V-1000-P1-RP-0002

Environment Plan

Offshore Gas Victoria

Drilling Program

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

Revision	Date	Reason for issue	Reviewer/s	Consolidator	Approver
0	9.02.2024	Submission to NOPSEMA	MH, BD, PW, LF	Xodus	BM
1	15.02.2024	Submission to NOPSEMA	MH, BD, PW, LF	Xodus	BM

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

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Acronyms

Terms/acronym	Definition/Expansion
ABS	Australian Bureau of Statistics
AEP	Australian Energy Producers
AFMA	Australian Fisheries Management Authority
AHO	Australian Hydrographic Office
ALARP	As Low as Reasonably Practicable
AMOSC	Australian Marine Oil Spill Centre
AMP	Australian Marine Park
AMSA	Australian Maritime Safety Authority
ANZECC	Australian and New Zealand Environment and Conservation Council
ASAP	As Soon as Practicable
Bass Strait CZSF	Bass Strait Central Zone Scallop Fishery
bbl	Barrel
BCP	Business Continuity Plan
Beach	Beach Energy (Operations) Limited
BIA	Biologically Important Area
BLCAC	Bunurong Land Council Aboriginal Corporation
BOM	Bureau of Meteorology
BOP	Blow-out Preventer
BRS	Bureau of Resource Sciences
BTEX	Benzene, Toluene, Ethylbenzene and Xylene
CCS	Capping and Containment Stack System
CH_4	Methane
CMP	Crisis Management Plan
CMT	Crisis Management Team
CO	Carbon monoxide
CO_2	Carbon dioxide
COLREG	Convention on The International Regulations for Preventing Collisions at Sea
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CxP	Crisis Communications Plan
CxT	Crisis Communications Team
DAFF	Department of Agriculture, Fisheries and Forestry formerly part of DAWE
DAWE	Commonwealth Department of Agriculture, Water and the Environment
dB	Decibel

Terms/acronym	Definition/Expansion
DCCEEW	Commonwealth Department of Climate Change, Energy, the Environment and Water formerly DAWE
DEECA	Victorian Department of Energy, Environment and Climate Action (formerly Victorian Department of Jobs, Precincts and Regions)
DJPR	Victorian Department of Jobs, Precincts and Regions now DEECA
DNP	Commonwealth Director of National Parks
DNRET	Department of Natural Resources and Environment Tasmania
DO	Dissolved Oxygen
DoD	Department of Defence
DotEE	Commonwealth Department of the Environment and Energy now DCCEEW
DP	Dynamic Positioning
DPE	Department of Planning and Environment (New South Wales)
DPI	Department of Primary Industries
DPIPWE	Tasmanian Department of Primary Industries, Parks, Water and Environment now DNRET
DPIR	Department of Primary Industries and Regions
DSEWPaC	Commonwealth Department of Sustainability, Environment, Water, Population and Communities
DST	Drill Stem Test
EHS	Environment, Health, and Safety
EIS	Environmental Impact Statement
EMAC	Eastern Maar Aboriginal Corporation
EMBA	Environment That May Be Affected
EMP	Emergency Management Plan
EMPCA	*Environmental Management and Pollution Control Act 1994*
EMT	Emergency Management Team
ENSO	El Niño – Southern Oscillation
EP	Environment Plan
EPA	Environmental Protection Authority
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
EPO	Environment Performance Outcome
EPS	Environment Performance Standard
ERP	Emergency Response Plan
ERT	Emergency Response Team
ESD	Ecologically Sustainable Development
ETBF	Eastern Tuna and Billfish Fishery
FFG	Flora and Fauna Guarantee Act
FRDC	Fisheries Research and Development Corporation

Terms/acronym	Definition/Expansion
GHG	Greenhouse gas
HF	High Frequency
HSE	Health, Safety and Environment
HSEMS	Health, Safety and Environment Management System
Hz	Hertz
IAOGP	International Association of Oil & Gas Producers
IAPP	International Air Pollution Prevention
IFC	International Finance Corporation
ILUA	Indigenous Land Use Agreement
IMAS	Institute for Marine and Antarctic Studies
IMO	International Maritime Organisation
IMOS	Integrated Marine Observing System
IMS	Invasive Marine Species
IOGP	International Association of Oil and Gas Producers
IPA	Indigenous Protection Area
IUCN	International Union for Conservation of Nature
JRCC	Joint Rescue Coordination Centre
KEF	Key Ecological Feature
kt CO2-e	Kilo tonnes of CO_2 equivalent
LALC	Local Aboriginal Land Council
Lattice	Lattice Energy Limited
LC50	Lethal Concentration 50
LF	Low Frequency
LGA	Local Government Area
LOC	Loss of Containment
LOR	Limit of Reporting
LOWC	Loss of Well Containment
MARPOL	International Convention for The Prevention of Pollution from Ships
MC	Measurement Criteria
MDO	Marine Diesel Oil
MEG	Monoethylene Glycol
MMO	Marine Mammal Observer
MMSCF	Million Standard Cubic Feet
MNES	Matters of National Environmental Significance
MO	Marine Order
MoC	Management of Change
MODU	Mobile Offshore Drilling Unit

Terms/acronym	Definition/Expansion
MoU	Memorandum of Understanding
MT	Metric Tonne
N_2O	Nitrous oxide
NatPlan	National Plan for Maritime Environmental Emergencies
NCVA	National Conservation Values Atlas
NEBA	Net Environmental Benefit Analysis
NERA	National Energy Resources Australia
NGER	National Greenhouse and Energy Reporting
NO_2	Nitrogen dioxide
NORM	Naturally Occurring Radioactive Material
NOPSEMA	National Offshore Petroleum Safety and Environmental Management Authority
NOx	Nitrous oxides
NPI	National Pollution Inventory
NPWS	National Parks and Wildlife Service (NSW)
NRDA	Natural Resource Damage Assessment
NSW	New South Wales
NWS	North West Shelf
O_3	Ozone
OCNS	Offshore Chemical Notification Scheme
ODS	Ozone-depleting substances
OEMS	Operations Excellence Management System
OGUK	Oil and Gas UK (now Offshore Energies UK)
OEUK	Offshore Energies UK
OGV	Offshore Gas Victoria
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 2023
OPP	Offshore Project Proposal
ORCV	Ocean Racing Club of Victoria
Origin	Origin Energy Resources Limited
ORP	Oxidation-Reduction Potential
OSMP	Operational and Scientific Monitoring Plan
OSPAR	Oslo and Paris Conventions
OSTM	Oil Spill Trajectory Modelling
OSV	Offshore Support Vessel
OWR	Oiled Wildlife Response
P&A	Plug and Abandon

Terms/acronym	Definition/Expansion
PAH	Poly aromatic hydrocarbons
Pb	Lead
PFC	Perfluorocarbons
PMST	Protected Matters Search Tool
POB	Persons on Board
POLREP	Marine Pollution Report
ppb	Parts Per Billion
ppm	Parts Per Million
PSZ	Petroleum Safety Zone
PTS	Permanent Threshold Shift
RAP	Registered Aboriginal Party
ROV	Remotely Operated Vehicle
SBDF	Synthetic Base Drilling Fluid
SBTF	Southern Bluefin Tuna Fishery
SCCP	Source Control Contingency Plan
SEEMP	Ship Energy Efficiency Management Plan
SEL	Sound Exposure Level
SESSF	Southern and Eastern Scalefish And Shark Fishery
SETFIA	South East Trawl Fishing Industry Association
SF_6	Sulphur hexafluoride
SIV	Seafood Industry Victoria
SMPEP	Shipboard Marine Pollution Emergency Plan
SMS	Short Message Service
SO_2	Sulphur dioxide
SOx	Sulphur oxides
SPE	Society of Petroleum Engineers
SPF	Small Pelagic Fishery
SPL	Sound Pressure Level
SPRAT	Species Profile and Threats
SRL	Southern Rock Lobster
SST	Sea surface temperature
tcf	Trillion cubic feet
TEC	Threatened Ecological Community
TKN	Total kjeldahl nitrogen
TN	Total nitrogen
TP	Total phosphorus
TRH	Total Recoverable Hydrocarbon

Terms/acronym	Definition/Expansion
TSC	Threatened Species Conservation
TSS	Total Suspended Solids
TSSC	Threatened Species Scientific Committee
TTS	Temporary Threshold Shift
VHF	Very High Frequency
VLSFO	Very Low Sulphur Fuel Oil
VSP	Vertical Seismic Profiling
WBDF	Water-Based Drilling Fluid
WECS	Well Engineering and Construction Management System
WET	Wells Emergency Team
WGCMA	West Gippsland Catchment Management Authority
WOMP	Well Operations Management Plan
Woodside	Woodside Petroleum Ltd
WTOAC	Wadawurrung Traditional Owners Aboriginal Corporation

1 Overview of the Activity

Beach Energy (Operations) Limited (Beach), proposes to undertake a Drilling Program within Commonwealth waters of the Otway and Bass Basins.

The proposed scope of the Drilling Program covered by this EP consists of:

- Drilling of up to six wells in Otway which may include a combination of:
  - Drilling of up to five exploration or appraisal wells in exploration licences VIC/P73 and/or VIC/P43.
  - Drilling of up to two exploration wells in exploration licence T/30P.
- Drilling of up to five wells in Bass which may include a combination of:
  - Drilling of up to four appraisal wells in retention licences T/RL2, T/RL4 and/or T/RL5.
  - Drilling, testing (contingent), and completing one infield well (Yolla 7) in production licence T/L1.
- Plugging, abandonment and removal of well infrastructure above the mudline for five legacy suspended subsea exploration wells:
  - Thylacine 1 in T/L2
  - Geographe 1 in VIC/L23
  - Trefoil 1 in T/RL2
  - Yolla 1 in T/L1
  - White Ibis 1 in T/RL4

The Operational Areas are where planned activities will occur. Within the Operational Area drilling and plug and abandonment (P&A) activities will be undertaken within a 3 km radius around the well sites whilst the drill rig is moored on location. The 3 km radius encompasses both the outer extent of mooring equipment on the seabed, and the 500 m petroleum safety zone (PSZ).

The estimated timings for each activity are:

- Drilling: 30 - 40 days per well.
- Completion: 15 - 20 days for one well, Yolla 7.
- Plug and abandonment: 15 – 20 days per well.

Activities will be conducted on a 24 hours per day, 7 days per week basis. The above timings equate to approximately 560 days of activity for the full Drilling Program and will be undertaken within the period of 1 November 2024 to the 31 December 2028.

Proposed activities will be undertaken with a single moored semi-submersible drill rig with a thruster assisted mooring system. The drill rig will be supported with up to three vessels.

Activities included in the scope of this EP are detailed in Section 3.

Activities excluded from the scope of this EP are:

- Vessels transiting to or from Operational Areas. The vessels are deemed to be operating under the Commonwealth *Navigation Act* 2012 and not performing a petroleum activity whilst outside the Operational Areas.
- Mobilisation of the drill rig and vessels into Australian Commonwealth waters and Victorian State waters, and associated biosecurity and ballast water management prior to the arrival of the drill rig and vessels into the Operational Areas. The drill rig and vessels are subject to biosecurity control on entering Australian territory (12 nm offshore) in accordance with the *Biosecurity Act* 2015. Biosecurity and ballast water management of the drill rig and vessels prior to their movement into the Operational Areas is managed directly by and remains the responsibility of the drill rig and vessel contractor.

1.1 Environment Plan Summary

This Offshore Gas Victoria – Drilling Program EP Summary has been prepared from material provided in this EP. The summary consists of the following (Table 1-1) as required by the Commonwealth Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (OPGGS(E)R).

Table 1-1: EP Summary of Material Requirements

EP Summary Material Requirement	Relevant Section of EP Containing EP Summary Material
The location of the activity	Section 3.1
A description of the receiving environment	Section 6
A description of the activity	Section 3
Details of the environmental impacts and risks	Section 7
A summary of the control measures for the activity	Section 7.15
A summary of the arrangements for ongoing monitoring of the titleholder's environmental performance	Section 8.3
A summary of the response arrangements in the oil pollution emergency plan	See OPEP
Details of consultation already undertaken and plans for ongoing consultation	Section 4
Details of the titleholders nominated liaison person for the activity	Section 1.2

1.2 Titleholder and Liaison Person Details

Beach Energy (Operations) Limited, a company wholly owned by Beach Energy Limited (Beach), is the operator of the petroleum assets located in the Otway and Bass basins. Table 1-2 details the titleholders and the liaison person for the title applicable to the activity.

Beach is an Australian Stock Exchange listed oil and gas exploration and production company headquartered in Adelaide, South Australia. Beach has operated and non-operated, onshore, and offshore oil and gas production assets in 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, as well as the Taranaki basin in New Zealand (Figure 1-1).

Beach will notify National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) of any change in titleholder, a change in the titleholder's nominated liaison for the activity, or a change in the contact details for either the titleholder or the nominated liaison as soon as practicable after such a change takes place.

