SETFIA, SSIA, SPF 08	Email from SETFIA providing SETFIA's approach to consultation document and offer of meeting.	Information received.
SETFIA, SSIA, SPF Stakeholder groups represented by Atlantis Fisheries Group	13/06/2019	SETFIA, SSIA, SPF 09 SETFIA, SSIA, SPF 10 SETFIA, SSIA, SPF 11	Phone call between Beach and SETFIA: Beach contacted SETFIA following email in which SETFIA provided SETFIA's approach to consultation. SETFIA explained that considerable amounts of time had been spent consulting on behalf and with oil & gas proponents. The SETFIA Board have reviewed this position and they are now resourced to be able to undertake consultation, at the rates shown in the document 'SETFIA Proposal for Oil & Gas coys 28 May 2019_Gas Image'. SETFIA noted that Beach activities would not cover the Eastern Zone or Scallop fisheries. SETFIA asked whether Beach has obtained the data on the Commonwealth fisheries within the area. Beach explained that necessary (available) Commonwealth data had been obtained and the Victorian fishery data that had been obtained. SETFIA expanded on SETFIA's consultation approach and all activity after this email would be expected to be chargeable. Email received from SETFIA in follow-up to conversation. SETFIA emphasised importance of obtaining both Commonwealth and State fisheries data. SETFIA could get involved as per our proposal either to interpret data or to obtain the data (Vic and/or C'wealth). SETFIA explained their current workload.	Information provided and received. Appendix B4.8 details the data in relation to the Commonwealth fisheries based on the last 5 years ABAREs Fishery Reports (2014-2018) and from AFMA (Stakeholder Record AFMA 02) stating that there were currently no active fishers in the area. Appendix B4.9 details the data in relation to the Victorian fisheries that was obtained from Victorian Fisheries Authority (VFA) (see Stakeholder Records 07 – 12). Beach responded to SETFIA see Stakeholder Record SETFIA, SSIA, SPF 13.
SETFIA, SSIA, SPF Stakeholder groups represented by Atlantis Fisheries Group	20/06/2019	SETFIA, SSIA, SPF 12	Beach received email from SETFIA: SETFIA provided Beach with general proposal to maintain service. In order to engage properly we would need to understand the extent of trawling and gillnetting in the area (we have a formal strategic alliance with the gillnet association). As a first step please can you provide us with any data you have about Commonwealth trawl or gillnet effort around your proposed wellheads. We are pleased that you are offering an SMS service.	Information received. Appendix B4.8 details the data in relation to the Commonwealth fisheries based on the last 5 years ABAREs Fishery Reports (2014 2018) and from AFMA (Stakeholder Record AFMA 02) stating that there were currently no active fishers in the area. Appendix B4.9 details the data in relation to the Victorian fisheries that was obtained from Victorian Fisheries Authority (VFA) (see Stakeholder Records 07 – 12). Beach responded to SETFIA see Stakeholder Record SETFIA, SSIA, SPF 13.
SETFIA, SSIA, SPF Stakeholder groups represented by Atlantis Fisheries Group	21/06/2019	SETFIA, SSIA, SPF 13 OP19IS#1 - Otway Offshore Program 2019 2pp Info Sheet #1 OPOG19IS#1 OPOG19IS#2	Beach email to SETFIA: Thank you for your offer of assistance with gathering data, analysis and consultation for Beach's Otway Offshore Project. I've followed up with our team regarding the fishing effort data we have gathered for the Otway Offshore Project. A review of the AFMA website and ABARES reports (2013 – 2017) identified that the following Commonwealth managed fisheries potentially have catch effort over the survey areas. The data from the ABARES report show that it is a low level of fishing, but the data is not granular enough to identify numbers. • Eastern Tuna and Billfish Fishery • Southern and Eastern Scalefish and Shark Fishery • Southern Squid Jig Fishery Could you provide Beach with a quote for you to undertake the following work for Beach: • Confirm the Commonwealth fisheries and level of fishing within the survey areas • Review the attached information sheets regarding the project and let me know of any questions you may have. Further details are available by visiting our Otway Basin Victoria web page at beachenergy.com.au/vic-otway-basin/ and clicking on the 'Otway Offshore Project Information Sheet' link. • Distribute the information sheet (s) to the relevant SETFIA members and collect any questions or feedback from them and pass them to us. • Distribution of SMS messages to the relevant fishers during the seabed assessment phase and the drilling phase, to inform them of the location of our boats and MODU. We have already provided the attached information sheet to the following groups who are relevant to the Commonwealth fisheries: Commonwealth Fisheries Association, Victorian Fisheries Authority, Seafood Industry Victoria who have distributed to their members, Tuna Australia who are the industry association for ETBF and Sustainable Shark Fishing Inc. To date only one shark fishery has contacted Beach.	Provision of information and request for quotation for service to confirm Commonwealth Fisheries and undertake consultation in relation to the Otway Development seabed assessment and drilling program.

Stakeholder name	Date	Record #	Description	Assessment of objection or claim
			I have also attached two further information sheets that provide more specific data related to the proposed location, duration and sequence of our activities. These will be updated as Beach works to finalise its plans however they may be useful to the fishers who fish in the area. If you would like to discuss please don't hesitate to call me, else I look forward to receiving your quote.	
SETFIA, SSIA, SPF Stakeholder groups represented by Atlantis Fisheries Group	21/06/2019	SETFIA, SSIA, SPF 14	SETFIA email: The challenge of your proposal is that it is so small that fishery management agencies may not provide us with data because it does not pass their confidentiality hurdles. The Commonwealth only release data for certain numbers of vessels and at a certain scale. SETFIA detailed a proposal to obtain data for the operational area and proposed a fee to obtain the Commonwealth data including: A review of the attached information sheets regarding the project and let me know of any questions you may have. Distribution of the information sheet (s) to the relevant SETFIA and SSIA (the likely affected sectors) members, collection of any questions or feedback. Distribution of SMS messages to the relevant fishers during the seabed assessment phase and the drilling phase, to inform them of the location of our boats and MODU. Given the need to wait for data requests it would take 6-8 weeks from contract execution. I note your plan to start drilling in September.	Due to the timeframe for which the information is required Beach requested the data in relation to Commonwealth fisheries direct from AFMA. Appendix B4.8 details the data in relation to the Commonwealth fisheries based on the last 5 years ABAREs Fishery Reports (2014 2018) and from AFMA (Stakeholder Record AFMA 02) stating that there were currently no active fishers in the area.
SETFIA, SSIA, SPF Stakeholder groups represented by Atlantis Fisheries Group	21/06/2019	SETFIA, SSIA, SPF 15	Beach email: Thanks for your quote. I've reviewed the proposal with our team and, like you we are concerned that we may not get much more data than we already have. Hence, we would like to focus on the consultation aspect of the quote only. Would you mind providing a revised quote, removing the data gathering and analysis piece but covering: • A review of the attached information sheets regarding the project and let me know of any questions you may have. • Distribution of the information sheet (s) to the relevant SETFIA and SSIA (the likely affected sectors) members, collection of any questions or feedback. • Distribution of SMS messages to the relevant fishers during the seabed assessment phase and the drilling phase, to inform them of the location of our boats and MODU.	Due to the timeframe for which the information is required Beach requested the data in relation to Commonwealth fisheries direct from AFMA. Appendix B4.8 details the data in relation to the Commonwealth fisheries based on the last 5 years ABAREs Fishery Reports (2014 2018) and from AFMA (Stakeholder Record AFMA 02) stating that there were currently no active fishers in the area. Beach requested an updated proposal cover the consultation aspects only.
SETFIA, SSIA, SPF Stakeholder groups represented by Atlantis Fisheries Group	21/06/2019 24/6/2019 25/06/2019 1/07/2019 2/07/2019	SETFIA, SSIA, SPF 16 - 21	SETFIA email: This is probably wise. You would have got a very large report that made very large assumptions about very little catch. SETFIA and Beach emails in relation to obtaining an updated quote for consultation as detailed in Stakeholder record SETFIA, SSIA, SPF 15.	SETFIA feedback in relation to there being very little catch in the area of the seabed surveys aligns with AFMA's feedback (Stakeholder Record AFMA 02) that there were currently no active Commonwealth fishers in the area.
SETFIA, SSIA, SPF Stakeholder groups represented by Atlantis Fisheries Group	2/07/2019	SETFIA, SSIA, SPF 22 OP19-USAIS-P2/7 OPOG19IS#2 OP19IS#2 - Otway Offshore Program 2019 10pp Info Sheet #2	Beach email: While the paperwork is being done for Beach to engage SETFIA to support our consultation on the Otway Offshore Project, I wanted to send you the latest information on the project. Please see attached for: • The original detailed, information sheet on the Otway Offshore Project. • An updated information sheet showing the proposed locations, durations and sequence of the seabed assessment activity. This replaces the one we sent you on 7 June. Please note the addition of a Geographe West survey area, which will increase the survey period by 5 days. There are also minor changes to the umbilicals stemming from the Artisan and La Bella survey areas. • An information sheet showing the proposed locations, durations and sequence of the drilling program. This is the same as the one we sent you on 7 June, as there is no changes to the locations, duration or sequence of the drilling program. We have also developed a Commercial Fisher Protocol which I have included below, for you use when engaging with SETFIA members. Please let me know if you have any questions or receive any feedback from your members on any aspects of the Otway Offshore Project.	Provision of updated information on the seabed assessment areas and timings as part of ongoing consultation.
SETFIA, SSIA, SPF Stakeholder groups represented by Atlantis Fisheries Group	3/07/2019	SETFIA, SSIA, SPF 23 - 25	Emails between Beach and SETFIA in relation to issue of SETFIA members providing phone numbers to Beach to undertake SMS message due to concerns with privacy.	Ongoing consultation in relation to service SETFIA will provide.
SETFIA, SSIA, SPF Stakeholder groups represented by	3/07/2019	SETFIA, SSIA, SPF 26	Beach email: I do understand how important privacy is to fishers. Once your team have contacted your members, we will have a better idea how many people need to be contacted. Given the very low levels of fishing in the region there may be only one or two, or in fact none that need to be kept informed. Like you, we don't want to send messages to people to whom the information is not relevant. In particular, regular messages about the location of a vessel doing seabed assessments will only serve to annoy them, which we want to avoid. When do you	Ongoing consultation in relation to service SETFIA will provide.

Stakeholder name	Date	Record #	Description	Assessment of objection or claim
Atlantis Fisheries Group			think you may know how many, if any, members will want to be kept informed? It may be that, other than yourself, we don't need to keep any of your members up to date.	
SETFIA, SSIA, SPF Stakeholder groups represented by Atlantis Fisheries Group	3/07/2019	SETFIA, SSIA, SPF 27	SETFIA email: I will try to be really clear on this. There are not low levels of fishing in western Victoria. There will be up to 20 or perhaps even 30 vessels impacted in some way. Your footprint is small which meant that the fishing in your footprint is low and hard to get data on. You have decided to not obtain data due to the confidentiality issues which means we will never know who is actually fishing in that area. We will contact our members which are just two of several fishing sectors that will likely be working there. The wellheads will likely impact fishing operations because some methods (especially trawling) occur along a contour and your wellheads will be in the way. Do you have any data to show very few or even no vessels work that area?	Information provided by VFA and AFMA have indicated low levels of fishing in the seabed assessment areas as detailed in Appendix 4.8 Commonwealth managed fisheries and Appendix B4.9 Victorian management fisheries. Further information in relation to the data obtained on fishing levels were provided to SETFIA see Stakeholder Record SETFIA, SSIA, SPF 28.
SETFIA, SSIA, SPF Stakeholder groups represented by Atlantis Fisheries Group	4/07/2019	SETFIA, SSIA, SPF 28	Beach email: I should have said there are low levels of fishing in the area where our Project will be operating, rather than the western Victorian region generally. We do understand that western Victoria is an important area for many fishers. Apologies for not being more specific in my email. We have based our assessment of low levels of fishing in our project area on the following: • The data we have obtained from the Victorian Fishing Authority for the period of 2014 – 2018 showed low levels (<5 vessels) of fishing by the crab and rock lobster fishery in the area where we will be operating. • We also requested data from AFMA whose response was that there are currently no vessels active in the area we provided, which covered the area we will be operating in. We are following up with AFMA to clarify what timeframe they were referring to in this statement to ensure we understand their response fully. We are keen to know more about the potential impacts to fishing methods, both during the project and after any wellheads have been installed. Let me know if you need any further information to help you assess these impacts. Notwithstanding our current assessment of fishing effort, for the avoidance of doubt, we are happy to engage your notification services.	Provision of information in relation to fishing data obtained from VFA and AFMA for the broader Otway Development area which covers the Geographe and Thylacine well locations. If any new or different information is provided by SETFIA this will be reviewed as per Section 8.23.2 Environment Plan review. If any objections or claims are raised from ongoing consultation with SETFIA these will be managed as detailed in Section 9.7.2 Management of objections or claims.
SETFIA, SSIA, SPF Stakeholder groups represented by Atlantis Fisheries Group	18/07/2019 – 19/07/2019 2/08/2019 – 6/08/2019	SETFIA, SSIA, SPF 30 SETFIA, SSIA, SPF 31 SETFIA, SSIA, SPF 32 SETFIA, SSIA, SPF 34 SETFIA, SSIA, SPF 35 SETFIA, SSIA, SPF 36	Emails between Beach and SETFIA confirming commencement of SETFIA notification services and Purchase Order details.	Provision of information.
SETFIA, SSIA, SPF Stakeholder groups represented by Atlantis Fisheries Group	03/09/2019 - 11/09/2019	SETFIA, SSIA, SPF 37 - SETFIA, SSIA, SPF 47	Emails between Beach and SETFIA (various unrelated to the drilling activity). SETFIA provided a review of the Beach Otway Offshore Project Proposed Seabed Assessment Locations 2 July 2019 Information Sheet and other documents associated with the seabed drilling locations assessment activity. Feedback was provided on the map and general information within the information sheets. SETFIA provided feedback from fishers they had spoken to that potentially fish within the broader Otway Offshore Project area. Two fishers detailed that they fish in the area and would like further information from Beach including information on compensation if they must avoid the area.	Provision of information. Beach engaged SETFIA to review fishing activity within Beach Otway Offshore Project area. The review identified that there was no trawl fishing or gill net fishing effort within or near to Beach existing or proposed offshore infrastructure (including development well locations). This information has been used to inform the impact and risk evaluation in relation to interaction with Fishers. See stakeholder record below for further information on relation to the SETFIA review. Beach is maintaining ongoing consultation with SETFIA and its members in relation to activities that may affect fishers and has provided those fishers Beach's Commercial Fishing Operating Protocol (Appendix D) which includes information on compensation.
SETFIA, SSIA, SPF Stakeholder groups represented by Atlantis Fisheries Group	12/09/2019 - 29/10/2019	SETFIA, SSIA, SPF 48 SETFIA, SSIA, SPF 49 SETFIA, SSIA, SPF 51 – SETFIA, SSIA, SPF 68 SETFIA, SSIA, SPF 81	Emails between Beach and SETFIA to follow up on July 2019 correspondence covering contours for trawling, potential snagging / breaking strength for the fishing net used by local (trawl) fishers, confidentiality agreement and Beach Energy formal engagement of SETFIA to provide confidential information about commercial fishing in the trawl method sub-sector in the Commonwealth Trawl Sector (CTS) and the gillnet sub-sector in the Gillnet Hook and Trap Sector (GHaT). Both sectors are part of the larger Commonwealth Government managed Southern and Eastern Scalefish and Shark Fishery (SESSF). REPORT TO BEACH ENERGY ON TRAWL AND GILLNET FISHING ACTIVITY AROUND BEACH ENERGY'S PROPOSED OTWAY OFFSHORE PROJECT. 29 OCTOBER 2019. Executive Summary (relevant points for the Artisan-1 well): 2.Trawl fishing in the SESSF CTS board trawl sub-sector does not occur in the Otway Offshore Project's (OOP) proposed footprint. It does occur to the SE of OOP. The grounds around the OOP footprint appear too rough for trawl fishing in its current form. 3.For unknown reasons gillnet fishing in the SESSF GHaT gillnet sub-sector does not seem to occur within the proposed OOP footprint. However, there is some activity from this sub-sector nearby to the east of the OOP.	Provision of information. Request for information – contours for trawling map / data. SETFIA Report to Beach indicates no trawl fishing effort within or near to Beach existing or proposed offshore infrastructure (including development well locations) – this information has been used to inform the impact and risk evaluation in relation to interaction with Fishers.