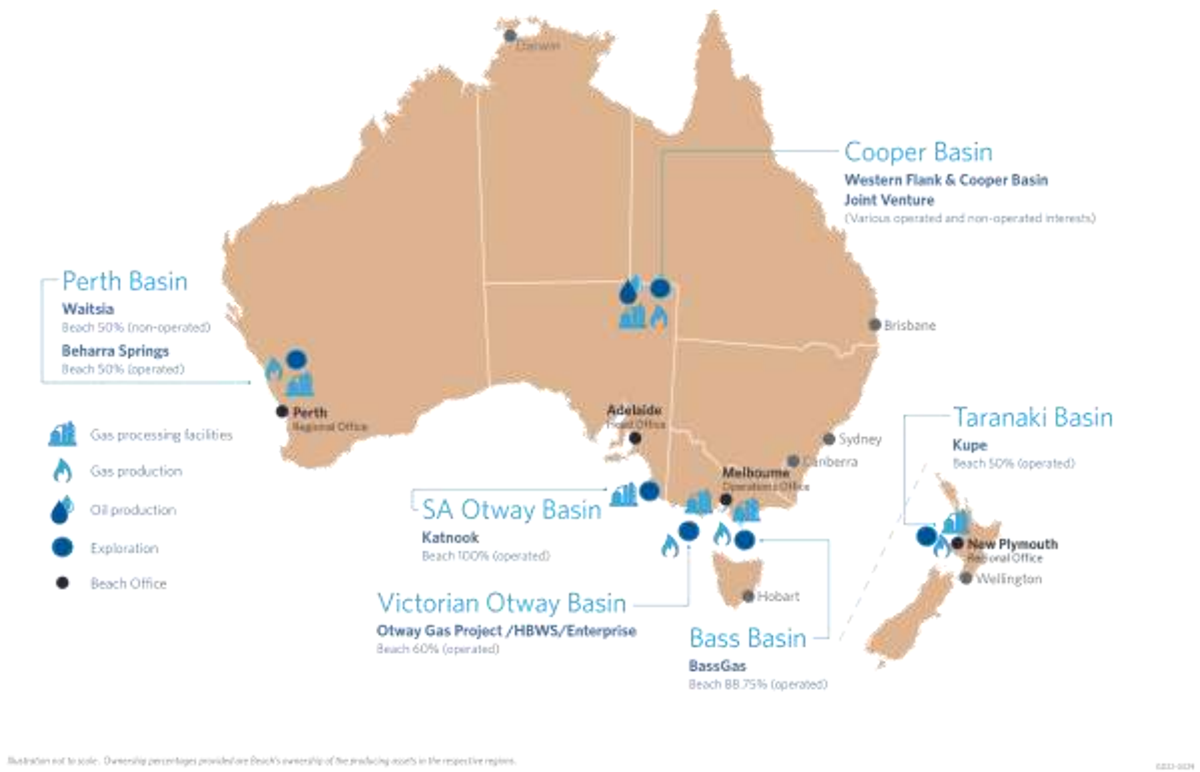


Figure 1-1: Beach Operations

Table 1-2: Details of Titleholder and Liaison Person

Petroleum Title(s)	Titleholders	
Otway		
VIC/P43 VIC/P73	Beach Energy (Operations) Limited – Operator OGOG (Otway) Pty Ltd	
VIC/L23 T/L2	Beach Energy (Operations) Limited – Operator OGOG (Otway) Pty Ltd Beach Energy (Otway) Limited	
T/30P	Beach Energy (Operations) Limited – Operator and sole titleholder	
Bass		
T/L1	Beach Energy (Operations) Limited – Operator Beach Energy Limited Prize Petroleum International Pte. Ltd. Beach Energy (Bass Gas) Limited	
T/RL2 T/RL4 T/RL5	Beach Energy (Operations) Limited – Operator Beach Energy Limited Prize Petroleum International Pte. Ltd.	
Titleholder Details		
Beach Energy (Operations) Limited – Operator	Business address	Level 8 80 Flinders Street Adelaide South Australia 5000
	Telephone number	(08) 8338 2833
	Email address	info@beachenergy.com.au
	Australian Company Number	007 845 338
Titleholder Liaison Person		
Carrie Trembath Project Director VIC Offshore Development	Business address	Level 8 80 Flinders Street Adelaide South Australia 5000
	Telephone number	(08) 8338 2833
	Email address	info@beachenergy.com.au

2 Environmental Impact and Risk Assessment Methodology

2.1 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 2-1 outlines this risk assessment process.

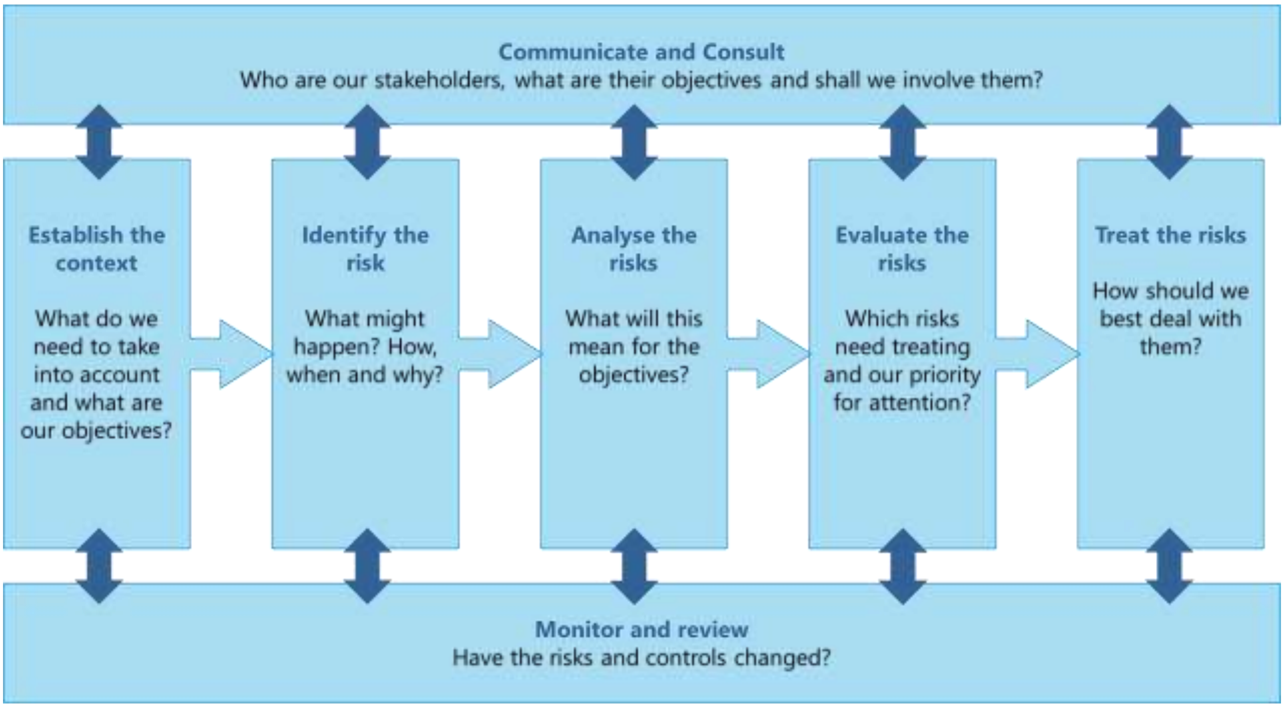


Figure 2-1: Risk Assessment Process

2.1.1 Definitions

Definitions of the term used in the risk assessment process are detailed in Table 2-1.

Table 2-1: Risk Assessment Process Definitions

Term	Definition
Activity	Refers to a 'petroleum activity' as defined under the OPGGS(E)R as: *petroleum activity means operations or works in an offshore area undertaken for the purpose of:* *exercising a right conferred on a petroleum titleholder under the Act* by a petroleum title; or* *discharging an obligation imposed on a petroleum titleholder by the Act or a legislative instrument under the Act*.* *Act is this context is the OPGGS Act.
Consequence	The consequence of an environmental impact is the potential outcome of the event on affected receptors (particular values and sensitivities). Consequence can be positive or negative.
Control measure	Defined under the OPGGS(E)R as *a system, an item of equipment, a person or a procedure, that is used as a basis for managing environmental impacts and risks.*
Emergency condition	An unplanned event that has the potential to cause significant environmental damage or harm to a Matter of National Environmental Significance (MNES). An environmental emergency condition may, or may not, correspond with a safety incident considered to be a Major Accident Event.
Environment	Under the OPGGS(E)R as *means:* *(a) ecosystems and their constituent parts, including people and communities; and* *(b) natural and physical resources; and* *(c) the qualities and characteristics of locations, places and areas; and* *(d) the heritage value of place;* *and includes* *(e) the social, economic and cultural features of the matters mentioned in paragraphs (a), (b), (c) and (d).*
Environmental aspect	An element or characteristic of an operation, product, or service that interacts or can interact with the environment. Environmental aspects can cause environmental impacts.
Environmental impact	Defined under the OPGGS(E)R as *any change to the environment, whether adverse or beneficial, that wholly or partially results from an activity.*
Environmental performance outcome	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.*
Environment receptors (or receptors)	Features of the environment that may be affected by impacts and risks.
Environmental risk	An unplanned environmental impact has the potential to occur, due either directly or indirectly from undertaking the activity.
Likelihood	The is the chance of the impact occurring.
Measurement criteria	Is a verifiable mechanism for determining control measures are performing as required.
Receptor	A receptors is a component of the environment that may be affected by the activity.

Term	Definition
Residual risk	The risk remaining after control measures have been applied (i.e. after risk treatment).

2.2 Communicate and Consult

In alignment with the OPGGS(E)R, during the development of this EP, Beach has consulted with relevant persons to obtain information in relation to their functions, interests and activities associated with the activity and potential impacts and risks. This information has been used to inform the EP and the impact and risk assessment undertaken for the activity.

2.3 Establish the Context

Context for the risk assessment process is established by:

- Identifying the environmental aspects of the activity that will or may cause environmental impacts or may present risks to the environment based on the 'Activity Description' in Section 3.
- Understanding the objections or claims of relevant persons and incorporating their feedback and any information provided into the design of the activity where appropriate as outlined in Section 4, 'Stakeholder Consultation'.
- Understanding the regulatory framework in which the activity takes place as described in Section 4.5, 'Applicable Requirements'.
- Identifying the environment that may be affected, either directly or indirectly, by the activity, as described in the 'Existing Environment' in Section 6).

2.4 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 receptors that may be affected, either directly or indirectly, by one or multiple aspects of the activity i.e., identifying the cause-effect pathway by which environmental and social receptors may be impacted. Table 7-1 details the aspects identified for the activity.

2.5 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.

2.5.1 Establish Environmental Performance Outcomes

Environmental performance outcomes (EPOs) are developed to provide a measurable level of performance for the management of environmental aspects of an activity to ensure that environmental impacts and risks will be of an acceptable level. The process of defining an appropriate EPO, has relied on the required levels of performance set either in legislation (such as the OPGGS Act), Government guidance notes such as the Matters of National Environmental Significance–Significant Impact Guidelines (CoA 2013), EPBC Act recovery/management plans or may be the result of consultation with relevant persons and/ or organisations (e.g. fishers, marine users, First Nations).

2.6 Evaluate and Treat the Potential Impacts and Risks

The following steps are undertaken using the Beach Risk Matrix (Table 2-2) 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 2.7) and an acceptable level (Section 2.8).
- Establish environmental performance standards for each of the identified control measures.

Table 2-2: Beach Risk Matrix

CDN 14740489 Beach Risk Matrix & Risk Management Quick Reference Guide

Risk Matrix

CONSEQUENCE CATEGORY

CONSEQUENCE	PEOPLE	ENVIRONMENT	REPUTATION	FINANCIAL	LEGAL	A. Remote	B. Highly Unlikely	C. Unlikely	D. Possible	E. Likely	F. Almost Certain
	Impact to Beach or contracting personnel	Natural environment	Community safety, reputation/social licence. media, items of cultural significance.	Financial impact (e.g. due to loss of revenue, business interruption, asset loss etc.)	E.G. Breach of law, prosecution, civil action	<1% chance of occuring within the next year. Requires exceptional circumstances, 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 within 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 distinct probability it won't. Could occur within months to years	>50% chance of occuring within the next year. Balance of probability 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
6 Catastrophic	Multiple fatalities >4 or severe irreversible disability to large group of people (>10)	Catastrophic offsite or onsite release or spill; long-term destruction of highly significant ecosystems; significant effects on endangered species or habitats; irreversible or very long-term impact	Multiple community fatalities; complete loss of social licence; prolonged negative national media; complete loss of items of cultural significance	> AUD$500m	Prolonged and complex civil and/or regulatory litigation; potential jail terms and/or very high fines and/or damages claim	HIGH	HIGH	SEVERE	SEVERE	EXTREME	EXTREME
5 Critical	1-3 fatalities or serious irreversible disability (>30%) to multiple persons (<10)	Significant offsite or onsite release or spill; eradication or impairment of the ecosystem; significant impact on highly valued species or habitats; widespread long-term impact	Community fatality; significant loss of social licence; negative national media for 2 or more days; significant damage to items of cultural significance	>AUD$100m & ≤ $500m	Civil and/or regulatory litigation; potential significant fines and/or damages claim	MEDIUM	MEDIUM	HIGH	SEVERE	SEVERE	EXTREME
4 Major	Serious permanent injury/ illness or moderate irreversible disability (<30%) to one or more persons	Major Offsite or onsite release or spill; very serious environmental effects, such as displacement of species and partial impairment of ecosystem; major impact on highly valued species or habitats; widespread medium and some long-term impact	Serious permanent injury to community member; major damage to social licence; negative national media; major damage to items of cultural significance	>AUD$10m & ≤ $100m	Civil and/or regulatory litigation; potential major fine and damages claim	MEDIUM	MEDIUM	MEDIUM	HIGH	SEVERE	SEVERE
3 Serious	Serious reversible/ temporary injury/illness; Lost Time Injury >5 days or Alternate/Restricted Duties > 1 month	Minor offsite or onsite release or spill; serious short-term effect to ecosystem functions; serious impact on valued species or habitats; moderate effects on biological or physical environment	Serious reversible injury to community member; serious damage to social licence; negative state media; serious damage to items of cultural significance	>AUD$1m & ≤$10m	Serious potential breach of law; report and investigation by regulator; possible prosecution or regulatory notice (e.g. improvement notice or equivalent), or possible civil litigation and serious damages claim	LOW	MEDIUM	MEDIUM	MEDIUM	HIGH	SEVERE
2 Moderate	Reversible temporary injury/ illness requiring Medical Treatment; Lost Time Injury ≤5 days or Alternate/Restricted Duties for ≤ 1 month	Event contained within site; short-term effects but not affecting ecosystem functions; some impact on valued species or habitats; minor short-term damage to biological and/or physical environment	Moderate injury to community member; moderate impact to social licence; negative local media; moderate damage to items of cultural significance	>AUD$100,000 & ≤ $1m	Potential Breach of law or non-compliance; inquiry by a regulator leading to Low-level legal issues; possible civil litigation and moderate damages claim	LOW	LOW	MEDIUM	MEDIUM	MEDIUM	HIGH
1 Minor	First Aid Injury/Illness	Spill limited to release location; minor effects but not affecting ecosystem functions; no impact on valued species or habitats; low-level impacts on biological and physical environment	Minor injury to community member, public concern restricted to local complaints, minor damage to items of cultural significance	≤AUD$100,000	Minor potential breach of law; not reportable to a regulator; on the spot fine or technical non-compliance	LOW	LOW	LOW	MEDIUM	MEDIUM	MEDIUM

2.7 Demonstration of ALARP

Beach's approach to demonstration of ALARP includes:

- Systematically identify and assess all potential environmental impacts and risks associated with the activity.
- Where relevant, apply industry 'good practice' controls to manage impacts and risks.
- Assess the effectiveness of the controls in place and determine whether the controls are adequate according to the 'hierarchy of control' principle.
- For higher order impacts and risks undertake a layer of protection analysis and implement further controls if both feasible and reasonably practicable to do so.

NOPSEMA's EP decision making guideline (NOPSEMA 2022) 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 2022) has been applied, whereby the level of ALARP assessment is dependent upon the:

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

2.7.1 Residual Impact and Risk Levels

2.7.1.1 Lower-order Environmental Impacts and Risks

NOPSEMA defines lower-order environmental impacts and risks as those where the environment or receptor is not formally managed, less vulnerable, widely distributed, not protected and/or threatened and there is confidence in the effectiveness of adopted control measures.

Impacts and risks are considered to be lower-order and ALARP when, using the Beach Environmental Risk Assessment Matrix (Table 2-2), the impact consequence is rated as 'minor' or 'moderate' or risks are rated as 'low', 'medium' or 'high.' In these cases, applying 'good industry practice' (as defined in Section 2.7.2.1) is sufficient to manage the impact or risk to ALARP.

2.7.1.2 Higher-order Environmental Impacts and Risks

All other impacts and risks are defined by NOPSEMA as higher-order environmental impacts and risks (i.e., where the environment or receptor is formally managed, vulnerable, restricted in distribution, protected, or threatened and there is little confidence in the effectiveness of adopted control measures).

Impacts and risks are considered to be higher-order when, using the Beach Environmental Risk Assessment Matrix (Table 2-2), 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 2.7.2.

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 2-3.

Table 2-3: 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		

2.7.2 Uncertainty of Impacts and Risks

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

In alignment with NOPSEMA’s ALARP Guidance Note (NOPSEMA 2022a), Beach have adapted the approach developed by Oil and Gas UK (OGUK) (OGUK 2014) for use in an environmental context to determine the assessment technique required to demonstrate that potential impacts and risks are ALARP (Figure 2-2). Specifically, the framework considers impact severity and several guiding factors:

- Activity type
- Risk and uncertainty
- Stakeholder influence

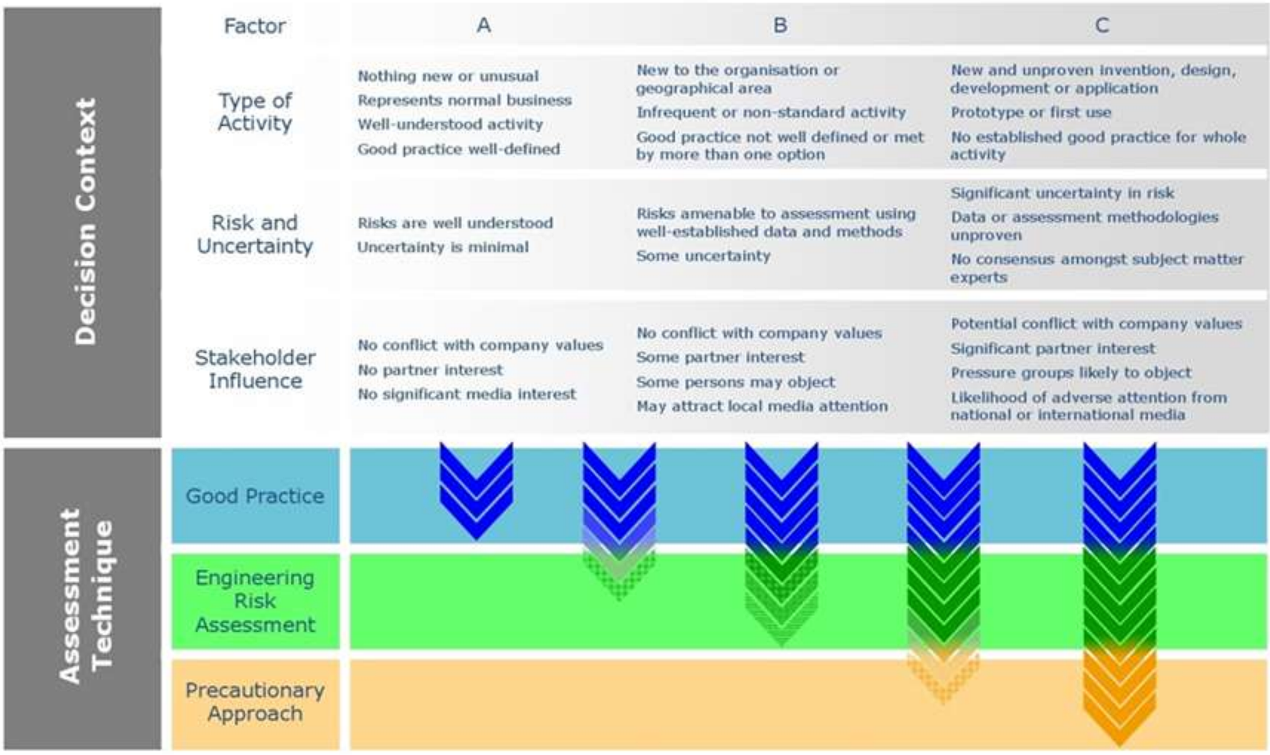


Figure 2-2: OGUK (2014) Decision Support Framework

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
- Precautionary approach

2.7.2.1 Good Practice

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

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

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

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

2.7.2.2 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.

2.7.2.3 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.

2.8 Demonstration of Acceptability

The OPGGS(E)R requires demonstration that environmental impacts and risks are of an acceptable level.

Beach considers a range of factors to demonstrate the acceptability of the environmental impacts and risks, including:

- The principles of ecologically sustainable development (ESD).

- Other requirements (e.g. laws, policies, standards, conventions etc.), including significant impacts to MNES.
- Internal context.
- External context.

2.8.1 Principles of Ecologically Sustainable Development

Based on Australia's National Strategy for Ecologically Sustainable Development (ESD) (Council of Australian Governments 1992), Section 3A of the EPBC Act defines ecologically sustainable development as:

Using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained and the total quality of life, now and in the future, can be increased.

The principles of ESD as defined under the EPBC Act are provided in Table 2-4 and describes how the impact and risk methodology aligns with these principles.

Table 2-4: Relevant ESD Principles

Principle of ESD	Beach Implementation
Decision making processes should effectively integrate both long term and short term economic, environmental, social, and equitable considerations.	This principle is inherently met through the EP development process, as such this principal is not considered separately for each acceptability evaluation.
If there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.	If there is, the project shall assess whether there is significant uncertainty in the evaluation, and if so, whether the precautionary approach should be applied.
The principle of inter-generational equity — that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.	The EP risk assessment methodology ensures that potential impacts and risks are ALARP, where the potential impacts and risks are determined to be serious or irreversible the precautionary principle is implemented to ensure the environment is maintained for the benefit of future generations. Consequently, this principal is not considered separately for each acceptability evaluation.
The conservation of biological diversity and ecological integrity should be a fundamental consideration in decision making.	Beach considers if there is the potential to affect biological diversity and ecological integrity through the impact and risk assessment process.

2.8.1.1 Internal Context

Beach's OEMS includes Elements and Standards relevant to the way Beach operates.

At the core of the OEMS are 11 Elements (see Section 8.1) which detail specific performance requirements for the implementation of Beach's Environmental Policy and management of potential HSE impacts and risks.

Elements and Standards in the OEMS which are relevant to either the activity, impact, control or receptor will be described within the internal context and contribute towards the assessment of acceptability.

To meet this acceptance criteria, the impact or risk must be compliant with the objectives of Beach's Environment Policy. Where specific internal procedures, guidelines, expectations are in place for management of the impact or risk in question, acceptability is demonstrated.

2.8.1.2 External Context

External context considers stakeholder expectations, obtained from stakeholder consultation.

Beach has undertaken stakeholder consultation, which is described in detail in Section 4. Where objections or claims have been raised, these are considered in the assessment of acceptability of related impacts and risks.

To meet this acceptance criteria, the merits of claims or objections raised by a relevant stakeholder must have been adequately assessed and additional controls adopted where appropriate.

2.8.1.3 Other Requirements

Aside from internal and external context, other requirements must be considered in the assessment of acceptability. These include:

- Environmental legislation (described in Section 2)
- Policies and guidelines (described in Section 2)
- International agreements (described in Section 2)
- EPBC Management Plans (described in Section 5.1)
- Australian Marine Park designations (described in Section 6.2.2)

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.

2.9 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 environmental performance outcomes, environmental performance standards and measurement criteria that are described for each environmental impact or risk. Monitoring and review are described in detail in the Implementation Strategy (Section 8).

3 Description of the Activity

The proposed scope of the Drilling Program covered by this EP consists of:

- Drilling of up to six wells in Otway which may include a combination of:
  - Drilling of up to five exploration or appraisal wells in exploration licences VIC/P73 and/or VIC/P43.
  - Drilling of up to two exploration wells in exploration licence T/30P.
- Drilling of up five wells in Bass which may include a combination of:
  - Drilling of up to four appraisal wells in retention licences T/RL2, T/RL4 and/or T/RL5.
  - Drilling, testing (contingent), and completing one infield well (Yolla 7) in production licence T/L1.

Plugging, abandonment and removal of well infrastructure below the mudline for five legacy suspended subsea exploration wells as per Table 3-1.

3.1 Operational Area

The Operational Areas are where planned activities will occur. The Operational Areas are shown in Figure 3-1 for Otway and Figure 3-2 for Bass.

The Operational Areas and indicative well locations for new wells and locations for the suspended P&A wells are shown in Figure 3-1 for Otway and Figure 3-2 for Bass, with the coordinates of the suspended P&A wells in Table 3-1: P& A Well Locations

For all new wells, Beach is in the process of determining the final drilling locations. The process of selecting a final drilling location involves the analysis of the existing reprocessed seismic data (no new seismic data is acquired for this program), interpretation of data to select prospects with high probability of success, and cost effectiveness. The timing for completion of this process is expected to be in Q2 2024. Consequently, a broader Operational Area has been used to ensure that the potential impacts and risks associated with drilling activities at all potential well locations are assessed.

Drilling and P&A activities will be undertaken within a 3 km radius around the well sites whilst the drill rig is moored on location. The 3 km radius encompasses both the outer extent of mooring equipment on the seabed, and the 500 m petroleum safety zone (PSZ).

Table 3-1: P& A Well Locations

Wells	Title	Location		Water depth (m)
		Latitude	Longitude	
Otway				
Geographe 1	Vic/L23	39° 06′ 41.811″ S	142° 55′ 43.877″ E	~85 m
Thylacine 1	T/L2	39° 14′ 22.281″ S	142° 54′ 49.136″ E	~101 m
Bass				
Trefoil 1	T/RL2	39° 51′ 44.12″ S	145° 22′ 30.73″ E	~68.9m
White Ibis 1	T/RL4	39° 57′ 44.218″ S	145° 15′ 22.123″ E	~74.4m
Yolla 1	T/L1	39° 50′ 14.24″ S	145° 48′ 24.98″ E	~90.1m

3.2 Activity Timing

The estimated timings for each activity are:

- Drilling: 30 - 40 days per well.
- Completion: 15 - 20 days for one well (Yolla 7).
- Plug and abandonment: 15 – 20 days per well.

Activities will be conducted on a 24 hours per day, 7 days per week basis. The above timings equate to approximately 560 days of activity for the full Drilling Program and will be undertaken within the period of 1 November 2024 to the 31 December 2028.

3.3 Drill Rig

The Drilling Program is proposed to be undertaken using a single moored semi-submersible drill rig with a thruster assisted mooring system. The Transocean Equinox, has been used to inform relevant aspects of the environmental impact and risk assessment (Section 7) of this EP, as either this drill rig or one with similar capabilities, design and capacities will be used for the Drilling Program.

The drill rig may have ~140 persons on board (POB) at any given time.