Stakeholder name	Date	Record #	Description	Assessment of objection or claim
			5.There is no SESSF CTS Danish seine sub-sector fishing in the proposed OOP footprint. 6.Such a clear separation of commercial fishing, albeit only a few sectors, and oil/gas is highly unusual in SETFIA's considerable experience with reports such as this.	
Sustainable Shark Fishing Inc (SSFI)	9/04/2019	SSFI 01 SSFI 02 OP19IS#1 - Otway Offshore Program 2019 2pp Info Sheet #1 Link to: OP19IS#2 - Otway Offshore Program 2019 10pp Info Sheet #2	Beach email providing information on Beach's Otway Offshore Project including drilling activities. Drilling is expected to start around December 2019. Attached is a brief information sheet and further details are available on the Otway Basin Victoria web page at beachenergy.com.au/vic-otway-basin/ and clicking on the 'Otway Offshore Project Information Sheet' link. As part of our consultation we are engaging with commercial fishing associations on arrangements to ensure each other's operational plans are understood, helping to minimise any impacts to fishing activities and to Beach's offshore development program. In preparation of our Environment Plan we are keen to understand if you have any questions, concerns or feedback or require any further consultation. Please don't hesitate to contact me.	Provision of information.
Sustainable Shark Fishing Inc (SSFI)	07/06/2019	SSFI 03 OPOG19IS#1 & OPOG19IS#2	Beach email providing information: As previously mentioned, the Otway Offshore Project will see up to 9 wells drilled offshore, consisting of exploration and production wells. Further activities in the Otway Basin will be carried out to ensure continued production at the Otway Gas Plant, including seabed site assessments, pre-drill activities, drilling of offshore gas wells, and subsea infrastructure installation. The first phase of the Seabed Site Assessments for the Otway Offshore Project will commence in September 2019. Please find attached an information sheet with the proposed seabed assessment locations and coordinates. The order in which each location will be accessed will be confirmed as the activities progress. All dates are subject to fair sea state conditions. The drilling component of the Otway Offshore Project will commence between December 2019 and February 2020. Please find attached an information sheet with the proposed drilling locations and coordinates, including an update exclusion zones for vessels. The order in which each location will be accessed will be confirmed as the activities progress. All dates are subject to fair sea state conditions. If you would like to be kept in touch via text message of confirmed locations, start dates and durations just prior to and during the activities, please let us know and we will add you to our distribution list. We will need you to provide your mobile phone number so we can include it on our list. Further details on the Otway Offshore Project are available by visiting our Otway Basin Victoria web page at beachenergy.com.au/vic-otway-basin/ and clicking on the 'Otway Offshore Information Sheet' link. We are consulting with commercial fishing associations on arrangements to ensure each other's operational plans are understood, helping to minimise any impacts to fishing activities and to Beach's offshore development program. In preparation of our Environment Plan we are keen to understand if you have any questions, concerns or feedback or require any further consultation. Please don't hesitate to contact us	Provision of information.
Sustainable Shark Fishing Inc (SSFI)	2/07/2019	SSFI 04 OP19-USAIS-P2/7 OPOG19IS#2	Beach email: Providing updated information on the seabed assessment areas and timings. Also provided an overview of Beach's Commercial Fisher Operating Protocol for seabed assessments and drilling operations. Please note, there have been no changes to the Drilling Information Sheet, which we have also re-attached for your convenience. We have also developed a Commercial Fisher Protocol which is outlined in the attached letter that we have drafted for you to use when sending the updated seabed assessment information to fishers. Let me know if you have any questions or concerns on this. Note that there is no change to the drilling locations we sent to you a few weeks ago. I've re-attached that information sheet for your convenience. As mentioned previously, unless otherwise requested, we will be in touch with confirmed locations, start dates and durations of Seabed Site Assessments and Drilling activities closer to the time. If you would like to be kept in touch via text message of confirmed locations, start dates and durations just prior to and during the activities, please let us know and we will add you to our distribution list. We will need you to provide your mobile phone number so we can include it on our list.	Provision of overview of Beach's Commercial Fisher Operating Protocol for seabed assessments and drilling operations.
Tasmanian Abalone Council Limited	9/04/2019	TACL 01 OP19IS#1 - Otway Offshore Program 2019 2pp Info Sheet #1& Link to: OP19IS#2 - Otway Offshore Program 2019 10pp Info Sheet #2	Beach email providing information on Beach's Otway Offshore Project including drilling activities. Drilling is expected to start around December 2019. Attached is a brief information sheet and further details are available on the Otway Basin Victoria web page at beachenergy.com.au/vic-otway-basin/ and clicking on the 'Otway Offshore Project Information Sheet' link. As part of our consultation we are engaging with commercial fishing associations on arrangements to ensure each other's operational plans are understood, helping to minimise any impacts to fishing activities and to Beach's offshore development program. In preparation of our Environment Plan we are keen to understand if you have any questions, concerns or feedback or require any further consultation. Please don't hesitate to contact me.	Provision of information.
Tasmanian Abalone Council Limited	07/06/2019	TACL 02 OPOG19IS#1 &	Beach email providing information: As previously mentioned, the Otway Offshore Project will see up to 9 wells drilled offshore, consisting of exploration and production wells. Further activities in the Otway Basin will be carried out to ensure continued production at the Otway Gas Plant, including seabed site assessments, pre-drill activities, drilling of offshore gas wells, and subsea infrastructure installation.	Provision of information.

Stakeholder name	Date	Record #	Description	Assessment of objection or claim
		OPOG19IS#2	The first phase of the Seabed Site Assessments for the Otway Offshore Project will commence in September 2019. Please find attached an information sheet with the proposed seabed assessment locations and coordinates. The order in which each location will be accessed will be confirmed as the activities progress. All dates are subject to fair sea state conditions. The drilling component of the Otway Offshore Project will commence between December 2019 and February 2020. Please find attached an information sheet with the proposed drilling locations and coordinates, including an update exclusion zones for vessels. The order in which each location will be accessed will be confirmed as the activities progress. All dates are subject to fair sea state conditions. If you would like to be kept in touch via text message of confirmed locations, start dates and durations just prior to and during the activities, please let us know and we will add you to our distribution list. We will need you to provide your mobile phone number so we can include it on our list. Further details on the Otway Offshore Project are available by visiting our Otway Basin Victoria web page at beachenergy.com.au/vic-otway-basin/ and clicking on the 'Otway Offshore Information Sheet' link. We are consulting with commercial fishing associations on arrangements to ensure each other's operational plans are understood, helping to minimise any impacts to fishing activities and to Beach's offshore development program. In preparation of our Environment Plan we are keen to understand if you have any questions, concerns or feedback or require any further consultation. Please don't hesitate to contact us	
Tasmanian Abalone Council Limited	2/07/2019	TACL 03 OP19-USAIS-P2/7 OPOG19IS#2	Beach email: Providing updated information on the seabed assessment areas and timings. Also provided an overview of Beach's Commercial Fisher Operating Protocol for seabed assessments and drilling operations. Please note, there have been no changes to the Drilling Information Sheet, which we have also re-attached for your convenience. We have also developed a Commercial Fisher Protocol which is outlined in the attached letter that we have drafted for you to use when sending the updated seabed assessment information to fishers. Let me know if you have any questions or concerns on this. Note that there is no change to the drilling locations we sent to you a few weeks ago. I've re-attached that information sheet for your convenience. As mentioned previously, unless otherwise requested, we will be in touch with confirmed locations, start dates and durations of Seabed Site Assessments and Drilling activities closer to the time. If you would like to be kept in touch via text message of confirmed locations, start dates and durations just prior to and during the activities, please let us know and we will add you to our distribution list. We will need you to provide your mobile phone number so we can include it on our list.	Provision of overview of Beach's Commercial Fisher Operating Protocol for seabed assessments and drilling operations.
Tasmania Parks and Wildlife Service DPIPWE	3/04/2019	TD 01 - 02	Phone call from Beach to discuss Beach Energy aquiring Lattice Energy and Beach's operations for Thylacine wellhead in Vic coast, Otway Gas Plant. Project summary and regulatory requirements. Discussion of plans to review the approved Oil Pollution Emergency Plan (OPEP) for the Thylacine platform. Offer to meet and discuss OPEP and the project and provide copy of the OPEP. Beach email: Confirming details of previous phone call.	Provision of information.
Tasmania Parks and Wildlife Service for DPIPWE	26/04/2019	TD 03 OP19IS#1 - Otway Offshore Program 2019 2pp Info Sheet #1 Link to: OP19IS#2 - Otway Offshore Program 2019 10pp Info Sheet #2	Beach email providing information on Beach's Otway Offshore Project including drilling activities. In January 2018, Beach Energy acquired Origin Energy's gas exploration and production assets in Victoria, Western Australia and New Zealand. With its head office in Adelaide, Beach Energy has been operating in Australia for over 50 years and has extensive experience in the gas industry. We would like to inform you that we're planning further development of our Otway offshore natural gas reserves within existing Commonwealth offshore exploration permits and production licenses. The 'Otway Offshore Project' will see up to 9 wells drilled offshore, consisting of exploration and production wells. Further activities in the Otway Basin will be carried out to ensure continued production at the Otway Gas Plant, including seabed site assessments, pre-drill activities, drilling of offshore gas wells, and subsea infrastructure installation. The project is expected to start around September 2019, depending on regulatory approvals, weather windows and availability of contractors. I've attached a brief information sheet and further details are available by visiting our Otway Basin Victoria web page at https://www.beachenergy.com.au/vic-otway-basin/ and clicking on the 'Otway Offshore Project Information Sheet' link. In preparation of our Environment Plan we are keen to understand if you have any questions, concerns or feedback or require any further consultation. Please don't hesitate to contact us.	Provision of information.
Tasmania Parks and Wildlife Service for DPIPWE/EPA Tasmania	21/05/2019	TD 04 – TD 09	Beach email providing copy of updated Offshore Victoria – Otway Basin Oil Pollution Emergency Plan (CDN/ID S4100AH717907) Rev D for Tas State review. Beach requested response by 11th June 2019. Series of communications prior to formal feedback on draft OPEP on 05/06/2019.	Provision of information.