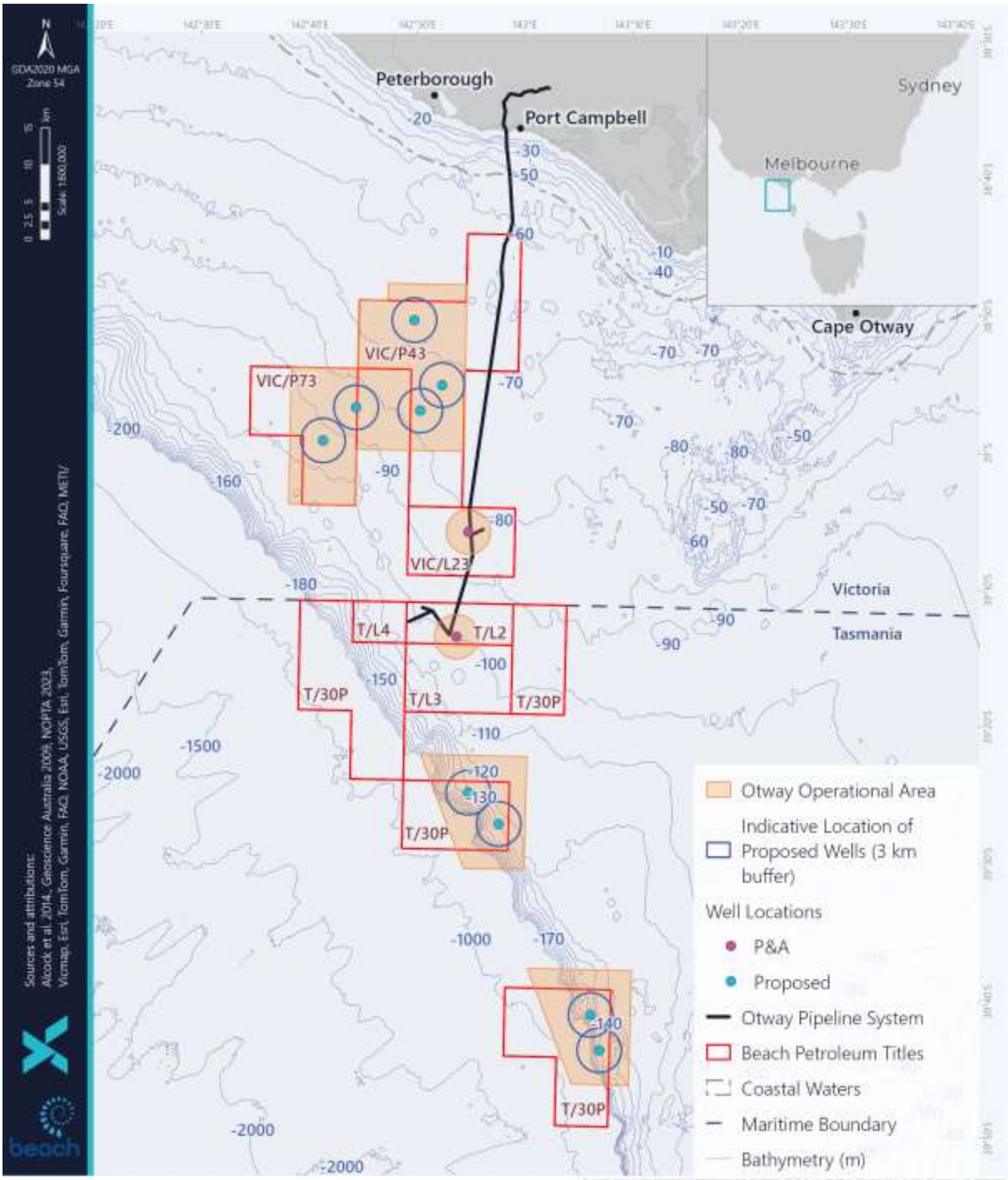


Figure 3-1: Drilling Program Otway Operational Area

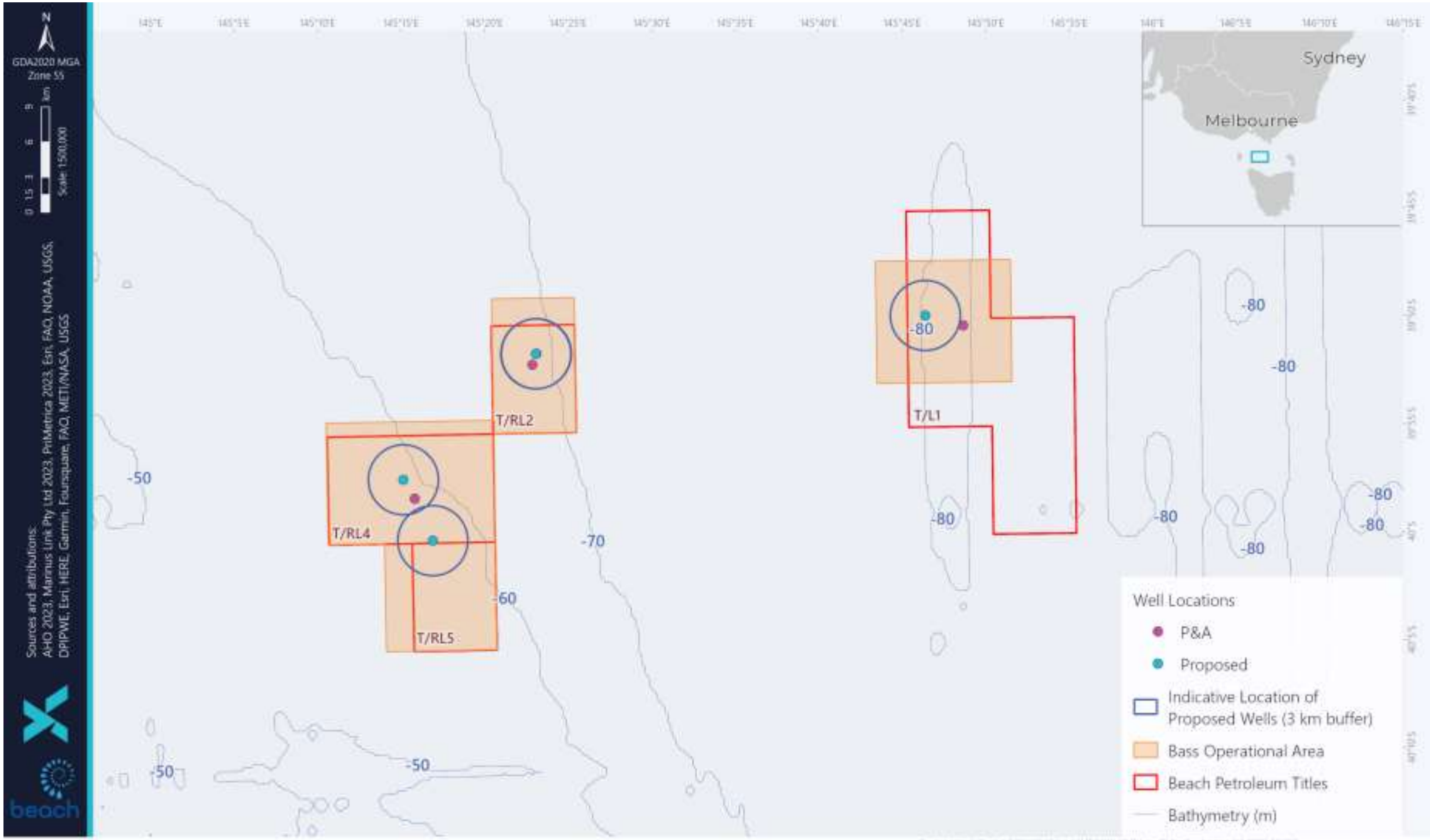


Figure 3-2: Drilling Program Bass Operational Area

3.4 Rig Positioning

The drill rig will either mobilise to the required Operational Area with its own propulsion system or be towed by vessels and anchored or connected to pre-laid anchors prior to commencing activities. Anchors may be positioned (pre-laid) on the sea floor typically 1 month and up to 3 months prior to the rig being on location.

The drill rig will be moored with 8 or 12 anchors, with weight ranging from 15 to 30 MT each, resulting in an individual footprint of ~30 m^2 to 60 m^2. A mooring analysis will be undertaken to determine specific mooring requirements for each well location. The mooring analysis will incorporate the results from the geophysical and geotechnical survey obtained prior to rig mobilisation and which is subject to a separate EP (Offshore Gas Victoria Geophysical and Geotechnical Seabed Survey Environment Plan CDN/ID V-1000-P1-MP-0011).

Anchors are attached to the rig by a chain or chain / wire system. The anchors will be positioned at ~2 km (ranging from 1.5 km – 2.1 km) from the rig. The rig is equipped with a thruster assisted mooring system to mitigate mooring fatigue in heavy sea states / poor weather conditions.

Transponders may be required to inform anchor positioning. The transponders for mooring are called ADAPS (Anchor Distance And Positioning) – they can be acoustically interrogated for GPS position and anchor orientation. They are affixed to the anchor so are deployed and recovered in the same timeframes as the anchor installation.

Each pre-laid anchor consists of:

- Anchor covering an area ~60 m^2
- Anchor chain including swivels and shackles. Typically, the anchor chain consists of 82 – 120 mm links. 300 m of chain is laid on the seabed with a pennant wire in the water column attached to a surface buoy. This equates to ~87 m^2 footprint based on the chain being ~ 290 mm wide.
- Surface buoy with a navigation light.

The total footprint for each anchor and chain will be less than 200 m^2. However, co-located wells sharing a common drill centre may use the same anchors with the drill rig moving across to the new well location.

An array of long baseline and/or ultra-short baseline transponders may be installed on the seabed, within a radius of 500 m from the well locations, for metrology and positioning. This positioning system is only expected to be used on selected wells and only if required.

Transponders, if used, will be moored to the seabed by a clump weight. Clump weights are typically made of cement or steel with a footprint of ~0.2 m^2. On completion of the positioning operation, transponders and associated equipment will be removed.

3.5 Blow-out Preventer Installation and Function Testing

A blow-out preventer (BOP) consists of a series of hydraulically operated valves and sealing mechanisms (annular preventers and ram preventers). During drilling and P&A operations, drill fluid is circulated up the marine riser to the drill rig during drilling and P&A. The BOP is used to close in the well in the event of an influx of hydrocarbons from the formation into the wellbore. The annular and ram preventers are used to shut in around various tubulars in the well, while the blind shear rams are designed to shear the pipe and both types of preventers will seal the well.

Once the BOP is installed, regular function and pressure tests are undertaken to confirm continued operability. Function tests are generally undertaken every 7 days, and pressure tests on a 21-day basis, in accordance with industry standards and the Drilling Contractor's maintenance system. Function testing is undertaken by activating the hydraulic control system onboard the drill rig to confirm functionality of the BOP systems, whilst a pressure test is undertaken to verify the seals on the BOP stack.

The BOP control system discharges control fluid into the sea upon operation. A full function test to close and open all ram and annular preventers discharges ~2,200 L of potable water with 1 to 3% water-soluble control fluid. Smaller volumes are discharged for pressure testing and when latching and unlatching the BOP at the start and end of each well.

Tethers may be used to arrest the BOP lateral movement. There are several types of BOP tethering system, selection is pending on engineering studies to inform both the necessity and type of tethering.

A typical tethering system would comprise of approximately four gravity anchors (25 to 50 MT each) or suction piles. Each gravity anchor or pile is located within ~25 - 40 m of the well and is attached to the BOP equipment via tethers. Gravity anchors laid on the seabed have a footprint of ~25 m^2 per anchor. Suction piles penetrate the seabed and have a smaller footprint than gravity anchors. Tethering systems, if required, would be temporarily placed on the seabed and would be recovered prior to the rig leaving the well location.

Greater detail on the performance standards for the BOP system, inclusive of design, functionality, and preventative maintenance are included in a Well Operations Management Plan (WOMP), which must be accepted by the regulator prior to drilling commencing.

3.6 Exploration and Appraisal Well Drilling Activity

An overview of the indicative drilling design and process for the exploration and appraisal wells is described in this section. This process is subject to change, depending on individual well design requirements and the final location of the wells.

The top-hole well sections (conductor and surface hole) will be drilled without a marine riser, which is standard practice. The cuttings (rock chips) and drilling fluids from this section will be discharged directly to sea. A marine riser and BOP will be installed and connected to the rig to facilitate the drilling of the deeper well sections once the surface casing is cemented in place. Once the riser and BOP are installed, drilling fluids and cuttings will be returned to the drill rig via the marine riser where the drilling fluids and cuttings will be separated using solids control equipment.

3.6.1 Drill Fluids and Cuttings Handling and Disposal

Drilling fluid performs several functions including cooling and lubrication of the drill bit; transportation of drill cuttings to the surface; and maintaining hydrostatic pressure in the wellbore, thus preventing the influx of hydrocarbons from the formation into the wellbore, drilling fluids are the primary well control barrier.

A summary of the drilling fluids and estimated cuttings discharges are described in Table 3-2.

The top-hole sections will be drilled with seawater and pre-hydrated gel sweeps, with discharge to the seabed. Gel sweeps are typically comprised of seawater with high viscosity pre-hydrated bentonite. The seawater may be treated with caustic soda (NaOH) and/or soda ash (Na_2CO_3) to increase pH and alkalinity, facilitating the development of the fluid properties required to drill the hole section.

Intermediate and reservoir-hole sections will be drilled with water-based drill fluids (WBDF). Drill water (fresh water) is the major component of WBDF to which bentonite clay, barite, brine and/or gellants (such as guar gum or xanthum gum) have been added. The drill water may be treated with caustic soda (NaOH) and/or soda ash (Na_2CO_3) to increase pH and alkalinity, facilitating the development of the fluid properties required to drill the hole section.

Once the riser and BOP are installed, drilling fluids and cuttings will be returned to the drill rig via the marine riser where the drilling fluids and cuttings will be separated using solids control equipment. The solids control equipment comprises a series of shale shakers that remove coarse cuttings from the drilling fluids. After processing by the shale shakers, the recovered fluids, that have been separated from the cuttings, are directed to centrifuges, which are used to remove the finer solids. The cuttings and fine solids are discharged below the water line and the reconditioned fluids are recirculated into the system.

A summary of the drilling fluids and estimated cuttings discharges are detailed in Table 3-2.

Bulk dry products (bentonite and barite) are transported to the drill rig via supply vessels and transferred to dry bulk storage tanks. During the transfer process, the holding tanks are vented to atmosphere, resulting in small amounts of dry product being discharged from venting pipes located under the rig.

Liquid drilling fluid, brine, and drill water are transferred to the drill rig from supply vessels and stored in tanks and pits. Dry and liquid additives are mixed into the fluid system from the bulk tanks, sacks or containers.

The Beach Drilling Program forms part of a rig consortium campaign that will be shared across Beach's Bass and Otway assets, along with other titleholders who also have drilling activities planned in the region. The final operator in the rig consortium campaign will minimise remaining bulk materials onboard both the rig and vessels to as low as reasonably practicable, ensuring well integrity and rig safety are maintained. At the end of the rig consortium campaign in the region, should the next rig operator not want any remaining dry bulk barite or bentonite these materials would be discharged to the marine environment once by the last titleholder using the rig. This discharge would occur only once throughout the multi-operator rig consortium campaign with discharges minimised as noted.

Table 3-2: Indicative Well Design

Hole size	Conductor/ casing/ liner size	Approx. MDRT (m) / TVD (m)	Fluid type	Maximum. cuttings volume (m^3)	Fluid discharge location	Cuttings discharge location
42″	36″	~280 m	Seawater & PHG sweeps	161 m^3	Seabed	Seabed
17-1/2″	13-3/8″	~1700 m	Seawater & PHG sweeps	232 m^3	Seabed	Seabed
12-1/4″	9-5/8″	~3850 m	WBDF	164 m^3	Sea surface	Surface – with residual WBDF

Hole size	Conductor/ casing/ liner size	Approx. MDRT (m) / TVD (m)	Fluid type	Maximum. cuttings volume (m^3)	Fluid discharge location	Cuttings discharge location
8-1/2”	5”	~4430 m	WBDF	21 m^3	Sea surface	Surface – with residual WBDF

3.6.2 Cementing

Cement is used to seal the casing following drilling of each hole section and as a result isolate any hydrocarbon bearing formations from the environment. Cement discharges to the marine environment may occur from the following:

- Prior to the commencement of cementing operations, the cementing unit is tested resulting in a very small discharge of cement slurry to sea.
- After a string of casing or liner has been installed into the well, a cementing spacer is pumped to flush drilling fluids and filter cake from the well to allow a good cement bond to be formed with the formation. During riserless drilling, the spacer is displaced by the cement slurry and discharged directly to the seabed at the mudline.
- Once the riser is installed, the pre-flush volumes are such that the spacer will remain downhole or very minor volumes of cement may be returned to the drill rig and discharged to sea. Upon completion of each cementing activity, the cementing head and blending tanks are cleaned which results in a release of cement contaminated water to the ocean.
- If mixed batches of cement spoil within the cementing unit, or there is a problem during the cementing operation, cement slurry will be either flushed from the cement unit or circulated out of the well and discharged to sea.

Cement discharge volumes are detailed in Table 7-12.

Bulk dry cement is transported to the drill rig via supply vessels and transferred to dry bulk storage tanks. During the transfer process, the holding tanks are vented to atmosphere, resulting in small amounts of dry cement being discharged from venting pipes located under the rig.

The Beach Drilling Program forms part of a rig consortium campaign that will be shared across Beach’s Bass and Otway assets, along with other titleholders who also have drilling activities planned in the region. The final operator in the rig consortium campaign will minimise remaining bulk materials onboard both the rig and the vessels to as low as reasonably practicable, ensuring well integrity and rig safety are maintained. At the end of the rig consortium campaign in the region, should the next rig operator not want any remaining dry cement these materials would be discharged to the marine environment by the last titleholder using the rig. This discharge would occur only once throughout the multi-operator campaign with discharges minimised as noted.

3.6.3 Formation Evaluation

During drilling, the formation is evaluated to determine the presence and quantity of hydrocarbon within the target reservoir. This information is gathered real-time from Logging Whilst Drilling techniques, wireline logging and mud logging.

Vertical Seismic Profiling (VSP) or check-shot surveys are not part of the Drilling Program.

3.6.4 Well Suspension

One of the outcomes for an exploration or appraisal well is to suspend the well with temporary cement plugs for future re-entry and completions or to suspend the well with completions and subsea tree for future tie-in to the facilities should the prospect be economically viable for future development.

Completions and suspension with a subsea tree for exploration or appraisal wells is not part of this EP except for Yolla 7 which is described in Section 3.7.

The exploration and appraisal wells will be suspended in accordance with a NOPSEMA-accepted WOMP. Barriers will be installed and verified to isolate the formation(s) and for ensuring well integrity is maintained while the well is temporarily suspended prior to completions.

3.6.5 Exploration and Appraisal Well Plug and Abandonment

If an exploration or appraisal well is not economically viable then it will be permanently plugged and abandoned (P&A'd) as part of this Drilling Program. P&A operations involve setting a series of permanent cement and mechanical plugs (barriers) within the wellbore, including plugs above and between any hydrocarbon bearing intervals identified for isolation, at appropriate depths in the well and at the surface. These cement and mechanical plugs will be installed in compliance with the Beach Well Engineering and Construction Management System (WECS) and tested to verify their integrity as per the WECS and the NOPSEMA accepted WOMP.

During well abandonment operations, as with other cementing operations (see Section 3.6.2), the majority of cement remains down-hole, but minor volumes may be discharged to the environment as detailed in Table 7-12.

Following P&A operations and associated verification of permanent barriers, the wellhead is cut below the mudline (~1.5 m below seabed) with either a mechanical or abrasive cutting tool and subsequently removed. The cutting process produces a small amount of metal shavings (swarf), some of which may remain on the seabed.

An ROV seabed survey will be conducted to ensure appropriate seabed clearance prior to the rig leaving the well location.

3.6.6 Contingent Activities

3.6.6.1 Re-spud of Wells

The re-spud of wells may be required for unforeseen circumstances (i.e., unable to retrieve stuck pipe, conductor out of installation specification, encountering unexpected shallow hazards). The re-spud well will be the same well design as the planned well and typically located within the same mooring pattern therefore not requiring an additional rig move. The original well would be permanently plugged and abandoned and any wellhead removed, per the process described in Section 3.6.5, prior to moving the rig and re-spudding.

3.6.6.2 Side Track

A side track contingency is included for the unlikely event where the geological result is poor and there is a requirement to assess an alternative geological target with the same wellbore or where there has been a stuck pipe downhole event that proves to be not retrievable after multiple attempts.

A standard approach for side track is to plug and abandon the original wellbore with cement plug(s) in accordance with regulatory requirements, followed by setting a high-density cement plug or a mechanical whipstock inside the previous casing. A window would be milled through the original casing (along with cement behind) to create an opening for the new side track wellbore. The drilling assembly would be guided through the window to continue drilling to target depth. The activities subsequent to the side track would be the same as was planned for the original wellbore. The window milling operations would generate some metal swarf which will be handled on the rig and disposed of onshore.

3.7 Yolla 7

The Yolla 7 well will be drilled as per the exploration and appraisal wells following sections:

- Section 3.6.1: Drill Fluids and Cuttings Handling and Disposal
- Section 3.6.2: Cementing Operations
- Section 3.6.3: Formation Evaluation

In addition, the Yolla 7 well, if determined to be feasible for production, will be completed and tested (contingency) as per the following sections.

3.7.1 Completions (Yolla 7 only)

Well completion is the process of preparing a well for production. It involves installing production and flow control equipment, and completing the final construction of the well, including:

- Installation of a subsea production tree (an assembly of valves, spools, and fittings used to regulate hydrocarbon flow within a well). Trees will be located on the seabed.
- Installation of the sand face completion, typically a production liner across the producing reservoir interval.
- Wellbore clean-up where the drilling fluid is displaced from the wellbore and replaced with a filtered completion fluid, typically brine. Completions brine consists of:
    - Sodium chloride (NaCl) or a NaCl / sodium bromide (NaBr) blend, with a density to maintain a suitable overbalance and partially inhibited as required.
    - Viscosifiers and surfactants to aid in removing and lifting drilling fluid residue and debris from the wellbore.
    - Biocide and/or oxygen scavenger to prevent contamination of the formation and any subsea or surface process equipment with anerobic or aerobic bacteria and to limit their growth.
- Evaluation of the cement bond for barrier and/or zonal isolation confirmation.
- Installation of the upper completion consisting of the production tubing, tubing hanger, surface-controlled subsurface safety valve and production packer and downhole monitoring capability and flow control equipment.

- The production annulus will be displaced to a packer fluid before setting the production packer. Once packer is set, the packer fluid will be isolated within the production annulus with the intention for it to remain in place throughout the well's production life to protect casing/tubing from degradation. At the same time, the tubing will be displaced to an underbalance fluid (such as base oil, diesel, or nitrogen), completion brine from the tubing then will be displaced and returned to the rig brine tanks and may be stored or diluted and discharged and this volume forms part of discharge (a) below. The packer fluids discharges are as per discharge (b) below.
- The production packer will be set, and the completion tested to confirm well integrity, prior to perforating and either suspending the well or undertaking well testing and clean-up operations.
- Perforating cemented production casing or liner to create communication from the reservoir into the wellbore.
- A suspension fluid will be place inside the production tubing above the subsurface safety valve and throughout the subsea tree production bore. Excess un-used suspension fluids will be discharged as per discharge (c) below.
- To inhibit marine growth or corrosion, a biocide and corrosion inhibitor may either be injected or placed within the tree cap. The tree cap can hold ~210 L of dilute corrosion / biocide mixture. Typically, the corrosion / biocide mixture is at a ratio of ~3 L corrosion inhibitor, 0.25 L biocide, and 207 L water. At this stage, there is no release to the environment; however, when the tree cap is removed at a later date for subsequent tie-in activities, the fluid will be discharged to the marine environment.
- Following well completions or clean-up / rig-based flow back (contingency) operations the well is secured, and integrity confirmed with suspension barriers as per the NOPSEMA-accepted WOMP. The well is then handed over to Production for subsequent tie-in activities to connect the well for long term production. The tie-in activities are covered by a separate EP.

Discharges:

a) Completion fluids (consisting of completion brine and any formation water or condensate present in the wellbore). These will be circulated back to the rig for treatment prior to discharge. Expected volume of discharge is ~ 400m^3 with ~16m^3 being formation water. the completion fluids will be tested and discharged only if the oil in water content is below 30 ppm. Fluid not meeting this criterion will be stored for onshore disposal.

b) Excess packer fluid left at the end of completion operations will be discharged (~100 bbls/16 m^3). The completion packer fluid contains brine (chlorides of calcium, potassium or sodium or a bromide solution) with additives that may include amine-type corrosion inhibitors, oxygen scavengers, biocide, and soda ash or caustic soda for pH (alkalinity) control.

c) An excess of suspension fluid will be discharged (~50 bbls/8 m^3). The suspension fluid typically includes a solution of 50% water and 50% hydrate inhibitor (monoethylene glycol (MEG)).

d) Cartridge filters used to filter the completion fluid prior to, during the clean-up operations, and any subsequent circulating operation. The filters will be returned to shore for suitable disposal. Any debris recovered during the clean-up operations and completion program such as metal shavings and rubber material will be consolidated and sent for onshore disposal.

3.7.2 Well Testing (Contingent for Yolla 7 only)

Well flowback and testing via the rig is not planned for the exploration and appraisal wells in this EP. Well flowback and testing is a contingency operation only for Yolla 7.

A well flowback and test operation is performed after the well has been completed and is the process of removing well construction fluid from the well and bringing reservoir fluid (condensate and/or gas) to surface. The objective of this activity is to remove well construction fluid, so this is not received by the Yolla A platform and the Lang Lang Gas Plant, and if necessary, undertake production testing to evaluate the reservoir potential and understand reservoir fluid properties.

The flowback fluid is typically a mixture of completion fluid (completion brine and any formation water or condensate present in the wellbore), underbalance/low density fluid (base oil, diesel or nitrogen) and remnants of WBDF. Depending on the formation and well construction process there could also be solids such as formation and perforating debris.

Well testing may be undertaken for up to 48 hours depending on the well geometry, the objectives of the clean-up and the test operation. Table 3-3 details the predicted emissions and discharges for the contingency Yolla 7 well clean-up and test operations.

The majority of fluids returned from the wellbore and formation are flammable and will be sent to the flare and burnt off. Non-flammable fluids, including any produced formation water or completion brine will be discharged to the marine environment via the well test water filtration treatment package to reduce the oil in water content to below 30 ppm prior to overboard discharge. Fluid not meeting this criterion will be stored in tanks for later onshore disposal.

Table 3-3: Predicted Yolla 7 Well Completion and Contingency Testing Emissions and Discharges

Emission Parameter	Amount	Discharge Location
Volume of gas (MMscf/day)	80	Atmosphere via flare
Volume of water (bbl)	450	Sea following filtration
Volume of condensate (bbl)	3,600	Atmosphere via flare
Volume underbalance cushion (bbl)	450	Re-use or to atmosphere via flare
Volume of brine, well flow back (bbl)	150	Atmosphere via flare, re-use or sea following filtration
Volume of methanol (L)	360	Atmosphere via flare
Volume of MEG (L)	720	Atmosphere via flare
Volume of nitrogen (L)	36,400	Atmosphere via flare
LPG Pilot Light (L)	265	Atmosphere via flare
Duration of well testing (flaring) (hours)	~48	N/A

3.8 Plug and Abandonment of Legacy Suspended Wells

3.8.1 Infrastructure Overview

P&A activities will be undertaken on the five legacy suspended subsea exploration wells. The wells were all drilled vertically to explore prospective geological structures and subsequently suspended as potential future production wells. Drill stem tests were conducted at the time of original drilling to evaluate the reservoir potential in Trefoil 1, White Ibis 1, and Yolla 1. None of the wells have been completed or used for commercial hydrocarbon production at any point. Therefore, none of the wells are connected to existing pipeline or production facilities. A full casing string or liner was cemented across the open hole section in each well, except for White Ibis 1. Each of the wells was suspended with the placement of a number of cement plugs as barriers in the wellbore.

A summary of each well to be P&A'd is provided in Table 3-4.