Stakeholder name	Date	Record #	Description	Assessment of objection or claim
Tasmania Parks and Wildlife Service for DPIPWE/EPA Tasmania	05/06/2019	TD 10 – TD 12	Beach email providing follow up to confirm key points discussed via telephone regarding Tas Sate review of Offshore Victoria – Otway Basin Oil Pollution Emergency Plan (CDN/ID S4100AH717907) Rev D. Email response from DPIPWE Marine Pollution Officer confirming key points correct as per telephone conversation and further providing contact details and reporting protocols: The whale hotline is 0427942537. However our protocol is that the EPA 24 hour number is called to notify of the spill, then our officer does an assessment and contacts our wildlife people directly. Our EPA Pollution hotline number is 1800 005171.	Confirmation of emergency spill response arrangements as discussed verbally. All comments received from Tasmanian State government have been incorporated into the subsequent revision of the Offshore Victoria – Otway Basin Oil Pollution Emergency Plan (CDN/ID S4100AH717907) prior to submission to NOPSEMA for assessment
Tasmania Parks and Wildlife Service for DPIPWE/EPA Tasmania	07/06/2019	TD 13 OPOG19IS#1 & OPOG19IS#2	Beach email providing further updates to the Otway Offshore Project. The drilling component of the Otway Offshore Project will commence between December 2019 and February 2020. Please find attached an information sheet with the proposed drilling locations and coordinates, including exclusion zones for vessels. The order in which each location will be accessed will be confirmed as the activities progress. All dates are subject to fair sea state conditions. Unless otherwise requested, we will be in touch with confirmed locations, start dates and durations of Seabed Site Assessments and Drilling activities closer to the time. If you would like to be kept in touch via text message of confirmed locations, start dates and durations just prior to and during the activities, please let us know and we will add you to our distribution list. We will need you to provide your mobile phone number so we can include it on our list. Further details on the Otway Offshore Project are available by visiting our Otway Basin Victoria web page at beachenergy.com.au/vic-otway-basin/ and clicking on the 'Otway Offshore Information Sheet' link. In preparation of our Environment Plan we are keen to understand if you have any questions, concerns or feedback or require any further consultation. Please don't hesitate to contact us.	Provision of information.
Tasmania Parks and Wildlife Service for DPIPWE	2/07/2019	TD 14 OP19-USAIS-P2/7 OPOG19IS#2	Beach email: Providing updated information on the seabed assessment areas and timings. Also provided an overview of Beach's Commercial Fisher Operating Protocol for seabed assessments and drilling operations. Please note, there have been no changes to the Drilling Information Sheet, which we have also re-attached for your convenience. We have also developed a Commercial Fisher Protocol which is outlined in the attached letter that we have drafted for you to use when sending the updated seabed assessment information to fishers. Let me know if you have any questions or concerns on this. Note that there is no change to the drilling locations we sent to you a few weeks ago. I've re-attached that information sheet for your convenience. As mentioned previously, unless otherwise requested, we will be in touch with confirmed locations, start dates and durations of Seabed Site Assessments and Drilling activities closer to the time. If you would like to be kept in touch via text message of confirmed locations, start dates and durations just prior to and during the activities, please let us know and we will add you to our distribution list. We will need you to provide your mobile phone number so we can include it on our list.	Provision of overview of Beach's Commercial Fisher Operating Protocol for seabed assessments and drilling operations.
Tasmania Parks and Wildlife Service for DPIPWE	26/09/2019	TD 16	Beach email: regarding worst case hydrocarbon discharge scenarios for proposed activities in the Otway Basin incorporating tables outlining environment potentially exposure to low in-water thresholds from both a hypothetical diesel release from Artisan-1 well location and condensate release from Artisan-1 well location. Beach provide offer to supply any additional information upon request. Beach sought feedback on the above information and any potential controls required regarding hydrocarbon spill monitoring and/or notification protocols.	Provision of information and clarification. No response received from Tasmania Parks and Wildlife Service to date.
Tasmanian Rock Lobster Fisherman's Association	9/04/2019	TRLFA 01 OP19IS#1 - Otway Offshore Program 2019 2pp Info Sheet #1 Link to: OP19IS#2 - Otway Offshore Program 2019 10pp Info Sheet #2	Beach email providing information on Beach's Otway Offshore Project including drilling activities. Drilling is expected to start around December 2019. Attached is a brief information sheet and further details are available on the Otway Basin Victoria web page at beachenergy.com.au/vic-otway-basin/ and clicking on the 'Otway Offshore Project Information Sheet' link. As part of our consultation we are engaging with commercial fishing associations on arrangements to ensure each other's operational plans are understood, helping to minimise any impacts to fishing activities and to Beach's offshore development program. In preparation of our Environment Plan we are keen to understand if you have any questions, concerns or feedback or require any further consultation. Please don't hesitate to contact me.	Provision of information.
Tasmanian Rock Lobster Fisherman's Association	07/06/2019	TRLFA 02 OPOG19IS#1 & OPOG19IS#2	Beach email providing information: As previously mentioned, the Otway Offshore Project will see up to 9 wells drilled offshore, consisting of exploration and production wells. Further activities in the Otway Basin will be carried out to ensure continued production at the Otway Gas Plant, including seabed site assessments, pre-drill activities, drilling of offshore gas wells, and subsea infrastructure installation. The first phase of the Seabed Site Assessments for the Otway Offshore Project will commence in September 2019. Please find attached an information sheet with the proposed seabed assessment locations and coordinates. The order in which each location will be accessed will be confirmed as the activities progress. All dates are subject to fair sea state conditions.	Provision of information.

Stakeholder name	Date	Record #	Description	Assessment of objection or claim
			The drilling component of the Otway Offshore Project will commence between December 2019 and February 2020. Please find attached an information sheet with the proposed drilling locations and coordinates, including an update exclusion zones for vessels. The order in which each location will be accessed will be confirmed as the activities progress. All dates are subject to fair sea state conditions. If you would like to be kept in touch via text message of confirmed locations, start dates and durations just prior to and during the activities, please let us know and we will add you to our distribution list. We will need you to provide your mobile phone number so we can include it on our list. Further details on the Otway Offshore Project are available by visiting our Otway Basin Victoria web page at beachenergy.com.au/vic-otway-basin/ and clicking on the 'Otway Offshore Information Sheet' link. We are consulting with commercial fishing associations on arrangements to ensure each other's operational plans are understood, helping to minimise any impacts to fishing activities and to Beach's offshore development program. In preparation of our Environment Plan we are keen to understand if you have any questions, concerns or feedback or require any further consultation. Please don't hesitate to contact us	
Tasmanian Rock Lobster Fisherman's Association	2/07/2019	TRLFA 03 OP19-USAIS-P2/7 OPOG19IS#2	Beach email: Providing updated information on the seabed assessment areas and timings. Also provided an overview of Beach's Commercial Fisher Operating Protocol for seabed assessments and drilling operations. Please note, there have been no changes to the Drilling Information Sheet, which we have also re-attached for your convenience. We have also developed a Commercial Fisher Protocol which is outlined in the attached letter that we have drafted for you to use when sending the updated seabed assessment information to fishers. Let me know if you have any questions or concerns on this. Note that there is no change to the drilling locations we sent to you a few weeks ago. I've re-attached that information sheet for your convenience. As mentioned previously, unless otherwise requested, we will be in touch with confirmed locations, start dates and durations of Seabed Site Assessments and Drilling activities closer to the time. If you would like to be kept in touch via text message of confirmed locations, start dates and durations just prior to and during the activities, please let us know and we will add you to our distribution list. We will need you to provide your mobile phone number so we can include it on our list.	Provision of overview of Beach's Commercial Fisher Operating Protocol for seabed assessments and drilling operations.
Tasmanian Seafood Industry Council (TSIC)	9/04/2019	TSIC 01 OP19IS#1 - Otway Offshore Program 2019 2pp Info Sheet #1 Link to: OP19IS#2 - Otway Offshore Program 2019 10pp Info Sheet #2	Beach email providing information on Beach's Otway Offshore Project including drilling activities. The project is expected to start around December 2019. Attached is a brief information sheet and further details are available on the Otway Basin Victoria web page at beachenergy.com.au/vic-otway-basin/ and clicking on the 'Otway Offshore Project Information Sheet' link. As part of our consultation we are engaging with commercial fishing associations on arrangements to ensure each other's operational plans are understood, helping to minimise any impacts to fishing activities and to Beach's offshore development program. In preparation of our Environment Plan we are keen to understand if you have any questions, concerns or feedback or require any further consultation. Please don't hesitate to contact me.	Provision of information.
TSIC	07/06/2019	TSIC 02 OPOG19IS#1 & OPOG19IS#2	Beach email providing information: As previously mentioned, the Otway Offshore Project will see up to 9 wells drilled offshore, consisting of exploration and production wells. Further activities in the Otway Basin will be carried out to ensure continued production at the Otway Gas Plant, including seabed site assessments, pre-drill activities, drilling of offshore gas wells, and subsea infrastructure installation. The first phase of the Seabed Site Assessments for the Otway Offshore Project will commence in September 2019. Please find attached an information sheet with the proposed seabed assessment locations and coordinates. The order in which each location will be accessed will be confirmed as the activities progress. All dates are subject to fair sea state conditions. The drilling component of the Otway Offshore Project will commence between December 2019 and February 2020. Please find attached an information sheet with the proposed drilling locations and coordinates, including an update exclusion zones for vessels. The order in which each location will be accessed will be confirmed as the activities progress. All dates are subject to fair sea state conditions. If you would like to be kept in touch via text message of confirmed locations, start dates and durations just prior to and during the activities, please let us know and we will add you to our distribution list. We will need you to provide your mobile phone number so we can include it on our list. Further details on the Otway Offshore Project are available by visiting our Otway Basin Victoria web page at beachenergy.com.au/vic-otway-basin/ and clicking on the 'Otway Offshore Information Sheet' link. We are consulting with commercial fishing associations on arrangements to ensure each other's operational plans are understood, helping to minimise any impacts to fishing activities and to Beach's offshore development program. In preparation of our Environment Plan we are keen to understand if you have any questions, concerns or feedback or require any further consultation. Please don't hesitate to contact us	Provision of information.
TSIC	2/07/2019	TSIC 03	Beach email: Providing updated information on the seabed assessment areas and timings. Also provided an overview of Beach's Commercial Fisher Operating Protocol for seabed assessments and drilling operations.	Provision of overview of Beach's Commercial Fisher Operating Protocol for seabed assessments and drilling operations.

Stakeholder name	Date	Record #	Description	Assessment of objection or claim
		OP19-USAIS-P2/7 OPOG19IS#2	Please note, there have been no changes to the Drilling Information Sheet, which we have also re-attached for your convenience. We have also developed a Commercial Fisher Protocol which is outlined in the attached letter that we have drafted for you to use when sending the updated seabed assessment information to fishers. Let me know if you have any questions or concerns on this. Note that there is no change to the drilling locations we sent to you a few weeks ago. I've re-attached that information sheet for your convenience. As mentioned previously, unless otherwise requested, we will be in touch with confirmed locations, start dates and durations of Seabed Site Assessments and Drilling activities closer to the time. If you would like to be kept in touch via text message of confirmed locations, start dates and durations just prior to and during the activities, please let us know and we will add you to our distribution list. We will need you to provide your mobile phone number so we can include it on our list.	
Tuna Australia (ETBF Industry Association)	17/04/2019	TA 01 TA 02 OP19IS#1 - Otway Offshore Program 2019 2pp Info Sheet #1 Link to: OP19IS#2 - Otway Offshore Program 2019 10pp Info Sheet #2	Beach email providing information on Beach's Otway Offshore Project including drilling activities. The project is expected to start around December 2019. Attached is a brief information sheet and further details are available on the Otway Basin Victoria web page at beachenergy.com.au/vic-otway-basin/ and clicking on the 'Otway Offshore Project Information Sheet' link. As part of our consultation we are engaging with commercial fishing associations on arrangements to ensure each other's operational plans are understood, helping to minimise any impacts to fishing activities and to Beach's offshore development program. In preparation of our Environment Plan we are keen to understand if you have any questions, concerns or feedback or require any further consultation. Please don't hesitate to contact me.	Provision of information.
Tuna Australia (ETBF Industry Association)	07/06/2019	TA 03 OPOG19IS#1 & OPOG19IS#2	Beach email providing information: As previously mentioned, the Otway Offshore Project will see up to 9 wells drilled offshore, consisting of exploration and production wells. Further activities in the Otway Basin will be carried out to ensure continued production at the Otway Gas Plant, including seabed site assessments, pre-drill activities, drilling of offshore gas wells, and subsea infrastructure installation. The first phase of the Seabed Site Assessments for the Otway Offshore Project will commence in September 2019. Please find attached an information sheet with the proposed seabed assessment locations and coordinates. The order in which each location will be accessed will be confirmed as the activities progress. All dates are subject to fair sea state conditions. The drilling component of the Otway Offshore Project will commence between December 2019 and February 2020. Please find attached an information sheet with the proposed drilling locations and coordinates, including an update exclusion zones for vessels. The order in which each location will be accessed will be confirmed as the activities progress. All dates are subject to fair sea state conditions. If you would like to be kept in touch via text message of confirmed locations, start dates and durations just prior to and during the activities, please let us know and we will add you to our distribution list. We will need you to provide your mobile phone number so we can include it on our list. Further details on the Otway Offshore Project are available by visiting our Otway Basin Victoria web page at beachenergy.com.au/vic-otway-basin/ and clicking on the 'Otway Offshore Information Sheet' link. We are consulting with commercial fishing associations on arrangements to ensure each other's operational plans are understood, helping to minimise any impacts to fishing activities and to Beach's offshore development program. In preparation of our Environment Plan we are keen to understand if you have any questions, concerns or feedback or require any further consultation. Please don't hesitate to contact us	Provision of information.
Tuna Australia (ETBF Industry Association)	2/07/2019	TA 04 OP19-USAIS-P2/7 OPOG19IS#2	Beach email: Providing updated information on the seabed assessment areas and timings. Also provided an overview of Beach's Commercial Fisher Operating Protocol for seabed assessments and drilling operations. Please note, there have been no changes to the Drilling Information Sheet, which we have also re-attached for your convenience. We have also developed a Commercial Fisher Protocol which is outlined in the attached letter that we have drafted for you to use when sending the updated seabed assessment information to fishers. Let me know if you have any questions or concerns on this. Note that there is no change to the drilling locations we sent to you a few weeks ago. I've re-attached that information sheet for your convenience. As mentioned previously, unless otherwise requested, we will be in touch with confirmed locations, start dates and durations of Seabed Site Assessments and Drilling activities closer to the time. If you would like to be kept in touch via text message of confirmed locations, start dates and durations just prior to and during the activities, please let us know and we will add you to our distribution list. We will need you to provide your mobile phone number so we can include it on our list.	Provision of overview of Beach's Commercial Fisher Operating Protocol for seabed assessments and drilling operations.
Victorian Fisheries Authority (VFA)	5/02/2019 – 11/02/2019	VFA 01 VFA 02 VFA 03 - 06	Beach email to set up a time to meet. VFA email of acknowledgement. Emails to set up meeting.	NA