Table 3-4: Summary of Legacy Suspended Subsea Exploration Wells

Well Name	Well history	Current Status	Insitu Fluids	Well Infrastructure
Geographe 1 Thylacine 1	Drilled and suspended in May/June 2001. Drilled with WBDF. The well was never completed, nor produced.	The well was suspended with multiple cement barriers.	WBDF only, seawater, inhibited KCl brine.	Subsea wellhead, ROV retrievable debris cap (non-pressure containing), and permanent and temporary guide base.
Trefoil 1	Drilled and suspended in Dec 2004. Drilled with WBDF. The well had a drill stem test, but never completed, nor produced.	The well was suspended with multiple cement barriers.	Inhibited NaCl brine, biocide, corrosion inhibitor, oxygen scavenger.	Mudline suspension, ROV retrievable debris cap (non-pressure containing).
White Ibis 1	Drilled and suspended in July 1998. Drilled with WBDF. The well was never completed, nor produced.	The well was suspended with multiple cement barriers.	Inhibited KCl brine, corrosion inhibitor.	Subsea wellhead, ROV retrievable debris cap (non-pressure containing), permanent guide base with 2 x guidepost remaining.
Yolla 1	Drilled and suspended in October 1985. Drilled with WBDF. The well had a drill stem test, but never completed, nor produced.	The well was suspended with multiple cement barriers.	WBDF only, seawater, inhibited KCl brine.	Wellhead, ROV retrievable debris cap (non-pressure containing), Guidelineless Re-Entry Assembly Drilling Template

3.8.2 Suspended Wells Inspection

A program of General Visual Inspections of each suspended well using a ROV has been in place since 2014. The Beach Well Integrity Standard mandates that inspections are undertaken every 2 years to confirm that well integrity is maintained.

An ROV wellhead preparation and inspection campaign was undertaken in June 2023 to assess the condition of the subsea wellhead and interfaces in advance of the rig arriving.

3.8.3 Activity Overview

P&A activities of the legacy suspended subsea exploration wells, including designing and installing permanent well barriers, will be completed per industry best practice (OEUK Guidelines) and in accordance with the NOPSEMA accepted WOMP.

Abandonments for each well will be performed sequentially through a marine riser and BOP. The P&A sequence for each well will depend on existing well design and integrity, casing cement quality and well condition upon re-entry.

Fluids will include those within the well, as well as clean fluids and chemicals specifically selected for the permanent well abandonment program.

The generic planned well abandonment will include the following steps for each well:

1. Position the drill rig over the well and anchor or connect to pre-laid anchors (location dependent) (Section 3.4)
2. Clean and prepare wellhead (as required) for landing the BOP (Section 3.8.4).
3. Run and land BOP on marine riser and interface with wellhead, connect with BOP tether system (if required) (Section 3.5).
4. Displace well with clean overbalanced WBDF (Section 3.8.5).
5. Drill out upper cement plug (s) to allow placing of a permanent cement barrier adjacent to caprock. (Section 3.8.6)
6. Set and verify abandonment plugs (Section 3.8.7). Recover BOP and marine riser.
7. Remove and recover wellhead and associated infrastructure to clear the seabed (Section3.8.8)

3.8.4 Clean and Prepare Wellhead

Although unlikely, some wellhead equipment may require scale dissolver or calci-wash for removal of scale on the wellhead. Typically, this is applied in batches of ~320 L applied over 1 hour. Total discharge can be up to 10 m^3.

3.8.5 Displace Well with Clean Overbalance WBDF

During well abandonment activities, fluids will be circulated in and out of the well to maintain a hydrostatic barrier over the wellbore pressure, and to clean the well in preparation for cementing. Fluids will include those insitu in the well and clean overbalanced fluids specifically selected for the well abandonment program.

The clean overbalanced fluid will be WBDF, consisting of barite, brine viscosifier, biocide and which may be discharged when drilling out the cement plugs as per Section 3.8.6

The insitu fluids discharge will include up to ~130 – 150 m^3 per well of inhibited water (corrosion inhibiter, biocide, and oxygen scavenger) and KCl brine. Due to the wells not being completed and commercially produced, and temporarily suspended with barriers in place, no hydrocarbons are expected to be in the insitu fluids.

3.8.6 Drill Out Upper Cement Plug (s) or a Cement Plug

Each legacy well is currently suspended with at least two cement plugs. The upper cement plugs are generally required to be drilled out to enable the permanent cement barrier to be properly placed adjacent to the regional caprock.

During the permanent plugging operation, if the permanent cement plugs do not pass the verification test, then drilling out of these cement plugs will be required so the cement plug(s) can be reinstalled. WBDF will be used, and the WBDF and cement cuttings will be processed through the drill fluids and cuttings handling system as described in Section 3.6.1, and discharged overboard. This will generate about 25 m^3 of cement cuttings per plug and use ~250 m^3 of WBDF.

3.8.7 Set and Verify Permanent Cement Barriers

The existing cement plug may be assessed by tagging and/or pressure testing as required. Wireline logs will be run to assess casing condition, annulus cement quality and position.

Wireline activities may include gamma ray and casing collar locator logging, ultrasonic cement bond logging and other tools such as drifts, bridge plugs, cement retaining tool, punch perforators or cutters etc. and will be performed through the marine riser and BOP with appropriate isolation barriers in place.

Permanent cement plugs will be placed adjacent to the caprock. Cement discharges will be as per the discharges described in Section 3.6.2.

Where required, a series of perforations and/or cuts to the casing (s) may be made, followed by pumping specially formulated quantities of cement slurry according to the operations program and NOPSEMA accepted WOMP. To remediate existing cement, the well including annular spaces behind casing are displaced with clean brine. Returns at surface will include excess cement spacer, the insitu fluids, and debris solids (e.g. cement cuttings). Insitu fluid details are outlined in Section 3.8.5.

Once permanent barriers are installed and verified, the BOP is recovered.

3.8.8 Removal and Recovery of Infrastructure

Following P&A operations and verification of permanent barriers, the wellhead is cut with either a mechanical or abrasive cutting tool and removed below the mudline (~1.5 m below seabed). The cutting process produces small amount of metal shaving (swarf), some of which may remain on the seabed. Subsequently, a shallow surface to seabed cement plug will be set as per approved WOMP (Section 3.8.7)

Equipment associated with the wells such as wellhead, permanent and temporary guide bases, guidelineless re-entry assembly, remaining guideposts, cut conductor and casing section(s) will also be removed for onshore disposal.

For White Ibis 1, minor dredging with ROV dredging tools will be required to excavate the seabed from around the wellhead to enable the wellhead to be cut.

An ROV seabed clearance survey will be conducted following P&A and removal of associated infrastructure to confirm all infrastructure on the seabed has been removed, returning the area to original condition as much as possible.

3.8.9 Contingent Activities

The following activities may be required because of operational or technical issues during P&A. These additional activities have been considered within the relevant impact assessment sections and do not represent significant additional risks or impacts but may generate additional small volumes of drilling fluids and drilled cement being operationally discharged, which have been assessed as part of the petroleum activity.

3.8.9.1 Cut and Pull, Milling and Wellbore Fishing Operations

If the cement on the outside of the casing does not meet well barrier requirements, casing or liners may need to be removed either by cutting and pulling or milling. These operations are done through the marine riser with milling debris returned to the rig (through a swarf handling system for milling operations) and will only be performed if necessary.

Milling operations involve removing steel casing, annulus cement and formation to expose formation (caprock). The methods used include milling tools that create chips or ribbons of steel (swarf), chips of cement and chips of formation. Milling is typically performed at a controlled rate (1 to 1.5 m/hr), to enable steel swarf to be removed effectively from the milling site.

As the steel swarf within the milled fluids is hard and sharp, the fluids from the well will be passed through specific swarf handling equipment, which generally includes magnets, that separate steel from the fluid before being processed through the solids control equipment on the rig. The milling fluids, including an additional ~2 m^3 of swarf, ~3 m^3 of drilled cement and ~3.5 m^3 of formation rock, will be discharged overboard per 100 m interval if milling is required. As a result of restricted milling speeds, the rate of swarf and cement will be generated over several days (the rate is expected to be about 50 m per 18 hours).

The metal shavings gathered from swarf handling equipment as above will be sent ashore for disposal.

Recovered WBDF will be circulated as part of the brine system with intermittent discharges during and at the end of the activities.

Casing or liners and other equipment that are removed from the well will be transported to shore for onshore disposal.

3.9 Routine Support Operations

3.9.1 Vessels

Vessel operations include:

- Rig moves between well locations and rig positioning.
- Deployment and retrieval of mooring and BOP tethering equipment (if required).
- Standby support to monitor and maintain the 500 m rig PSZ from errant vessels.
- Transfer of goods and equipment between the shore base and rig.
- Facilitating site and equipment inspection and operation of rig positioning equipment.

The rig will be supported by up to three support vessels with one vessel on standby within the operational area (outside the 500 m rig PSZ) at any given time and the other two vessels outside the operational area transporting cargo between port and the rig or performing other supporting duties of the rig.

Vessels only enter the 500 m rig PSZ under instruction from the rig when transferring cargo to the rig or supporting specific operations. Support vessels generally have ~15 POB at any given time.

Support vessels maintain station-keeping via dynamic positioning (DP) during the drilling activity therefore no anchoring is required.

Based on a review of operational details from Beach Energy's Otway drilling campaign, conducted from February 2021 to July 2022, resupply operations are predicted to occur near-daily for an average duration of 3 hours.

3.9.2 Helicopter

Helicopters are the primary form of transport for personnel to and from the drill rig and may also be used during emergency situations, including operational and scientific monitoring in the event of a hydrocarbon spill. Helicopters will be available to service the rig up to 7 days per week for the duration of the drilling program, normally operating in daylight hours only.

Helicopter operations within the Operational Area are limited to landing and take-off directly to and from the rig helideck.

Offshore refuelling of the helicopters whilst onboard the rig is not planned, however, may be undertaken if required.

3.9.3 Remotely Operated Vehicle

An underwater remotely operated vehicle (ROV) is a tethered underwater vehicle deployed from a vessel or drill rig. ROVs are unoccupied, highly manoeuvrable and operated by a crew aboard a vessel or rig.

ROVs are equipped with a video camera and lighting and can monitor the subsea infrastructure and the surrounding environment. ROVs are also used to deploy specialist tooling and equipment. Tooling and equipment may be operated with the use of electrics or hydraulics. Hydraulics on ROVs are closed system, where hydraulic fluid is circulated to move components and the system is designed not to release hydraulic fluid.

The ROVs will be housed on the deck of a vessel and / or drill rig and are unlikely to be temporarily parked on the seabed during the drilling program.

ROVs will undertake:

- Pre and post-activity site surveys.
- Assist in installation and removal of subsea equipment.
- Equipment deployment, monitoring and retrieval.
- Tool deployment and operation (dredgers, cutters etc.).

- BOP activation under emergency conditions.

4 Stakeholder Consultation

4.1 Summary

Beach has consulted relevant persons in the course of preparing this EP in accordance with applicable regulations, case law, guidelines, Beach policies and standards as set out in Section 8.

Beach understands that the purpose of consultation is to inform its understanding of the environment, including people and communities, the heritage value of places, and their social and cultural features, which may be affected by the proposed activities in this EP, and therefore refine or change measures proposed to reduce impacts and risks to an acceptable level and ALARP.

Consultation carried out in accordance with the regulations and guidelines etc, was designed to ensure that relevant persons were identified and provided sufficient information and a reasonable time period to allow them to make an informed assessment of the potential impacts and risks of the EP activities. Where objections or claims were raised about adverse impacts and risks of the EP activities, the consultation process enabled an assessment of impacts and risks and new or changed control measures to be adopted in the EP to reduce impacts and risk to an acceptable level and ALARP.

Beach has provided sufficient information in different formats including information sheets; website content; public notice advertisements; radio advertisements; consultations with Beach technical staff at information sessions and meetings. Relevant persons were advised of the purpose of consultation, provided multiple opportunities over a reasonable period to ask questions, raise concerns, and discuss control measures. Beach also included advice regarding sensitive information not being published.

Recognising the diversity of different categories of relevant persons and multiple regional locations, a range of engagement methods and locations were used including emailing information sheets and updates to all identified relevant persons; publishing information on Beach's website and new online consultation hub (Engage Beach); in person and online meetings with individuals and organisations; community and industry drop-in sessions.

Beach has continued to observe broad concerns about climate change and increasing concerns about marine seismic surveys. However, after explaining in direct consultations that the OGV Project and the Drilling and P&A activities do not include seismic acquisition, minimal additional information was sought, and minimal concerns raised. For the limited concerns raised, Beach has assessed their merits and identified any additional control measures as described in Section 4.12.

Consultation in the course of preparing this EP has been completed and Beach believes it has met the regulatory engagement requirements. Consultation in relation to implementing the activities in this EP (Section 4.16) and for the development of other EPs required for the OGV Project will continue. Should concerns or feedback about adverse impacts and risks from the activities in this EP be received after this EP has been accepted, Beach will assess the matters raised, and where a further measure or control may be required, Beach will apply its Management of Change process as detailed in Section 8.3.4.

4.2 Consultation Context

As an operator of offshore and onshore facilities in the Otway and Bass Basins, Beach has consulted with relevant persons and local communities regarding its projects for many years. Beach has been consulting with relevant persons since 2019 for its Otway Offshore Project for the preparation and implementation of several EPs relating to different project phases from drilling and P&A, connecting wells, and its ongoing offshore operations. Beach has also consulted with relevant person for its Bass

Basin activities including management of suspended wells, Drilling and P&A, seismic surveys, and its ongoing offshore operations. For further activities being planned in these basins and in the course of preparing this EP, Beach has continued to review its methodology for identifying relevant persons and refined its engagement methods in response to case law and growing community interest.

Consultation for this EP has been undertaken by providing relevant persons sufficient information on drilling activities and the P&A of suspended wells, that Beach has described in the simple collective term of 'Drilling Program'.

Beach has also provided information to relevant persons on the broader context for the Drilling Program by explaining that the activities are a part of several phases for Beach's Offshore Gas Victoria (OGV) Project for which additional EPs will be developed after further consultation. This includes previous submission of a Seabed Survey EP and an OPP for the OGV Project. Beach has undertaken this holistic approach as it gives relevant persons contextual information on why the Drilling Program is necessary to carry out subsequent activities in the OGV Project. This approach also demonstrates Beach's commitment to consulting transparently, consistent with NOPSEMA consultation guidelines and Beach's Community Engagement Standards.

4.3 Regulatory Requirements

Table 4-2 details where information in this EP has been included to demonstrate that Beach has met the consultation requirements in the OPGGS(E)R and NOPSEMA's Guideline GL2086 Consultation in the course of preparing an environment plan prepared to support clarity and transparency on the legal requirements including recent case law: Santos NA Barossa Pty Ltd v Tipakalippa [2022] FCAFC 193 (appeal decision). Beach has also reviewed the Federal court decision in Cooper v NOPSEMA (N0 2) [2023] FCA 1158. with regard to consultation requirements.

4.4 Guidelines Considered

The guidelines detailed in Table 4-1 were also considered in planning and delivering the consultation carried out in the course of preparing this EP:

Table 4-1: Consultation Guidelines Considered

Organisation	Guideline
NOPSEMA	GL2086 – Consultation in the course of preparing an environment plan – May 2023 (NOPSEMA Consultation Guidelines)
	GN1344 - Environment plan content requirements – January 2024
	GN1488 - Oil pollution risk management - July 2021
	GN1785 – Petroleum activities and Australian Marine Parks – January 2024
	GL1887 – Consultation with Commonwealth agencies with responsibilities in the marine area – January 2024
AFMA	Petroleum industry consultation with the commercial fishing industry
IAP2	Public participation spectrum
DCCEEW	Interim Engaging with First Nations People and Communities on Assessments and Approvals under the Environment Protection and Biodiversity Act 1999

Table 4-2: OPGGS(E)R, NOPSEMA Guidelines and How Requirements Met

Table note: the sections from the OPGGS(E)R have been updated to align with 2024 OPGGS(E)R. The NOPSEMA guidance has not been updated to align with OPGGS(E)R 2024.

OPGGS(E)R SECTION *(for consultation)*	**NOPSEMA GUIDELINE**	**HOW REQUIREMENTS WERE MET**
34 Criteria for acceptance of environment plan For section 34, the criteria for acceptance of an environment plan are that the plan demonstrates that: (g)(i) the titleholder has carried out the consultations required by section 25; and (g)(ii) the measures (if any) that the titleholder has adopted, or proposes to adopt, because of the consultations are appropriate	Section 25 establishes a duty on titleholders to carry out consultation in the course of preparing an EP. NOPSEMA's role is to assess whether or not the duty has been discharged, read particularly with section 34(g). In order to accept an EP under section 33, NOPSEMA must be reasonably satisfied (as per section 34) that the EP demonstrates the duty (to carry out consultation with relevant persons required by section 25) has been discharged and that the measures (if any) the titleholder has adopted, or proposes to adopt, because of the consultations are appropriate. **General principles for effective consultation** Consultation should be a genuine and meaningful two-way dialogue in which relevant persons are given sufficient information and time to allow them to make an informed assessment of the possible consequences of the activity on their functions, interests, or activities. The consultation process used for different activities may vary depending on a range of factors, certain key principles should be evident in the Environment Plan. **Consulting with groups where interests are held communally** Where interests are held communally, in accordance with tradition, the method of consultation will need reasonably to reflect the characteristics of the interests affected by the titleholder's proposed activity. **First Nations people / groups** First Nations groups, such as land councils and prescribed body corporates, may be relevant persons with a function that may be affected by the activities in the environment plan, but they may also provide advice in relation to who and how other First Nations groups or individuals should be consulted as relevant persons whose interests may be affected by the activities. A connection of traditional owners with sea country may constitute an interest for the purposes of section 25(1)(d). Titleholders must demonstrate to NOPSEMA that a reasonable opportunity to be consulted has been afforded to First Nation groups.	**Consultations required by Division 3** EP Section 4.15 Report on consultations EP Section 4.12 Assessment of merit of objections or claims shows approach to assessment of objections or claims. EP Section 4.13 Measures adopted as a result of consultation shows actual measures adopted as a result of consultation on this EP. EP Section 4.5 Principles of effective consultation shows the policy, standards and guidelines Beach applies when planning consultation. EP Section 4.5.1Consulting groups with communal interests show respect for consulting representative commercial fishers associations. EP Section 4.5.2 Consulting First Nations groups and peoples shows an informed and culturally sensitive approach to consulting First Nations groups holding formal representative roles in their communities.
25 Consultation with relevant authorities, persons and organisations, etc (1) In the course of preparing an environment plan (including a revised environment plan referred to in Division 5) a titleholder must consult each of the	**Identifying relevant persons** Titleholders are required to identify and consult with each authority, person or organisation who falls within the categories of relevant persons set out in section 25. Titleholders must clearly identify in their EP who is a relevant person and the rationale the titleholder has used to determine who they consider falls within that definition.	**Relevant Persons Identification** EP Section 4.6 Relevant Person identification methodology sets out a comprehensive methodology followed by research techniques, public notices, and other methods to identify relevant persons.

OPGGS(E)R SECTION *(for consultation)*	NOPSEMA GUIDELINE	HOW REQUIREMENTS WERE MET
following (a relevant person): (a) each Commonwealth, State or Northern Territory agency of authority to which the activities to be carried out under the environment plan may be relevant; (b) if the plan related to activities in the offshore area of a State – the Department of the responsible State Minister; (c) if the plan related to activities in the Principal Northern Territory offshore area – the Department of the responsible Northern Territory Minister; (d) a person or organisation whose functions, interests or activities may be affected by the activities to be carried out under the environment plan; (e) any other person or organisation that the titleholder considers relevant.	EPs should set out the processes that have been applied to identifying and determining who are relevant persons, as well as the processes undertaken for consultation. Authorities, persons, and organisations are to be identified on a case-by-case basis. Factors such as the nature of the activity, the environment in which the activity is being undertaken and the possible impacts and risks of the activity should be taken into account when determining whether the activity may be relevant to authorities, or determining who has functions, interests or activities that may be affected. Section 25, like most statutory consultation provisions, imposes an obligation that must be capable of practicable and reasonable discharge by the titleholder. It also involves 'some decisional choice' that the titleholder must make in identifying relevant persons and in how the consultation is undertaken. Processes for the identification of relevant persons must provide for sufficiently broad capture of ascertainable persons and organisations who may have their functions, interests or activities affected or that may be affected by the activity. Publication in appropriate media forms may be a reasonable tool to assist in the identification of relevant persons and inform the delivery of more targeted notices to potentially relevant persons. It is recognised that in any community consultation there will inevitably be persons within a group who could not participate for various reasons, however the absence of their participation would not invalidate the process provided reasonable efforts were made to identify the relevant persons and to consult with them. The process should include reference to multiple sources of information, such as publicly available materials, review of databases and registers, published guidance, previous history, as well as advice from authorities and other relevant persons. In some cases, relevant persons have developed guidance detailing their functions, interests, or activities and how and when they wish to be consulted on activities. Titleholders should take this guidance into account in developing consultation processes with relevant persons. Titleholders may also consider how they can create awareness of their activities to encourage potentially relevant persons to make themselves known to the titleholder. **Functions, interests or activities under section 25(1)(d)** The phrase "functions, interests or activities" in section 25(1)(d) should be broadly construed as this approach best promotes the objects of the Regulations, including that offshore petroleum and greenhouse gas activities are carried out in a manner consistent with the principles of ESD. The phrase is a composite one, each part of which has work to do in identifying relevant persons. **Functions**: refers to "a power or duty to do something" **Activities**: to be read broadly and is broader than the definition of 'activity' in section 5 of the Environment Regulations and is likely directed to what the relevant person is already doing	EP Section 4.7 Relevant persons identified shows the categories and names of relevant persons, alongside their functions, interests, and activities.

OPGGS(E)R SECTION *(for consultation)*	NOPSEMA GUIDELINE	HOW REQUIREMENTS WERE MET
	Interests: to be construed as conforming with the accepted concept of "interest" in other areas of public administrative law includes "any interest possessed by an individual whether or not the interest amounts to a legal right or is a proprietary or financial interest or relates to reputation"	
25 Consultation with relevant authorities, persons and organisations, etc. (2) For the purpose of the consultation, the titleholder must give each relevant person sufficient information to allow the relevant person to make an informed assessment of the possible consequences of the activity on the functions, interests or activities of the relevant person.	**Providing sufficient information under section 25(2)** Information provided must be sufficient to allow an informed assessment of the possible consequences of the activity on the functions, interests or activities of the relevant person. Again, the titleholder has a "decisional choice" to make in how information will be given to allow the "relevant person" to make the assessment contemplated by section 25(2). Titleholders should consider the functions, interests or activities of relevant persons and the impacts and risks that affect them when determining information requirements. The level of information necessary is likely to vary for different relevant persons and may depend on the degree to which a relevant person is affected. Different consultation processes may be required for relevant persons and organisations depending on information requirements. What constitutes sufficient information may differ depending on the relevant person(s) and the EP should demonstrate that the process was suited to the type of relevant person. Generic, targeted electronic mailouts or links to a webpage may not be sufficient. Information should be in a form that is readily accessible and appropriate for the relevant person being consulted. Materials provided may include written forms, pictorial or other graphics, verbal briefings or presentations, and the use of other technologies.	**Sufficient information** EP Section 4.8 Sufficient Information sets out the approach to preparing different types of information based on the potential impacts on the functions, interest or activities of the relevant persons. Includes a schedule of advertising and public information sessions held.
25 Consultation with relevant authorities, persons and organisations, etc. (3) The titleholder must allow a relevant person a reasonable period for the consultation.	**Providing a reasonable period under section 25(3)** Titleholders must provide a "reasonable period" for the relevant person to make an informed assessment of the possible consequences of the proposed activity on their functions, interests or activities and so they are able to respond with any concerns. The nature, scale and complexity of an activity as well as the extent and severity of potential impacts and risks on a relevant person's functions, interests or activities may inform what makes a reasonable period for consultation. Relevant persons may have also provided the titleholder with their views of what constitutes reasonable timeframes, their availability and or accessibility issues that should be taken into account. Therefore, what is a reasonable period for consultation should be considered on a case-by-case basis.	**Reasonable period** Beach recognises that what constitutes a reasonable period for consultation should be considered on a case-by-case basis, with reference to the nature, scale and complexity of the activity. EP Sections 4.9 Reasonable Period shows that a reasonable period has been provided and consultation has been completed.
25 Consultation with relevant authorities, persons and organisations, etc. (4) The titleholder must tell each relevant		**Sensitive information**

OPGGS(E)R SECTION *(for consultation)*	NOPSEMA GUIDELINE	HOW REQUIREMENTS WERE MET
person the titleholder consults that: (a) the relevant person may request that particular information the relevant person provides in the consultation not be published; and (b) information subject to such a request is not to be published under this Part.		EP Section 4.14 Sensitive Information shows that relevant persons have been informed of their rights regarding sensitive information.
24 Other information in environment plan The environment plan must contain the following: (b) a report on all consultations under section 25 of any relevant person by the titleholder, that contains: (i) a summary of each response made by a relevant person; and (ii) an assessment of the merits of any objection or claim about the adverse impact of each activity to which the environment plan relates; and (iii) a statement of the titleholder's response, or proposed response, if any, to each objection or claim; and (iv) a copy of the full text of any response by a relevant person;	**Reporting on consultation in the EP under section 24** The consultation process should be documented within the Environment Plan through the titleholder report on consultation and the sensitive information report. NOPSEMA expects the Environment Plan to also provide descriptions of the consultation processes and the rationale used to determine who and how to consult with relevant persons, including the approach to provision of sufficient information and how a reasonable period for the consultation was determined. This will assist to provide a basis for NOPSEMA to form a reasonable satisfaction view that the titleholder has carried out the consultations required by section 25. The consultation process should also assist the titleholder to meet its obligation under section 280 or 460 of the *Offshore Petroleum and Greenhouse Gas Storage Act* which requires that it must carry out the petroleum or greenhouse gas activity respectively in a manner that does not interfere with navigation, fishing, conservation of resources of the sea and seabed, other offshore electricity infrastructure and petroleum activities, and the enjoyment of native title rights and interests (within the meaning of the *Native Title Act 1993*) to a greater extent than is necessary for the reasonable exercise of the titleholder's rights and obligations. The report on consultation should include clear and precise identification of claims and objections presented, an assessment of the merit of each objection or claim with sufficient rationale provided to support that assessment, and a demonstration of the suitability of any measures adopted as a result of the consultation.	**Report on consultations** EP Section 4.11 Consultation to Minimise Impacts on Relevant Persons Rights shows the approach taken to consult to understand and not interfere with others rights. EP Section 4.15 Report on Consultations Includes responses made, assessment of the merits of objections or claims about the adverse impacts of each activity and Beach's response. The report on consultation is in Appendix A. The full text of any response by a relevant person was provided to NOPSEMA on submission of the EP as sensitive information.
22 Implementation strategy for environment plan (15) The implementation strategy must provide for appropriate consultation with: (a) relevant authorities of the Commonwealth, a State or a Territory; and (b) other relevant interested persons or organisations.	Demonstrating in an Environment Plan that ongoing consultation is a part of a titleholder's implementation strategy as required by section 22(15), is separate to demonstrating that requirements for relevant persons consultation outlined in this guideline have been met	**Ongoing consultation** EP Section 4.16 Consultation for Implementation of EP shows the consultation that will continue as part of the implementation strategy for this EP.

4.5 Principles of Effective Consultation

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

- Community and Stakeholder Engagement Policy
- Indigenous Participation Policy
- Human Rights Policy
- Community Engagement Standard BSTD 10.2.

This standard incorporates the International Association of Public Participation (IAP2) Spectrum of Public Participation global best practice model.

4.5.1 Consulting Groups with Communal Interests

Beach respects the role of commercial fishing associations in representing their members and consults with them to understand their preferred consultation approach for their executive, board (where applicable) and their members. Where an individual commercial fisher is known to Beach and wishes to receive information from Beach and consult directly, Beach respects such requests.