Stakeholder name	Date	Record #	Description	Assessment of objection or claim
VFA	25/02/2019	VFA 07	Beach email providing overview of upcoming activities in Victoria including drilling activities, details include: Offshore activities including: seabed assessments over a series of 4 x 4 km areas; drilling and construction of exploration and production wells; installation of seabed infrastructure for successful wells. The activities will require safe operating zones around each seabed assessment and the MODU. We will send an information sheet on this project in the next week or so. To enable us to prepare our different environment plans, including any impacts on commercial fishing activity and mitigation plans that may be required, we need to assess fishing effort in Commonwealth and State managed fisheries. As such we are seeking VFA's support to provide data on Victorian State managed fisheries as follows: Catch data in each of the requested blocks/per block: • By month of year, for the last five years. • By species caught / tonnage of each. • By number of vessels operating. • If number of fishers < 5, return a "yes" in output field. • If no fishers, return a "no" in output field.	Request for information. It is noted that since this email was sent the areas of the seabed assessment have increased (See Section 4.1.1 Operational Area for details). The updates areas are within the fishing grids requested so updated information was not required from VFA.
VFA	4/03/2019	VFA 08	Beach follow-up email in relation to data request in VFA 07 and request to meet with VFA.	Follow-up of request for information.
VFA	6/03/2019	VFA 09 VFA 10 VFA 11	VFA email confirming data request had been sent and emails between Beach and VFA to arrange meeting on 12/03/19.	Follow-up of request for information.
VFA	12/03/2019	VFA 12	Meeting. Beach explained proposed offshore activities, discussed information sheet and map. Thanked VFA for providing fishing data and discussed low level of State managed (VFA) fishing activity in the vicinity. General discussion on Total Allowable Commercial Catch (TACC) and new harvest strategy. Beach asked if VFA could advise of any new strategies or research that may be relevant to assessment of any impacts from our operations. Also, that their website does not always show the latest TACC levels or strategies. VFA advised that they won't have much involvement in engagement regarding Beach's activities and mentioned industry representatives. Beach explained ongoing relationship with Seafood Industry Victoria (SIV), and Victorian Rock Lobster Association (VRLA), and that meeting SIV today.	VFA highlighted consultation with industry representatives. Beach is undertaking consultation with industry representatives including SIV, SETFIA and Victorian Rock Lobster Association.
VFA	18/04/2019	VFA 13 VFA 14 VFA 15 OP19IS#1 - Otway Offshore Program 2019 2pp Info Sheet #1 Link to: OP19IS#2 - Otway Offshore Program 2019 10pp Info Sheet #2	Beach email: Provision of information on the 'Otway Offshore Project and upcoming activities including drilling activities. In January 2018, Beach Energy acquired Origin Energy's gas exploration and production assets in Victoria, Western Australia and New Zealand. With its head office in Adelaide, Beach Energy has been operating in Australia for over 50 years and has extensive experience in the gas industry. We would like to inform you that we're planning further development of our Otway offshore natural gas reserves within existing Commonwealth offshore exploration permits and production licenses. The 'Otway Offshore Project' will see up to 9 wells drilled offshore, consisting of exploration and production wells. Further activities in the Otway Basin will be carried out to ensure continued production at the Otway Gas Plant, including seabed site assessments, pre-drill activities, drilling of offshore gas wells, and subsea infrastructure installation. The project is expected to start around September 2019, depending on regulatory approvals, weather windows and availability of contractors. I've attached a brief information sheet and further details are available by visiting our Otway Basin Victoria web page at https://www.beachenergy.com.au/vic-otway-basin/ and clicking on the 'Otway Offshore Project Information Sheet' link. In preparation of our Environment Plan we are keen to understand if you have any questions, concerns or feedback or require any further consultation. Please don't hesitate to contact us	Provision of information.
VFA	29/04/2019	VFA 16	Email from VFA: There is significant overlap with Victoria's rock lobster and giant crab fisheries. There has been approximately 18t of Giant crab and 40t of Southern Rock lobster taken from within the boundaries of the survey grid provided over past 10 years. Can you please also confirm "coordinates of all locations will be made available to relevant stakeholders after completion of planning" to advise of further overlap with fishing activity. I would also like to be kept informed with the outcomes and recommendations from this section: In preparation of Environment Plans a noise assessment on marine fauna will be completed to identify any potential impacts and mitigation plans that may be required. This will include assessment of any Vertical Seismic Profiling (VSP) as this may be required to validate one exploration well. Please also provide the EP for comment when available.	Beach provided VFA with an extract of the current draft of the Seabed Assessment EP chapters related to noise modelling and the identification of fisheries. See Record VFA 25. No Vertical Seismic Profiling (VSP) to be undertaken during the proposed development drilling. This extract provided the information in EP Section Appendix B.4.8 Victorian managed fisheries which details: • Based on information from Seafood Industry Victoria approximately 40 t of southern rock lobster has been caught within the operational area of the last 10 years. This equates to between 1.5 – 1.7% of the total catch over the 10 year period.

Stakeholder name	Date	Record #	Description	Assessment of objection or claim
				• Based on information from Seafood Industry Victoria approximately 18 t of giant crab has been caught within the operational area of the last 10 years. The total catch over the last 10 years has been 157.8 t so 18 t equates to This equates to 11% of the total catch being caught in the operational area. A meeting was held with VFA to further discuss Beach's Otway development activities. See Record VFA 25.
VFA	30/04/2019 1/05/2019	VFA 17 VFA 18 VFA 19 VFA 20	Emails between Beach and VFA to arrange meeting. Meeting set for 3/5/2019.	See Record VFA 25.
VFA	2/05/2019	VFA 21 VFA 22 VFA 23 VFA 24	Beach email: Prior to tomorrow's meeting, can you clarify what you wanted in relation to the noise assessment? Is it just for VSP? VFA email: I am interested in the assessment and mitigation recommendations that follow. What are the outcomes for rock lobster and giant crab? Does this consider the studies that have indicated effects on RL? Beach email: Is the noise assessment (assessment and mitigations) just for the VSP activities? VFA email: I am interested in the assessment for all activities and their impacts.	See Record VFA 25 for details of the information provided to VFA. No Vertical Seismic Profiling (VSP) to be undertaken during the proposed development drilling
VFA	3/05/2019	VFA 25	Meeting between Beach, VFA and SIV. Beach provided VFA with an extract of the current draft of the Seabed Assessment EP chapters related to noise modelling and the identification of fisheries. Beach stepped VFA through the noise modelling at a high level and the conclusions that there was no unacceptable impact to marine fauna. VFA said it was good to have the report and that they would review it in more detail. Beach explained the consultation approach with fishers; engagement had been via SIV who undertook a mailout of a 2-page information sheet (which had also been provided to VFA) to their approx. 300 members. A cover letter had asked for fishers to identify if they felt they would be impacted by the activities. SIV had reported that 4 fishers had come forward and 2 others had contacted Beach directly. Beach will engage with these fishers and SIV as part of on-going consultation and specifically when details of the exact locations and timing of the seabed assessments and drilling were available. Beach would also provide regular information on the location of vessels and MODUs to those who wanted to receive that information. VFA was comfortable with this approach. VFA asked about any permanent restrictions on fishing grounds, such as permanent exclusion zones, as this would reduce the available area for fishing. Beach explained that there may be a requirement for some wells to have exclusion zones around the infrastructure that will be installed on the seabed. At this stage the requirements for which wells and any details of the exclusion zones were not yet known. SIV joined the meeting and Beach gave a recap on the consultation that had been undertaken with commercial fishers. SIV was also provided with a copy of the draft EP extract. SIV informed VFA that they were happy with the way that Beach had undertaken the consultation and their plans for on-going consultation. Beach discussed with SIV a time when they could catch up to discuss the impacts on the four fishers that had identified themselves but no date was chosen due to current availability. SIV and VFA reviewed the fishing effort maps in the draft Seabed Assessment EP extract and queried the fishing activity for the giant crab map, in the grids located close to shore. Beach informed that the data had been provided by VFA.	Beach provided VFA with an extract of the current draft of the Seabed Assessment EP chapters related to noise modelling and the identification of fisheries. Beach will continue ongoing engagement with SIV and any affected fishers as per Section 9.3.1 Fishery specific consultation approach to ensure impacts to fishers are ALARP and an acceptable level. Beach has engaged directly with the fishers that contacted them. See Records for CRLF and CSF. VFA had raised concerns about loss of fishing area from permanent exclusion zones. During drilling activities, a temporary 500 m rig safety zone will be established, coinciding with the activity timing and duration (approximately 35-55 days). Additionally, a 2 km cautionary zone will be relayed to fishers via the AHO NTM process. A permanent PSZ shall be maintained at or sought for each well location Updated rock lobster and giant crab fishery maps were sent to VFA and SIV. See Record SIV 22 and VFA 27.
VFA	9/05/2019	VFA 26	Beach email requesting further fisheries data for grid L13.	Request for information. Grid L13 is outside the area where the Geographe and Thylacine wells will be drilled.
VFA	10/05/2019	VFA 27	Beach email providing updated information as discussed at meeting on 3/5/2019 Record VFA 25. In the extract of the EP Beach provided VFA and SIV commented on the fishing effort maps. Beach have reviewed the maps we discussed and are including revised versions in the EP we are submitting shortly. The updated maps were provided which show only the areas where there has been catch effort for rock lobsters and giant crabs within the seabed survey operational area. We have also firmed up the sizes of the seabed assessment survey areas which vary slightly to what was communicated in the Otway Offshore Information Sheet we published. The revised areas were provided. Don't hesitate to let me know if you have any questions.	Updated rock lobster and giant crab fishery maps showing overlap of fishery effort with the operational area within the Otway Development area which includes the Geographe and Thylacine wells where provided to SIV and VFA. Meeting will be set up with SIV to discuss the fishing effort of the four fishers who have raised with SIV that they fish in the area. Beach will continue ongoing engagement with SIV and any affected fishers as per Section 9.3.1 Fishery specific consultation approach to ensure impacts to fishers are ALARP and an acceptable level.
VFA		VFA 28 – VFA 40	Various emails requesting catch data information. Beach email requesting meeting. Meeting scheduled for 03/06/2019 – record VFA 41	Request for information
VFA	03/06/2019	VFA 41 OPOG19IS#1 OPOG19IS#2	Meeting between Beach and VFA held at VFA office, Melbourne. Beach presented 2 x short information sheets which show the locations of the seabed assessment with coordinates and expected durations and sequence on the back. Similar sheet has been produced for drilling phase.	Ongoing stakeholder engagement commitment within EP (Section 9.7) to regularly update Fishers by text. During drilling activities, a temporary 500 m rig safety zone will be established, coinciding with the activity timing and duration (approximately 35-55 days).

Stakeholder name	Date	Record #	Description	Assessment of objection or claim
			The information sheets will help fishers plan around our activities. Beach offered to keep Fishers informed by text message of the location of the vessel on a regular basis to minimise impacts on each other. Beach offered compensation for damaged lines or rock lobster pots (attributable to Beach activities). There will be a 500m exclusion zone around the MODU overlaid with a 2km cautionary zone so fishers know where we are. Petroleum Safety Zones (Otway Offshore Project): A potential PSZ has a 500m radius. There will be a few PSZs created around the Thylacine wells and Beach is mapping these to see what they look like as a group. They won't be applied for yet until after the production wells are drilled. Generally, the infrastructure is located on a sandy sea bottom but the 500m zone may overlap some reefy areas. We will know more once we have the information from the seabed assessments to see what areas are included in the zones. Beach will come back to VFA once we have more information. VFA thanked Beach for coming to meet with them.	Additionally, a 2 km cautionary zone will be relayed to fishers via the AHO NTM process. A permanent PSZ shall be maintained at or sought for each well location.
VFA	07/06/2019	VFA 42 OPOG19IS#1 & OPOG19IS#2	Beach email providing update information: The drilling component of the Otway Offshore Project will commence between December 2019 and February 2020. Please find attached an information sheet with the proposed drilling locations and coordinates, including exclusion zones for vessels. The order in which each location will be accessed will be confirmed as the activities progress. All dates are subject to fair sea state conditions. Unless otherwise requested, we will be in touch with confirmed locations, start dates and durations of Seabed Site Assessments and Drilling activities closer to the time. If you would like to be kept in touch via text message of confirmed locations, start dates and durations just prior to and during the activities, please let us know and we will add you to our distribution list. We will need you to provide your mobile phone number so we can include it on our list.	Provision of information
VFA	20/06/2019 26/06/2019	VFA 43 - 44	Beach email requesting further fisheries data for grid L13.	Request for information. Grid L13 is outside the area where the Geographe and Thylacine wells will be drilled.
VFA	2/07/2019	VFA 45 OP19-USAIS-P2/7 OPOG19IS#2	Beach email: Providing updated information on the seabed assessment areas and timings. Also provided an overview of Beach's Commercial Fisher Operating Protocol for seabed assessments and drilling operations. Please note, there have been no changes to the Drilling Information Sheet, which we have also re-attached for your convenience. We have also developed a Commercial Fisher Protocol which is outlined in the attached letter that we have drafted for you to use when sending the updated seabed assessment information to fishers. Let me know if you have any questions or concerns on this. Note that there is no change to the drilling locations we sent to you a few weeks ago. I've re-attached that information sheet for your convenience. As mentioned previously, unless otherwise requested, we will be in touch with confirmed locations, start dates and durations of Seabed Site Assessments and Drilling activities closer to the time. If you would like to be kept in touch via text message of confirmed locations, start dates and durations just prior to and during the activities, please let us know and we will add you to our distribution list. We will need you to provide your mobile phone number so we can include it on our list.	Provision of overview of Beach's Commercial Fisher Operating Protocol for seabed assessments and drilling operations.
Victorian Recreational Fishing Peak Body (VR Fish)	9/04/2019	VRFISH 01 VRFISH 02 OP19IS#1 - Otway Offshore Program 2019 2pp Info Sheet #1 Link to: OP19IS#2 - Otway Offshore Program 2019 10pp Info Sheet #2	Beach email providing information on Beach's Otway Offshore Project including drilling activities. The project is expected to start around December 2019. Attached is a brief information sheet and further details are available on the Otway Basin Victoria web page at beachenergy.com.au/vic-otway-basin/ and clicking on the 'Otway Offshore Project Information Sheet' link. As part of our consultation we are engaging with commercial fishing associations on arrangements to ensure each other's operational plans are understood, helping to minimise any impacts to fishing activities and to Beach's offshore development program. In preparation of our Environment Plan we are keen to understand if you have any questions, concerns or feedback or require any further consultation. Please don't hesitate to contact me.	Provision of information.
VR Fish	07/06/2019	VRFISH 03 OPOG19IS#1 & OPOG19IS#2	Beach email providing information: As previously mentioned, the Otway Offshore Project will see up to 9 wells drilled offshore, consisting of exploration and production wells. Further activities in the Otway Basin will be carried out to ensure continued production at the Otway Gas Plant, including seabed site assessments, pre-drill activities, drilling of offshore gas wells, and subsea infrastructure installation. The first phase of the Seabed Site Assessments for the Otway Offshore Project will commence in September 2019. Please find attached an information sheet with the proposed seabed assessment locations and coordinates. The order in which each location will be accessed will be confirmed as the activities progress. All dates are subject to fair sea state conditions. The drilling component of the Otway Offshore Project will commence between December 2019 and February 2020. Please find attached an information sheet with the proposed drilling locations and coordinates, including an update exclusion zones for vessels. The order in which each location will be accessed will be confirmed as the activities progress. All dates are subject to fair sea state conditions.	Provision of information.

Stakeholder name	Date	Record #	Description	Assessment of objection or claim
			If you would like to be kept in touch via text message of confirmed locations, start dates and durations just prior to and during the activities, please let us know and we will add you to our distribution list. We will need you to provide your mobile phone number so we can include it on our list. Further details on the Otway Offshore Project are available by visiting our Otway Basin Victoria web page at beachenergy.com.au/vic-otway-basin/ and clicking on the 'Otway Offshore Information Sheet' link. We are consulting with commercial fishing associations on arrangements to ensure each other's operational plans are understood, helping to minimise any impacts to fishing activities and to Beach's offshore development program. In preparation of our Environment Plan we are keen to understand if you have any questions, concerns or feedback or require any further consultation. Please don't hesitate to contact us	
VR Fish	2/07/2019	VRFISH 04 OP19-USAIS-P2/7 OPOG19IS#2	Beach email: Providing updated information on the seabed assessment areas and timings. Also provided an overview of Beach's Commercial Fisher Operating Protocol for seabed assessments and drilling operations. Please note, there have been no changes to the Drilling Information Sheet, which we have also re-attached for your convenience. We have also developed a Commercial Fisher Protocol which is outlined in the attached letter that we have drafted for you to use when sending the updated seabed assessment information to fishers. Let me know if you have any questions or concerns on this. Note that there is no change to the drilling locations we sent to you a few weeks ago. I've re-attached that information sheet for your convenience. As mentioned previously, unless otherwise requested, we will be in touch with confirmed locations, start dates and durations of Seabed Site Assessments and Drilling activities closer to the time. If you would like to be kept in touch via text message of confirmed locations, start dates and durations just prior to and during the activities, please let us know and we will add you to our distribution list. We will need you to provide your mobile phone number so we can include it on our list.	Provision of overview of Beach's Commercial Fisher Operating Protocol for seabed assessments and drilling operations.
Victorian Rock Lobster Association (VRLA)	29/03/2019	VRLA 01 OP19IS#1 - Otway Offshore Program 2019 2pp Info Sheet #1 Link to: OP19IS#2 - Otway Offshore Program 2019 10pp Info Sheet #2	VRLA was included in Seafood Industry Victoria's mail-out of 2pp fact sheet to approx. 300 SIV members.	Provision of information. See Record SIV 14.
Victorian Scallop Fishermen's Association Inc	17/04/2019	VSFA 01 VSFA 02 OP19IS#1 - Otway Offshore Program 2019 2pp Info Sheet #1 Link to: OP19IS#2 - Otway Offshore Program 2019 10pp Info Sheet #2	Beach email providing information on Beach's Otway Offshore Project including drilling activities. The project is expected to start around December 2019. Attached is a brief information sheet and further details are available on the Otway Basin Victoria web page at beachenergy.com.au/vic-otway-basin/ and clicking on the 'Otway Offshore Project Information Sheet' link. As part of our consultation we are engaging with commercial fishing associations on arrangements to ensure each other's operational plans are understood, helping to minimise any impacts to fishing activities and to Beach's offshore development program. In preparation of our Environment Plan we are keen to understand if you have any questions, concerns or feedback or require any further consultation. Please don't hesitate to contact me.	Provision of information.
Victorian Scallop Fishermen's Association Inc	07/06/2019	VSFA 03 OPOG19IS#1 & OPOG19IS#2	Beach email providing information: As previously mentioned, the Otway Offshore Project will see up to 9 wells drilled offshore, consisting of exploration and production wells. Further activities in the Otway Basin will be carried out to ensure continued production at the Otway Gas Plant, including seabed site assessments, pre-drill activities, drilling of offshore gas wells, and subsea infrastructure installation. The first phase of the Seabed Site Assessments for the Otway Offshore Project will commence in September 2019. Please find attached an information sheet with the proposed seabed assessment locations and coordinates. The order in which each location will be accessed will be confirmed as the activities progress. All dates are subject to fair sea state conditions. The drilling component of the Otway Offshore Project will commence between December 2019 and February 2020. Please find attached an information sheet with the proposed drilling locations and coordinates, including an update exclusion zones for vessels. The order in which each location will be accessed will be confirmed as the activities progress. All dates are subject to fair sea state conditions. If you would like to be kept in touch via text message of confirmed locations, start dates and durations just prior to and during the activities, please let us know and we will add you to our distribution list. We will need you to provide your mobile phone number so we can include it on our list. Further details on the Otway Offshore Project are available by visiting our Otway Basin Victoria web page at beachenergy.com.au/vic-otway-basin/ and clicking on the 'Otway Offshore Information Sheet' link. We are consulting with commercial fishing associations on arrangements to ensure each other's operational plans are understood, helping to minimise any impacts to fishing activities and to Beach's offshore development program. In preparation of our Environment Plan we are keen to understand if you have any questions, concerns or feedback or require any further consultation. Please don't hesitate to contact us	Provision of information.

Stakeholder name	Date	Record #	Description	Assessment of objection or claim
Victorian Scallop Fishermen's Association Inc	2/07/2019	VSFA 04 OP19-USAIS-P2/7 OPOG19IS#2	Beach email: Providing updated information on the seabed assessment areas and timings. Also provided an overview of Beach's Commercial Fisher Operating Protocol for seabed assessments and drilling operations. Please note, there have been no changes to the Drilling Information Sheet, which we have also re-attached for your convenience. We have also developed a Commercial Fisher Protocol which is outlined in the attached letter that we have drafted for you to use when sending the updated seabed assessment information to fishers. Let me know if you have any questions or concerns on this. Note that there is no change to the drilling locations we sent to you a few weeks ago. I've re-attached that information sheet for your convenience. As mentioned previously, unless otherwise requested, we will be in touch with confirmed locations, start dates and durations of Seabed Site Assessments and Drilling activities closer to the time. If you would like to be kept in touch via text message of confirmed locations, start dates and durations just prior to and during the activities, please let us know and we will add you to our distribution list. We will need you to provide your mobile phone number so we can include it on our list.	Provision of overview of Beach's Commercial Fisher Operating Protocol for seabed assessments and drilling operations.

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Appendix A EPBC Act Protected Matters Search Reports

A.1: OPERATIONAL AREA

Australian Government

Department of the Environment and Energy

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

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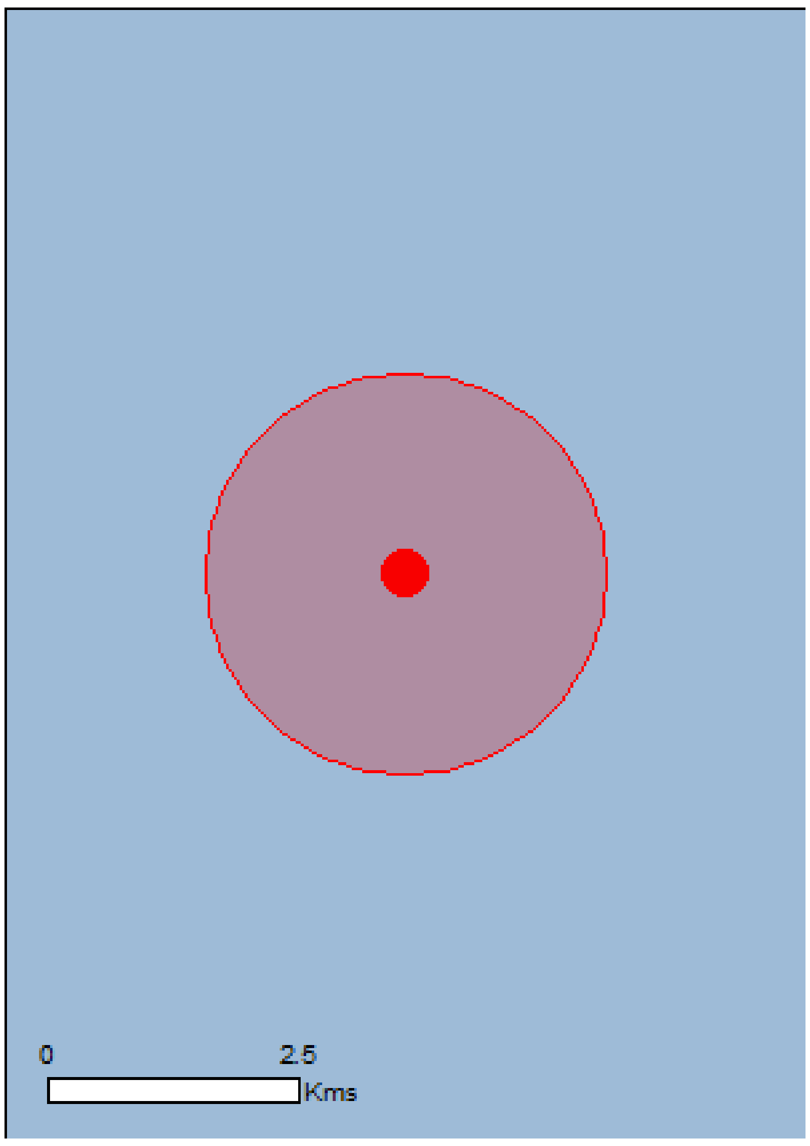
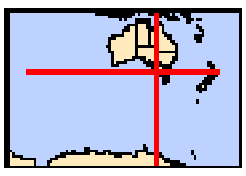


This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

Coordinates

Buffer: 2.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	1
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	32
Listed Migratory Species:	36

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	58
Whales and Other Cetaceans:	13
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	None
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Commonwealth Marine Area [Resource Information]

Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside the Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area. Generally the Commonwealth Marine Area stretches from three nautical miles to two hundred nautical miles from the coast.

Name
EEZ and Territorial Sea

Marine Regions [Resource Information]

If you are planning to undertake action in an area in or close to the Commonwealth Marine Area, and a marine bioregional plan has been prepared for the Commonwealth Marine Area in that area, the marine bioregional plan may inform your decision as to whether to refer your proposed action under the EPBC Act.

Name
South-east

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within

Name	Status	Type of Presence
		area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat may occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area
Pterodroma leucoptera leucoptera Gould's Petrel, Australian Gould's Petrel [26033]	Endangered	Species or species habitat may occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Species or species habitat may occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche bulleri platei Northern Buller's Albatross, Pacific Albatross [82273]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche cauta cauta Shy Albatross [82345]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche cauta steadi White-capped Albatross [82344]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche chrysostoma Grey-headed Albatross [66491]	Endangered	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Mammals		
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Foraging, feeding or related behaviour known to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat known to occur

Name	Status	Type of Presence
		within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat likely to occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat likely to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat likely to occur within area
Sharks		
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Ardenna carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Species or species habitat likely to occur within area
Ardenna grisea Sooty Shearwater [82651]		Species or species habitat may occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche cauta Shy Albatross [89224]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area

Name	Threatened	Type of Presence
Thalassarche chrysostoma Grey-headed Albatross [66491]	Endangered	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Migratory Marine Species		
Balaena glacialis australis Southern Right Whale [75529]	Endangered*	Species or species habitat known to occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Foraging, feeding or related behaviour known to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Caperea marginata Pygmy Right Whale [39]		Foraging, feeding or related behaviour may occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat likely to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat likely to occur within area
Isurus oxyrinchus Shortfin Mako, Mako Shark [79073]		Species or species habitat likely to occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat likely to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Orcinus orca Killer Whale, Orca [46]		Species or species habitat likely to occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Catharacta skua Great Skua [59472]		Species or species habitat may occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area

Name	Threatened	Type of Presence
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat may occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Species or species habitat may occur within area
Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Species or species habitat likely to occur within area
Puffinus griseus Sooty Shearwater [1024]		Species or species habitat may occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche cauta Shy Albatross [89224]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thalassarche chrysostoma Grey-headed Albatross [66491]	Endangered	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche sp. nov. Pacific Albatross [66511]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area

Name	Threatened	Type of Presence
Thalassarche steadi White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Fish		
Heraldia nocturna Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area
Hippocampus abdominalis Big-belly Seahorse, Eastern Potbelly Seahorse, New Zealand Potbelly Seahorse [66233]		Species or species habitat may occur within area
Hippocampus breviceps Short-head Seahorse, Short-snouted Seahorse [66235]		Species or species habitat may occur within area
Histiogamphelus briggsii Crested Pipefish, Briggs' Crested Pipefish, Briggs' Pipefish [66242]		Species or species habitat may occur within area
Histiogamphelus cristatus Rhino Pipefish, Macleay's Crested Pipefish, Ring-back Pipefish [66243]		Species or species habitat may occur within area
Hypselognathus rostratus Knifesnout Pipefish, Knife-snouted Pipefish [66245]		Species or species habitat may occur within area
Kaupus costatus Deepbody Pipefish, Deep-bodied Pipefish [66246]		Species or species habitat may occur within area
Leptoichthys fistularius Brushtail Pipefish [66248]		Species or species habitat may occur within area
Lissocampus caudalis Australian Smooth Pipefish, Smooth Pipefish [66249]		Species or species habitat may occur within area
Lissocampus runa Javelin Pipefish [66251]		Species or species habitat may occur within area
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area
Mitotichthys semistriatus Halfbanded Pipefish [66261]		Species or species habitat may occur within area
Mitotichthys tuckeri Tucker's Pipefish [66262]		Species or species habitat may occur within area
Notiocampus ruber Red Pipefish [66265]		Species or species habitat may occur within area
Phycodurus eques Leafy Seadragon [66267]		Species or species habitat may occur within area
Phyllopteryx taeniolatus Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area
Pugnaso curtirostris Pugnose Pipefish, Pug-nosed Pipefish [66269]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Solegnathus robustus Robust Pipehorse, Robust Spiny Pipehorse [66274]		Species or species habitat may occur within area
Solegnathus spinosissimus Spiny Pipehorse, Australian Spiny Pipehorse [66275]		Species or species habitat may occur within area
Stigmatopora argus Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area
Stipecampus cristatus Ringback Pipefish, Ring-backed Pipefish [66278]		Species or species habitat may occur within area
Urocampus carinirostris Hairy Pipefish [66282]		Species or species habitat may occur within area
Vanacampus margaritifer Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area
Vanacampus phillipi Port Phillip Pipefish [66284]		Species or species habitat may occur within area
Vanacampus poecilolaemus Longsnout Pipefish, Australian Long-snout Pipefish, Long-snouted Pipefish [66285]		Species or species habitat may occur within area
Mammals		
Arctocephalus forsteri Long-nosed Fur-seal, New Zealand Fur-seal [20]		Species or species habitat may occur within area
Arctocephalus pusillus Australian Fur-seal, Australo-African Fur-seal [21]		Species or species habitat may occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat likely to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat likely to occur within area

Whales and other Cetaceans [Resource Information]

Name	Status	Type of Presence
Mammals		
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Foraging, feeding or related behaviour known

Name	Status	Type of Presence
		to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Caperea marginata Pygmy Right Whale [39]		Foraging, feeding or related behaviour may occur within area
Delphinus delphis Common Dophin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat known to occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat likely to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat likely to occur within area
Pseudorca crassidens False Killer Whale [48]		Species or species habitat likely to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area

Extra Information

A.2: SPILL EMBA

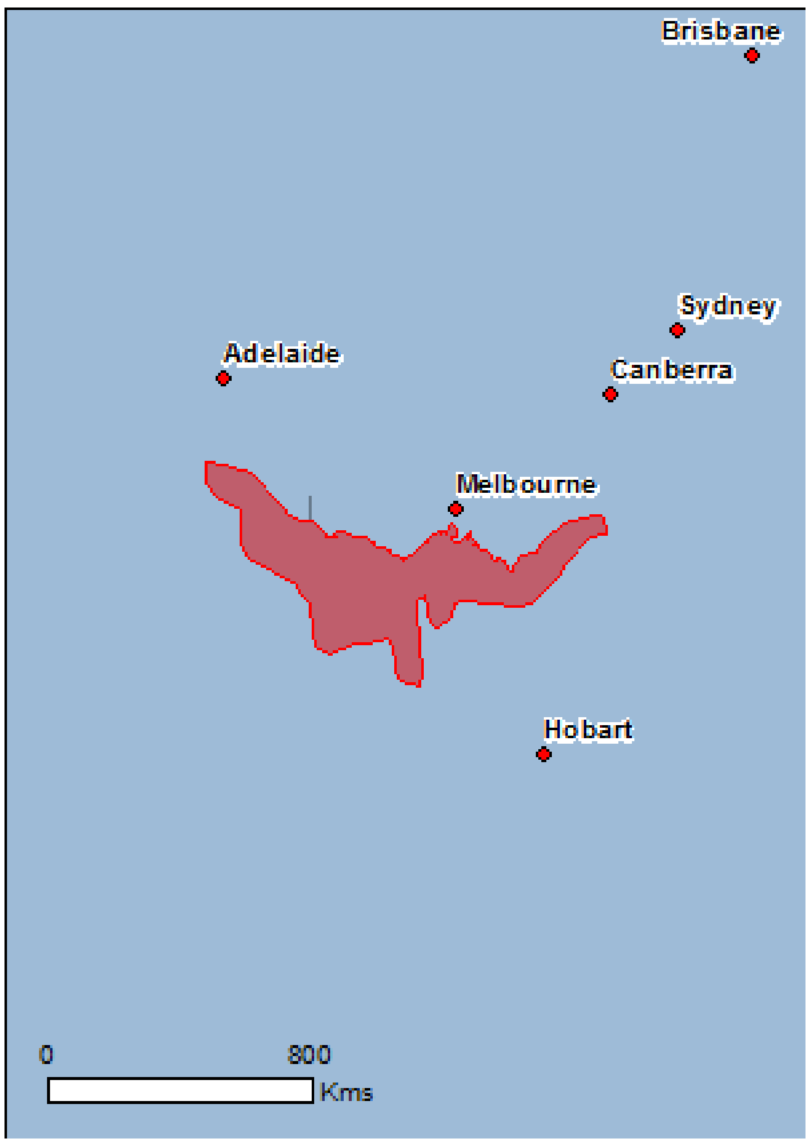
EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 07/02/20 15:09:00



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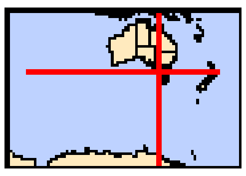

Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	3
Wetlands of International Importance:	6
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	1
Listed Threatened Ecological Communities:	9
Listed Threatened Species:	112
Listed Migratory Species:	79

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	10
Commonwealth Heritage Places:	8
Listed Marine Species:	132
Whales and Other Cetaceans:	32
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	6

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	95
Regional Forest Agreements:	3
Invasive Species:	57
Nationally Important Wetlands:	15
Key Ecological Features (Marine)	3

Details

Matters of National Environmental Significance

National Heritage Properties [Resource Information]

Name	State	Status
Historic		
Great Ocean Road and Scenic Environs	VIC	Listed place
Point Nepean Defence Sites and Quarantine Station Area	VIC	Listed place
Quarantine Station and Surrounds	VIC	Within listed place

Wetlands of International Importance (Ramsar) [Resource Information]

Name	Proximity
Corner inlet	Within 10km of Ramsar
Glenelg estuary and discovery bay wetlands	Within Ramsar site
Lavinia	Within Ramsar site
Piccaninnie ponds karst wetlands	Within Ramsar site
Port phillip bay (western shoreline) and bellarine peninsula	Within Ramsar site
Western port	Within Ramsar site

Commonwealth Marine Area [Resource Information]

Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside the Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area. Generally the Commonwealth Marine Area stretches from three nautical miles to two hundred nautical miles from the coast.

Name
EEZ and Territorial Sea

Marine Regions [Resource Information]

If you are planning to undertake action in an area in or close to the Commonwealth Marine Area, and a marine bioregional plan has been prepared for the Commonwealth Marine Area in that area, the marine bioregional plan may inform your decision as to whether to refer your proposed action under the EPBC Act.

Name
South-east

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Assemblages of species associated with open-coast salt-wedge estuaries of western and central Victoria ecological community	Endangered	Community likely to occur within area
Giant Kelp Marine Forests of South East Australia	Endangered	Community may occur within area
Grassy Eucalypt Woodland of the Victorian Volcanic Plain	Critically Endangered	Community known to occur within area
Natural Damp Grassland of the Victorian Coastal Plains	Critically Endangered	Community likely to occur within area
Natural Temperate Grassland of the Victorian Volcanic Plain	Critically Endangered	Community likely to occur within area
Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains	Critically Endangered	Community likely to occur within area
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area
Tasmanian Forests and Woodlands dominated by black gum or Brookers gum (Eucalyptus ovata / E. brookeriana)	Critically Endangered	Community likely to occur within area
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Community likely to occur within area

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Acanthiza pusilla archibaldi		
King Island Brown Thornbill, Brown Thornbill (King Island) [59430]	Endangered	Species or species habitat likely to occur within area
Acanthornis magna greeniana		
King Island Scrubtit, Scrubtit (King Island) [82329]	Critically Endangered	Species or species habitat known to occur within area
Anthochaera phrygia		
Regent Honeyeater [82338]	Critically Endangered	Foraging, feeding or related behaviour likely to occur within area
Aquila audax fleayi		
Tasmanian Wedge-tailed Eagle, Wedge-tailed Eagle (Tasmanian) [64435]	Endangered	Species or species habitat likely to occur within area
Botaurus poiciloptilus		
Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Calidris canutus		
Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris tenuirostris		
Great Knot [862]	Critically Endangered	Roosting known to occur within area
Calyptorhynchus banksii graptogyne		
South-eastern Red-tailed Black-Cockatoo [25982]	Endangered	Species or species habitat known to occur within area
Ceyx azureus diemenensis		
Tasmanian Azure Kingfisher [25977]	Endangered	Species or species habitat may occur within area
Charadrius leschenaultii		
Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Roosting known to occur within area
Charadrius mongolus		
Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area
Diomedea antipodensis		
Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea antipodensis gibsoni		
Gibson's Albatross [82270]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora		
Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans		
Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi		
Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Fregetta grallaria grallaria		
White-bellied Storm-Petrel (Tasman Sea), White-bellied Storm-Petrel (Australasian) [64438]	Vulnerable	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area
Limosa lapponica baueri Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat known to occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Bar-tailed Godwit (menzbieri) [86432]	Critically Endangered	Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Neophema chrysogaster Orange-bellied Parrot [747]	Critically Endangered	Migration route known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat known to occur within area
Pedionomus torquatus Plains-wanderer [906]	Critically Endangered	Species or species habitat likely to occur within area
Pezoporus occidentalis Night Parrot [59350]	Endangered	Extinct within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area
Platycercus caledonicus brownii Green Rosella (King Island) [67041]	Vulnerable	Species or species habitat likely to occur within area
Pterodroma leucoptera leucoptera Gould's Petrel, Australian Gould's Petrel [26033]	Endangered	Species or species habitat may occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat known to occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Species or species habitat known to occur within area

Name	Status	Type of Presence
Strepera fuliginosa colei Black Currawong (King Island) [67113]	Vulnerable	Breeding likely to occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche bulleri platei Northern Buller's Albatross, Pacific Albatross [82273]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche cauta cauta Shy Albatross [82345]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche cauta steadi White-capped Albatross [82344]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche chrysostoma Grey-headed Albatross [66491]	Endangered	Species or species habitat may occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thinornis rubricollis rubricollis Hooded Plover (eastern) [66726]	Vulnerable	Species or species habitat known to occur within area
Crustaceans		
Euastacus bispinosus Glenelg Spiny Freshwater Crayfish, Pricklyback [81552]	Endangered	Species or species habitat known to occur within area
Fish		
Galaxiella pusilla Eastern Dwarf Galaxias, Dwarf Galaxias [56790]	Vulnerable	Species or species habitat known to occur within area
Nannoperca obscura Yarra Pygmy Perch [26177]	Vulnerable	Species or species habitat likely to occur within area
Nannoperca variegata Variegated Pygmy Perch, Ewens Pygmy Perch, Golden Pygmy Perch [26178]	Vulnerable	Species or species habitat known to occur within area
Prototroctes maraena Australian Grayling [26179]	Vulnerable	Species or species habitat known to occur within area
Frogs		
Litoria raniformis Growling Grass Frog, Southern Bell Frog, Green and Golden Frog, Warty Swamp Frog [1828]	Vulnerable	Species or species habitat known to occur within area
Insects		

Name	Status	Type of Presence
Synemon plana Golden Sun Moth [25234]	Critically Endangered	Species or species habitat may occur within area
Mammals		
Antechinus minimus maritimus Swamp Antechinus (mainland) [83086]	Vulnerable	Species or species habitat known to occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Foraging, feeding or related behaviour known to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dasyurus maculatus maculatus (SE mainland population) Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat known to occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Breeding known to occur within area
Isoodon obesulus obesulus Southern Brown Bandicoot (eastern), Southern Brown Bandicoot (south-eastern) [68050]	Endangered	Species or species habitat known to occur within area
Mastacomys fuscus mordicus Broad-toothed Rat (mainland), Tooarrana [87617]	Vulnerable	Species or species habitat known to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Miniopterus orianae bassanii Southern Bent-wing Bat [87645]	Critically Endangered	Breeding known to occur within area
Neophoca cinerea Australian Sea-lion, Australian Sea Lion [22]	Vulnerable	Species or species habitat known to occur within area
Petauroides volans Greater Glider [254]	Vulnerable	Species or species habitat may occur within area
Potorous tridactylus tridactylus Long-nosed Potoroo (SE Mainland) [66645]	Vulnerable	Species or species habitat known to occur within area
Pseudomys fumeus Smoky Mouse, Konoom [88]	Endangered	Species or species habitat may occur within area
Pseudomys novaehollandiae New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat known to occur within area
Pseudomys shortridgei Heath Mouse, Dayang, Heath Rat [77]	Endangered	Species or species habitat known to occur within area
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Plants		

Name	Status	Type of Presence
Amphibromus fluitans River Swamp Wallaby-grass, Floating Swamp Wallaby-grass [19215]	Vulnerable	Species or species habitat known to occur within area
Caladenia calcicola Limestone Spider-orchid [10065]	Vulnerable	Species or species habitat likely to occur within area
Caladenia colorata Coloured Spider-orchid, Small Western Spider-orchid, Painted Spider-orchid [54999]	Endangered	Species or species habitat known to occur within area
Caladenia hastata Melblom's Spider-orchid [16118]	Endangered	Species or species habitat likely to occur within area
Caladenia insularis French Island Spider-orchid [24372]	Vulnerable	Species or species habitat likely to occur within area
Caladenia orientalis Eastern Spider Orchid [83410]	Endangered	Species or species habitat known to occur within area
Caladenia robinsonii Frankston Spider-orchid [24375]	Endangered	Species or species habitat likely to occur within area
Caladenia tessellata Thick-lipped Spider-orchid, Daddy Long-legs [2119]	Vulnerable	Species or species habitat known to occur within area
Dianella amoena Matted Flax-lily [64886]	Endangered	Species or species habitat may occur within area
Eucalyptus strzeleckii Strzelecki Gum [55400]	Vulnerable	Species or species habitat known to occur within area
Euphrasia collina subsp. muelleri Purple Eyebright, Mueller's Eyebright [16151]	Endangered	Species or species habitat known to occur within area
Glycine latrobeana Clover Glycine, Purple Clover [13910]	Vulnerable	Species or species habitat known to occur within area
Grevillea infecunda Anglesea Grevillea [22026]	Vulnerable	Species or species habitat known to occur within area
Haloragis exalata subsp. exalata Wingless Raspwort, Square Raspwort [24636]	Vulnerable	Species or species habitat known to occur within area
Hypolepis distans Scrambling Ground-fern [2148]	Endangered	Species or species habitat likely to occur within area
Ixodia achillaeoides subsp. arenicola Sand Ixodia, Ixodia [21474]	Vulnerable	Species or species habitat known to occur within area
Lachnagrostis adamsonii Adamson's Blown-grass, Adamson's Blowngrass [76211]	Endangered	Species or species habitat known to occur within area
Leiocarpa gatesii Wrinkled Buttons [76212]	Vulnerable	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Lepidium aschersonii Spiny Pepper-cress [10976]	Vulnerable	Species or species habitat likely to occur within area
Lepidium hyssopifolium Basalt Pepper-cress, Peppercress, Rubble Pepper-cress, Pepperweed [16542]	Endangered	Species or species habitat known to occur within area
Leucochrysum albicans var. tricolor Hoary Sunray, Grassland Paper-daisy [56204]	Endangered	Species or species habitat may occur within area
Pimelea spinescens subsp. spinescens Plains Rice-flower, Spiny Rice-flower, Prickly Pimelea [21980]	Critically Endangered	Species or species habitat likely to occur within area
Pomaderris halmaturina subsp. halmaturina Kangaroo Island Pomaderris [21964]	Vulnerable	Species or species habitat known to occur within area
Prasophyllum frenchii Maroon Leek-orchid, Slaty Leek-orchid, Stout Leek-orchid, French's Leek-orchid, Swamp Leek-orchid [9704]	Endangered	Species or species habitat likely to occur within area
Prasophyllum spicatum Dense Leek-orchid [55146]	Vulnerable	Species or species habitat known to occur within area
Pterostylis chlorogramma Green-striped Greenhood [56510]	Vulnerable	Species or species habitat likely to occur within area
Pterostylis cucullata Leafy Greenhood [15459]	Vulnerable	Species or species habitat known to occur within area
Pterostylis tenuissima Swamp Greenhood, Dainty Swamp Orchid [13139]	Vulnerable	Species or species habitat known to occur within area
Pterostylis ziegeleri Grassland Greenhood, Cape Portland Greenhood [64971]	Vulnerable	Species or species habitat may occur within area
Senecio psilocarpus Swamp Fireweed, Smooth-fruited Groundsel [64976]	Vulnerable	Species or species habitat known to occur within area
Taraxacum cygnorum Coast Dandelion [2508]	Vulnerable	Species or species habitat likely to occur within area
Thelymitra epipactoides Metallic Sun-orchid [11896]	Endangered	Species or species habitat known to occur within area
Thelymitra matthewsii Spiral Sun-orchid [4168]	Vulnerable	Species or species habitat likely to occur within area
Xerochrysum palustre Swamp Everlasting, Swamp Paper Daisy [76215]	Vulnerable	Species or species habitat known to occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area

Name	Status	Type of Presence
Dermochelys coriacea		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Eretmochelys imbricata		
Hawksbill Turtle [1766]	Vulnerable	Species or species habitat likely to occur within area
Sharks		
Carcharodon carcharias		
White Shark, Great White Shark [64470]	Vulnerable	Breeding known to occur within area
Rhincodon typus		
Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Anous stolidus		
Common Noddy [825]		Species or species habitat likely to occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardenna carneipes		
Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Species or species habitat known to occur within area
Ardenna grisea		
Sooty Shearwater [82651]		Species or species habitat may occur within area
Ardenna tenuirostris		
Short-tailed Shearwater [82652]		Breeding known to occur within area
Diomedea antipodensis		
Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora		
Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans		
Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi		
Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Hydroprogne caspia		
Caspian Tern [808]		Breeding known to occur within area
Macronectes giganteus		
Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Macronectes halli		
Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Phoebetria fusca		
Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Sternula albifrons Little Tern [82849]		Breeding known to occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche cauta Shy Albatross [89224]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thalassarche chrysostoma Grey-headed Albatross [66491]	Endangered	Species or species habitat may occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Migratory Marine Species		
Balaena glacialis australis Southern Right Whale [75529]	Endangered*	Breeding known to occur within area
Balaenoptera bonaerensis Antarctic Minke Whale, Dark-shoulder Minke Whale [67812]		Species or species habitat likely to occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Foraging, feeding or related behaviour known to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Caperea marginata Pygmy Right Whale [39]		Foraging, feeding or related behaviour likely to occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Breeding known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known

Name	Threatened	Type of Presence
		to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat likely to occur within area
Isurus oxyrinchus Shortfin Mako, Mako Shark [79073]		Species or species habitat likely to occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat likely to occur within area
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat likely to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat likely to occur within area
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Migratory Terrestrial Species		
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat known to occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Breeding known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Arenaria interpres Ruddy Turnstone [872]		Roosting known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Roosting known to occur within area
Calidris alba Sanderling [875]		Roosting known to occur within area

Name	Threatened	Type of Presence
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area
Calidris ruficollis Red-necked Stint [860]		Roosting known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Roosting known to occur within area
Charadrius bicinctus Double-banded Plover [895]		Roosting known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Roosting known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Roosting known to occur within area
Gallinago megala Swinhoe's Snipe [864]		Roosting likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Roosting known to occur within area
Limicola falcinellus Broad-billed Sandpiper [842]		Roosting known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Roosting known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Roosting likely to occur within area
Numenius phaeopus Whimbrel [849]		Roosting known to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Phalaropus lobatus Red-necked Phalarope [838]		Roosting known to occur within area
Philomachus pugnax Ruff (Reeve) [850]		Species or species habitat known to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Roosting known to occur within area
Pluvialis squatarola Grey Plover [865]		Roosting known to occur

Name	Threatened	Type of Presence
		within area
Thalasseus bergii Crested Tern [83000]		Breeding known to occur within area
Tringa brevipes Grey-tailed Tattler [851]		Roosting known to occur within area
Tringa glareola Wood Sandpiper [829]		Roosting known to occur within area
Tringa incana Wandering Tattler [831]		Roosting known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Roosting known to occur within area
Xenus cinereus Terek Sandpiper [59300]		Roosting known to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land -
Commonwealth Land - Australian Maritime Safety Authority
Defence - CROWS NEST CAMP - QUEENSCLIFF
Defence - HMAS CERBERUS
Defence - STAFF COLLEGE-FORT QUEENSCLIFF
Defence - SWAN ISLAND TRAINING AREA
Defence - TRAINING CENTRE (Norris Barracks) - Portsea
Defence - Training Depot, Darts RD 3305 Portland
Defence - WARRNAMBOOL TRAINING DEPOT
Defence - WEST HEAD GUNNERY RANGE

Commonwealth Heritage Places [Resource Information]

Name	State	Status
Natural		
HMAS Cerberus Marine and Coastal Area	VIC	Listed place
Swan Island and Naval Waters	VIC	Listed place
Historic		
Cape Northumberland Lighthouse	SA	Listed place
Cape Wickham Lighthouse	TAS	Listed place
Fort Queenscliff	VIC	Listed place
Sorrento Post Office	VIC	Listed place
Swan Island Defence Precinct	VIC	Listed place
Wilsons Promontory Lighthouse	VIC	Listed place

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Anous stolidus Common Noddy [825]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Anseranas semipalmata Magpie Goose [978]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Breeding known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Arenaria interpres Ruddy Turnstone [872]		Roosting known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Roosting known to occur within area
Calidris alba Sanderling [875]		Roosting known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area
Calidris ruficollis Red-necked Stint [860]		Roosting known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Roosting known to occur within area
Catharacta skua Great Skua [59472]		Species or species habitat may occur within area
Charadrius bicinctus Double-banded Plover [895]		Roosting known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Roosting known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area
Charadrius ruficapillus Red-capped Plover [881]		Roosting known to occur within area
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat known to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely

Name	Threatened	Type of Presence
		to occur within area
Diomedea gibsoni Gibson's Albatross [64466]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Eudyptula minor Little Penguin [1085]		Breeding known to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Roosting known to occur within area
Gallinago megala Swinhoe's Snipe [864]		Roosting likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Roosting known to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Breeding known to occur within area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area
Heteroscelus brevipes Grey-tailed Tattler [59311]		Roosting known to occur within area
Heteroscelus incanus Wandering Tattler [59547]		Roosting known to occur within area
Himantopus himantopus Pied Stilt, Black-winged Stilt [870]		Roosting known to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
Larus dominicanus Kelp Gull [809]		Breeding known to occur within area
Larus novaehollandiae Silver Gull [810]		Breeding known to occur within area
Larus pacificus Pacific Gull [811]		Breeding known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area
Limicola falcinellus Broad-billed Sandpiper [842]		Roosting known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Roosting known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area

Name	Threatened	Type of Presence
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Morus capensis Cape Gannet [59569]		Breeding known to occur within area
Morus serrator Australasian Gannet [1020]		Breeding known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat known to occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Breeding known to occur within area
Neophema chrysogaster Orange-bellied Parrot [747]	Critically Endangered	Migration route known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Roosting likely to occur within area
Numenius phaeopus Whimbrel [849]		Roosting known to occur within area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Pelagodroma marina White-faced Storm-Petrel [1016]		Breeding known to occur within area
Pelecanoides urinatrix Common Diving-Petrel [1018]		Breeding known to occur within area
Phalacrocorax fuscescens Black-faced Cormorant [59660]		Breeding known to occur within area
Phalaropus lobatus Red-necked Phalarope [838]		Roosting known to occur within area
Philomachus pugnax Ruff (Reeve) [850]		Species or species habitat known to occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Roosting known to occur within area
Pluvialis squatarola Grey Plover [865]		Roosting known to occur within area
Pterodroma macroptera Great-winged Petrel [1035]		Foraging, feeding or related behaviour known to occur within area

Name	Threatened	Type of Presence
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Species or species habitat known to occur within area
Puffinus griseus Sooty Shearwater [1024]		Species or species habitat may occur within area
Puffinus tenuirostris Short-tailed Shearwater [1029]		Breeding known to occur within area
Recurvirostra novaehollandiae Red-necked Avocet [871]		Roosting known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat known to occur within area
Sterna albifrons Little Tern [813]		Breeding known to occur within area
Sterna bergii Crested Tern [816]		Breeding known to occur within area
Sterna caspia Caspian Tern [59467]		Breeding known to occur within area
Sterna fuscata Sooty Tern [794]		Breeding known to occur within area
Sterna nereis Fairy Tern [796]		Breeding known to occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche cauta Shy Albatross [89224]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thalassarche chrysostoma Grey-headed Albatross [66491]	Endangered	Species or species habitat may occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche sp. nov. Pacific Albatross [66511]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area

Name	Threatened	Type of Presence
Thalassarche steadi White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thinornis rubricollis Hooded Plover [59510]		Species or species habitat known to occur within area
Thinornis rubricollis rubricollis Hooded Plover (eastern) [66726]	Vulnerable	Species or species habitat known to occur within area
Tringa glareola Wood Sandpiper [829]		Roosting known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Roosting known to occur within area
Xenus cinereus Terek Sandpiper [59300]		Roosting known to occur within area
Fish		
Acentronura australe Southern Pygmy Pipehorse [66185]		Species or species habitat may occur within area
Campichthys tryoni Tryon's Pipefish [66193]		Species or species habitat may occur within area
Heraldia nocturna Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area
Hippocampus abdominalis Big-belly Seahorse, Eastern Potbelly Seahorse, New Zealand Potbelly Seahorse [66233]		Species or species habitat may occur within area
Hippocampus breviceps Short-head Seahorse, Short-snouted Seahorse [66235]		Species or species habitat may occur within area
Hippocampus minotaur Bullneck Seahorse [66705]		Species or species habitat may occur within area
Histiogamphelus briggsii Crested Pipefish, Briggs' Crested Pipefish, Briggs' Pipefish [66242]		Species or species habitat may occur within area
Histiogamphelus cristatus Rhino Pipefish, Macleay's Crested Pipefish, Ring-back Pipefish [66243]		Species or species habitat may occur within area
Hypselognathus rostratus Knifesnout Pipefish, Knife-snouted Pipefish [66245]		Species or species habitat may occur within area
Kaupus costatus Deepbody Pipefish, Deep-bodied Pipefish [66246]		Species or species habitat may occur within area
Kimblaeus bassensis Trawl Pipefish, Bass Strait Pipefish [66247]		Species or species habitat may occur within area
Leptoichthys fistularius Brushtail Pipefish [66248]		Species or species habitat may occur within

Name	Threatened	Type of Presence
		area
[Lissocampus caudalis](#) Australian Smooth Pipefish, Smooth Pipefish [66249]		Species or species habitat may occur within area
[Lissocampus runa](#) Javelin Pipefish [66251]		Species or species habitat may occur within area
[Maroubra perserrata](#) Sawtooth Pipefish [66252]		Species or species habitat may occur within area
[Mitotichthys mollisoni](#) Mollison's Pipefish [66260]		Species or species habitat may occur within area
[Mitotichthys semistriatus](#) Halfbanded Pipefish [66261]		Species or species habitat may occur within area
[Mitotichthys tuckeri](#) Tucker's Pipefish [66262]		Species or species habitat may occur within area
[Notiocampus ruber](#) Red Pipefish [66265]		Species or species habitat may occur within area
[Phycodurus eques](#) Leafy Seadragon [66267]		Species or species habitat may occur within area
[Phyllopteryx taeniolatus](#) Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area
[Pugnaso curtirostris](#) Pugnose Pipefish, Pug-nosed Pipefish [66269]		Species or species habitat may occur within area
[Solegnathus robustus](#) Robust Pipehorse, Robust Spiny Pipehorse [66274]		Species or species habitat may occur within area
[Solegnathus spinosissimus](#) Spiny Pipehorse, Australian Spiny Pipehorse [66275]		Species or species habitat may occur within area
[Stigmatopora argus](#) Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area
[Stigmatopora nigra](#) Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area
[Stipecampus cristatus](#) Ringback Pipefish, Ring-backed Pipefish [66278]		Species or species habitat may occur within area
[Syngnathoides biaculeatus](#) Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
[Urocampus carinirostris](#) Hairy Pipefish [66282]		Species or species habitat may occur within area
[Vanacampus margaritifer](#) Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Vanacampus phillipi Port Phillip Pipefish [66284]		Species or species habitat may occur within area
Vanacampus poecilolaemus Longsnout Pipefish, Australian Long-snout Pipefish, Long-snouted Pipefish [66285]		Species or species habitat may occur within area
Vanacampus vercoi Verco's Pipefish [66286]		Species or species habitat may occur within area
Mammals		
Arctocephalus forsteri Long-nosed Fur-seal, New Zealand Fur-seal [20]		Species or species habitat may occur within area
Arctocephalus pusillus Australian Fur-seal, Australo-African Fur-seal [21]		Breeding known to occur within area
Neophoca cinerea Australian Sea-lion, Australian Sea Lion [22]	Vulnerable	Species or species habitat known to occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat likely to occur within area

Whales and other Cetaceans [Resource Information]

Name	Status	Type of Presence
Mammals		
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera bonaerensis Antarctic Minke Whale, Dark-shoulder Minke Whale [67812]		Species or species habitat likely to occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Foraging, feeding or related behaviour known to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Berardius arnuxii Arnoux's Beaked Whale [70]		Species or species habitat may occur within area

Name	Status	Type of Presence
Caperea marginata Pygmy Right Whale [39]		Foraging, feeding or related behaviour likely to occur within area
Delphinus delphis Common Dophin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Breeding known to occur within area
Globicephala macrorhynchus Short-finned Pilot Whale [62]		Species or species habitat may occur within area
Globicephala melas Long-finned Pilot Whale [59282]		Species or species habitat may occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Hyperoodon planifrons Southern Bottlenose Whale [71]		Species or species habitat may occur within area
Kogia breviceps Pygmy Sperm Whale [57]		Species or species habitat may occur within area
Kogia simus Dwarf Sperm Whale [58]		Species or species habitat may occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat likely to occur within area
Lissodelphis peronii Southern Right Whale Dolphin [44]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Mesoplodon bowdoini Andrew's Beaked Whale [73]		Species or species habitat may occur within area
Mesoplodon densirostris Blainville's Beaked Whale, Dense-beaked Whale [74]		Species or species habitat may occur within area
Mesoplodon grayi Gray's Beaked Whale, Scamperdown Whale [75]		Species or species habitat may occur within area
Mesoplodon hectori Hector's Beaked Whale [76]		Species or species habitat may occur within area
Mesoplodon layardii Strap-toothed Beaked Whale, Strap-toothed Whale, Layard's Beaked Whale [25556]		Species or species habitat may occur within area
Mesoplodon mirus True's Beaked Whale [54]		Species or species habitat may occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species

Name	Status	Type of Presence
		habitat likely to occur within area
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area
Pseudorca crassidens False Killer Whale [48]		Species or species habitat likely to occur within area
Tasmacetus shepherdi Shepherd's Beaked Whale, Tasman Beaked Whale [55]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area
Ziphius cavirostris Cuvier's Beaked Whale, Goose-beaked Whale [56]		Species or species habitat may occur within area

Australian Marine Parks [Resource Information]

Name	Label
Apollo	Multiple Use Zone (IUCN VI)
Beagle	Multiple Use Zone (IUCN VI)
Murray	Multiple Use Zone (IUCN VI)
Nelson	Special Purpose Zone (IUCN VI)
Zeehan	Multiple Use Zone (IUCN VI)
Zeehan	Special Purpose Zone (IUCN VI)

Extra Information

State and Territory Reserves [Resource Information]

Name	State
Aire River	VIC
Anglesea B.R.	VIC
Anser Island	VIC
Bay of Islands Coastal Park	VIC
Breamlea F.F.R.	VIC
Bucks Lake	SA
Canunda	SA
Cape Liptrap Coastal Park	VIC
Cape Nelson	VIC
Cape Patterson N.C.R	VIC
Cape Wickham	TAS
Cape Wickham	TAS
Carpenter Rocks	SA
Christmas Island	TAS
City of Melbourne Bay	TAS
Cone Islet	TAS
Councillor Island	TAS
Crib Point G228 B.R.	VIC
Crib Point G229 B.R.	VIC
Curtis Island	TAS
Deen Maar	VIC
Devils Tower	TAS
Disappointment Bay	TAS
Discovery Bay Coastal Park	VIC
Douglas Point	SA
East Moncoeur Island	TAS
Edna Bowman N.C.R.	VIC
French Island	VIC
Glenelg River	VIC

Name	State
Great Otway	VIC
Hogan Group	TAS
Kilcunda N.C.R.	VIC
Lady Julia Percy Island W.R.	VIC
Lake Connewarre W.R	VIC
Lake Flannigan	TAS
Lavinia	TAS
Lawrence Rocks W.R.	VIC
Lily Pond B.R.	VIC
Lonsdale Lakes W.R	VIC
Marengo N.C.R.	VIC
Merricks Creek B.R.	VIC
Mornington Peninsula	VIC
Nene Valley	SA
New Year Island	TAS
North East Islet	TAS
Phillip Island Nature Park	VIC
Piccaninnie Ponds	SA
Point Nepean	VIC
Porky Beach	TAS
Port Campbell	VIC
Portland H47 B.R.	VIC
Princetown W.R	VIC
Queenscliff N.F.R	VIC
Reef Island and Bass River Mouth N.C.R	VIC
Rodondo Island	TAS
Salt Lagoon, St Leonards W.R	VIC
Seal Islands W.R.	VIC
Southern Wilsons Promontory	VIC
Stony Creek (Otways)	VIC
Sugarloaf Rock	TAS
Swan Bay - Edwards Point W.R	VIC
Tyrendarra F.R	VIC
Unnamed (No.HA1404)	SA
Unnamed (No.HA1457)	SA
Unnamed (No.HA26)	SA
Unnamed (No.HA42)	SA
Unnamed C0042	VIC
Unnamed C0043	VIC
Unnamed C0064	VIC
Unnamed C0065	VIC
Unnamed C0125	VIC
Unnamed C0179	VIC
Unnamed C0195	VIC
Unnamed C0196	VIC
Unnamed C0293	VIC
Unnamed C0422	VIC
Unnamed C0449	VIC
Unnamed C0519	VIC
Unnamed C0539	VIC
Unnamed C1136	VIC
Unnamed C1147	VIC
Unnamed C1425	VIC
Unnamed C1452	VIC
Unnamed C1467	VIC
Unnamed C1717	VIC
Unnamed P0176	VIC
Ventnor B.R.	VIC
Warrengine Creek SS.R.	VIC
West Moncoeur Island	TAS
Wild Dog Creek SS.R.	VIC
Wilsons Promontory	VIC
Wilsons Promontory Islands	VIC
Wonthaggi Heathlands N.C.R	VIC
Yambuk F.F.R.	VIC
Yambuk Wetlands N.C.R.	VIC

Regional Forest Agreements [Resource Information]

Note that all areas with completed RFAs have been included.

Name	State
Gippsland RFA	Victoria
Tasmania RFA	Tasmania
West Victoria RFA	Victoria

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Alauda arvensis Skylark [656]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Callipepla californica California Quail [59451]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Carduelis chloris European Greenfinch [404]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Gallus gallus Red Junglefowl, Domestic Fowl [917]		Species or species habitat likely to occur within area
Meleagris gallopavo Wild Turkey [64380]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Pavo cristatus Indian Peafowl, Peacock [919]		Species or species habitat likely to occur within area
Phasianus colchicus Common Pheasant [920]		Species or species habitat likely to occur within area
Pycnonotus jocosus Red-whiskered Bulbul [631]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Turdus philomelos Song Thrush [597]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Alternanthera philoxeroides Alligator Weed [11620]		Species or species habitat likely to occur within area
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf		Species or species habitat likely to occur

Name	Status	Type of Presence
Madeiravine, Potato Vine [2643]		within area
Asparagus aethiopicus		
Asparagus Fern, Ground Asparagus, Basket Fern, Sprengi's Fern, Bushy Asparagus, Emerald Asparagus [62425]		Species or species habitat likely to occur within area
Asparagus asparagoides		
Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Asparagus scandens		
Asparagus Fern, Climbing Asparagus Fern [23255]		Species or species habitat likely to occur within area
Austrocylindropuntia spp.		
Prickly Pears [85132]		Species or species habitat likely to occur within area
Carrichtera annua		
Ward's Weed [9511]		Species or species habitat may occur within area
Cenchrus ciliaris		
Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area
Chrysanthemoides monilifera		
Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera		
Boneseed [16905]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera subsp. rotundata		
Bitou Bush [16332]		Species or species habitat likely to occur within area
Cytisus scoparius		
Broom, English Broom, Scotch Broom, Common Broom, Scottish Broom, Spanish Broom [5934]		Species or species habitat likely to occur within area
Eichhornia crassipes		
Water Hyacinth, Water Orchid, Nile Lily [13466]		Species or species habitat likely to occur within area
Genista linifolia		
Flax-leaved Broom, Mediterranean Broom, Flax Broom [2800]		Species or species habitat likely to occur within area
Genista monspessulana		
Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana		
Broom [67538]		Species or species habitat may occur within area
Lycium ferocissimum		
African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Nassella neesiana		
Chilean Needle grass [67699]		Species or species habitat likely to occur within area
Nassella trichotoma		
Serrated Tussock, Yass River Tussock, Yass Tussock, Nassella Tussock (NZ) [18884]		Species or species habitat likely to occur within area
Olea europaea		
Olive, Common Olive [9160]		Species or species habitat may occur within area

Name	Status	Type of Presence
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Senecio madagascariensis Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area
Tamarix aphylla Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering Cypress, Salt Cedar [16018]		Species or species habitat likely to occur within area
Ulex europaeus Gorse, Furze [7693]		Species or species habitat likely to occur within area

Nationally Important Wetlands [Resource Information]

Name	State
Anderson Inlet	VIC
Glenelg Estuary	VIC
Lake Connewarre State Wildlife Reserve	VIC
Lake Flannigan	TAS
Long Swamp	VIC
Lower Aire River Wetlands	VIC
Lower Merri River Wetlands	VIC
Mud Islands	VIC
Piccaninnie Ponds	SA
Powlett River Mouth	VIC
Princetown Wetlands	VIC
Shallow Inlet Marine & Coastal Park	VIC
Swan Bay & Swan Island	VIC
Western Port	VIC
Yambuk Wetlands	VIC

Key Ecological Features (Marine) [Resource Information]

Key Ecological Features are the parts of the marine ecosystem that are considered to be important for the biodiversity or ecosystem functioning and integrity of the Commonwealth Marine Area.

Name	Region
Bonney Coast Upwelling	South-east
Upwelling East of Eden	South-east
West Tasmania Canyons	South-east

Appendix B Commercial Fisher Operating Protocol

Beach Energy Otway Development Seabed Survey and Drilling Program
Commercial Fisher Operating Protocol
1 July 2019

This protocol will be undertaken by Beach Energy (Beach) for the Otway Development Seabed Survey and Drilling Programs with Fishers who have identified they fish in the area of the seabed surveys and/or well locations.

The aim of this Commercial Fisher Operating Protocol is to ensure that Beach and Fishers may continue their activities without unduly impacting on each other. These protocols are:

- Beach will notify Fishers a minimum of 4 weeks prior to the commencement of the seabed surveys and drilling program and provide the following information:
  - type of activity;
  - location of activity, coordinates and map;
  - timing of activity: expected start and finish date and duration;
  - sequencing of locations if applicable;
  - vessel or rig details including call sign and contact;
  - requested clearance from other vessels; and
  - Beach contact details.

  Note: coordinates will be provided as degrees and decimal minutes referenced to the WGS 84 datum.
- Beach will consider any reasonable requests to change the sequencing of a survey, however, where a change cannot be accommodated, Beach will inform the Fisher as to the reasons in a timely manner.
- Once the seabed surveys commence, Beach will provide regular (most likely daily) SMS messaging system updates on the locations the vessel will be operating and the expected duration, so Fishers can plan their fishing activities with the least disruption. Beach will request Fishers who wish to receive these SMS updates, to provide their mobile phone number, so they can be included in the distribution list. Beach will also have the vessel master put out daily radio messages on channel 16. The survey vessel will have AIS and so will be able to track any larger fishing vessels in their immediate area.
- The MODU exclusion zone (500 m) will be communicated via Notice to Mariners. Fishers are to contact channel 16 if they wish to communicate with the rig at any time. The rig will be stationary until it is required to move to the next location. Beach will provide SMS messaging system updates 2 days prior to the rig moving to a new location detailing the new location and the expected duration at the location so Fishers can plan their fishing activities with the least disruption. Beach has undertaken an assessment of the Commonwealth and Victorian fisheries that overlap with the project's operational area and has identified low levels of fishing in this area.
- Where Fishers provide Beach with sensitive fishing data, Beach will maintain the confidentiality of that data as per Beach's privacy policy.

Given this assessment has identified low levels of fishing and commercial fisheries cover a vast area vs. Beach's seabed surveys and drilling that will only access a relatively small area over a short period of time, Beach's approach is to constructively work with Fishers in order to minimise impact to each other's activities. However, Beach has a stated position that Fishers should not suffer an economic loss as a result of our activities. Should a Fisher incur additional costs in order to work around our activities, or if they have lost catch, or have damaged equipment, Beach will assess the claim and ask for evidence, including, past fishing history and the loss incurred. Where the claim is genuine, Beach will provide compensation and will also ensure that the evidence required is not burdensome on the Fisher whilst ensuring genuine claims are processed.