Beach respects communal interests held by First Nations groups and has approached consultation as set in Section 4.5.2.

4.5.2 Consulting First Nations Groups and Peoples

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

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

Beach's approach to respectful and effective consultation with RAPs and Registered Native Title Body Corporate identified as relevant persons has included the following key steps:

1. Provided information on the activities in this EP (and the OGV Project).
2. Provided information on the purpose of consultation.

3. Explained that the identification of cultural values and sensitivities is an important part of preparing EPs as it enables any impacts and risks to be assessed and where applicable for measures to be developed to reduce impacts and risks to an acceptable level and ALARP.

4. Inquired how they wish to consult with Beach and whether they have existing consultation guidelines and protocols if they wanted consultation between Beach and their members and how they would like that to occur.

5. Asked if there is any information they wish to provide on cultural values and sensitivities and any heritage values and discussed relevant information they have already published where applicable.

6. Inquired if they are aware of any people, who in accordance with Indigenous tradition, may have spiritual and cultural connections to the environment that may be affected by the activity that have not yet been afforded the opportunity to provide information that may inform the management of the activity.

The consultation approach set out above was not to the exclusion of any individual First Nations persons and Beach has undertaken such direct consultations.

Beach carried out desk-top research to identify potential individual First Nations person who may be relevant and placed public notice advertisements in relevant publications to facilitate the opportunity for First Nations peoples, or groups who may not be RAPs or a Registered Native Title Body Corporate, to consult with Beach.

4.6 Relevant Persons Identification methodology

4.6.1 Identification Process

In following the law set out in Santos NA Barossa Pty Ltd v Tipakalippa [2022] FCAFC 193 (appeal decision) Beach undertook a further comprehensive review of its methodology for identifying and consulting with relevant persons resulting in the recently accepted Beach Seabed Survey EP. Beach is constantly refining its methodology cognisant of NOPSEMA Guidelines, recent case law, industry best practice and applicable to the nature and scale of the activities in this EP.

The methodology follows a process of assessing elements of this EP to identify potentially relevant persons: defined activities; the spatial extent of the Operational Areas, Planning Areas and impact and risk specific environment that may be affected (EMBA); environmental values and sensitivities; identification and assessment of risks and impacts. After initial identification, the consultation process was used to verify and refine the initial steps. That process is set out in Figure 4-1.

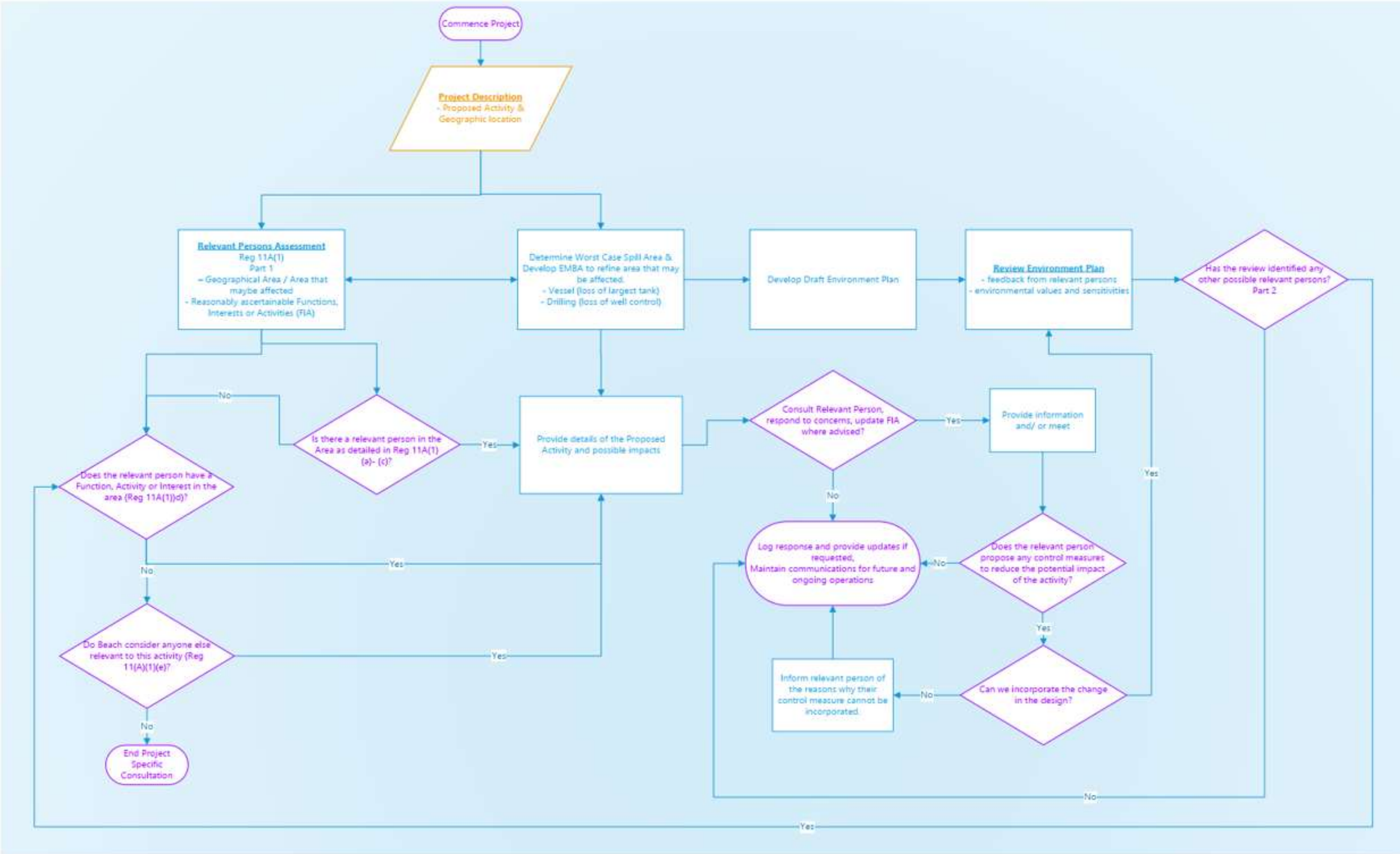


Figure 4-1: Relevant Person Methodology

4.6.2 Geographical Locations

The purpose of consultation is to ensure that authorities, persons, or organisations which are potentially affected by activities are consulted and their input considered in the development of EPs. The proposed activities, their locations and the broadest extent of potential impacts were assessed, after which a geographic area of inquiry was undertaken in the first phase of the relevant person identification methodology.

This process used the following areas:

- Operational Area: where the Drilling Program activities and the rig and vessels will occur.
- Planning Area: the area that may be potentially exposed to hydrocarbons at the low exposure values for the four hydrocarbon phases described in NOPSEMA Environment Bulletin Oil spill modelling (NOPSEMA 2019). The Planning Area is conservatively based on the low exposure values which do not result in environmental or ecological impacts.

The Planning Area was determined from quantitative spill modelling for a loss of diesel from a vessel collision and a loss of containment (condensate) whilst drilling (Section 7.12.4). The spill modelling and impact assessment defines different hydrocarbon exposure values for the four hydrocarbon phases (floating, dissolved, entrained, and accumulated shoreline) that pose different potential ecological and socio-economic risks. Section 7.12.5 details the predicted level of risk.

The defined geographic locations (Figure 6-1) and Section 7 Environmental Impact and Risk Assessment, were examined by the Beach Community Relations and Environment OGV Project team members in the first steps in the relevant persons identification methodology. That assessment was also used to plan appropriate consultation methods given the nature and scale of the activity and the potential impacts on the relevant persons functions, interests, or activities.

There may be instances where potential environmental impacts may occur and despite a geographical overlap, this will not necessarily equate to an impact on a organisations or person's functions, interests or activities, or a potential impact may be immaterial or negligible, and in such instances an organisation or person would not be identified as a relevant person (as defined under OPGGS(E)R Section 25).

Table 4-3 summarises the different geographical areas of inquiry, potential impacts and relevant person category focus for further research to identify relevant organisations or persons.

Table 4-3: Geographic Locations and Relevant Person Focus

Area	Summary of Potential Impacts	Relevant Persons Category Focus
Operational Area Area where the activities will take place.	Displacement of other marine users required to avoid the rig, vessels, and wells. Localised disturbance of the marine environment including seabed, marine fauna, and flora. Potential for disturbance to telecommunications infrastructure.	Relevant Commonwealth and State Departments and Authorities. Persons or organisations whose functions, interests or activities may be affected by the displacement or disturbance from the planned activities, such as: • Commercial fishing • Indigenous groups • Marine based industries • Marine tourism

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

4.6.3 Defining Relevant Person Categories

The second key step in the relevant persons identification methodology determined the categories of relevant persons whose functions, interests or activities may be affected by the activities in the EP. Defining the categories of relevant persons enabled detailed analysis and research of persons or organisations whose functions, interests or activities may be affected by the planned activities in the operational area, or who may be affected in the event of an unplanned release of hydrocarbons. Relevant persons categories are shown in Table 4-4.

4.6.4 Identifying Relevant Authorities

Relevant authorities, as required in the OPGGS(E)R Section 25(1)(a) and (b) were identified as relevant based on their roles and responsibilities in relation to the proposed activities in this EP, the spatial extent of the Planning Area, potential impacts and control measures. Methods to identify relevant authorities included review of:

- GL1887 – Consultation with Commonwealth agencies with responsibilities in the marine area – January 2024.
- AFMA Petroleum industry consultation with the commercial fishing industry.
- NOPSEMA and Director of National Parks Petroleum activities and Australian Marine Parks. A guidance note to support environmental protection and effective consultation – January 2024
- Beach's recent consultation records in BeachConnect (Beach's stakeholder database).
- Desktop research to identify any agency or department changes.
- Department or Agency feedback to Beach from time to time.

The Department of the responsible State Minister has also been identified, for both Victoria and Tasmania, as required by OPGGS(E)R Section 25(1)(c).

4.6.5 Identifying Relevant Persons or Organisations

Building upon the spatial extent of activities and relevant person category assessments in Table 4-4, the next step involved identifying individual organisations or persons whose functions, interests or activities may be affected by the activities in the EP (OPGGS(E)R Section 25(1)(d)).

Table 4-5 sets out the broad approach for most relevant person categories. Further information is provided in Section 4.6.6 for First Nations and Section 4.6.7 for Commercial Fishers categories.

Table 4-4: Identification of Relevant Persons Categories

Environmental Values and Sensitivities	Operational Area	Planning Area: Floating, dissolved, entrained	Planning Area: Shoreline	Relevant Person Categories
Conservation Values and Sensitivities - Otway				
World Heritage Properties • Tasmanian Wilderness	N/A	N/A	✓ ✓ ✓ ✓ ✓	Relevant Government Departments and Agencies Indigenous Groups Marine Tourism Land Tourism Environment Conservation Groups
Australian Marine Parks: • Apollo • Beagle • Boags • Franklin • Huon • Nelson • Tasman Fracture • Zeehan	N/A	✓ ✓ ✓ ✓ ✓ ✓	N/A	Relevant Government Departments and Agencies Indigenous Groups Marine Based Industries Marine Tourism Educational and Research Organisations Environmental Conservation Groups
National Heritage Places: • Great Ocean Road and Scenic Environs • Point Lonsdale Lighthouse Reserve and Environs • Point Nepean Defence Sites and Quarantine Station Area • Quarantine Station and Surrounds (within Point Nepean Site) • Summerland Peninsula • Tasmanian Wilderness	N/A	N/A	✓ ✓ ✓ ✓ ✓ ✓	Relevant Government Departments and Agencies Indigenous Groups Marine Based Industries Marine Tourism Educational and Research Organisations Environmental Conservation Groups

Environmental Values and Sensitivities	Operational Area	Planning Area: Floating, dissolved, entrained	Planning Area: Shoreline	Relevant Person Categories
• Western Tasmania Aboriginal Cultural Landscape				
Commonwealth Heritage Places: • HMAS Cerberus Marine and Coastal Area • Swan Island and Naval Waters	N/A	N/A	✓ ✓ ✓ ✓	Relevant Government Departments and Agencies Indigenous Groups Land Tourism Environment Conservation Groups
• No wrecks have been recorded within the Otway Operational Areas	N/A	N/A	N/A	N/A
Wetlands of International Importance • Glenelg Estuary and Discovery Bay Wetlands • Lavinia • Port Phillip Bay (Western Shoreline) and Bellarine Peninsula • Western Port	N/A	N/A	✓ ✓ ✓ ✓ ✓	Relevant Government Departments and Agencies Indigenous Groups Land Tourism Educational and Research Organisations Environment Conservation Groups
Nationally Important Wetlands: Numerous on Victoria, Tasmania, and NSW coast. See Section 6.2.7	N/A	N/A	✓ ✓ ✓ ✓ ✓	Relevant Government Departments and Agencies Indigenous Groups Land Tourism Educational and Research Organisations Environment Conservation Groups
Marine Protected Areas: • Victorian – see Section 6.2.8 • Tasmanian – see Section 6.2.10 • SA – See Section 6.2.12 • NSW – See Section 6.2.13	N/A	✓ ✓ ✓ ✓ ✓	Depending on location	Relevant Government Departments and Agencies Indigenous Groups Marine Tourism Educational and Research Organisations Environment Conservation Groups

Environmental Values and Sensitivities	Operational Area	Planning Area: Floating, dissolved, entrained	Planning Area: Shoreline	Relevant Person Categories
Terrestrial Protected Areas: • Victorian – see Section 6.2.9 • Tasmanian – see Section 6.2.11 • NSW – See Section 6.2.14	N/A	N/A	✓ ✓ ✓ ✓ ✓	Relevant Government Departments and Agencies Indigenous Groups Land Tourism Educational and Research Organisations Environment Conservation Groups
Key Ecological Features: • Bonney Coast Upwelling • Seamounts South and East of Tasmania • Upwelling East of Eden • West Tasmania Canyons – only KEF in Operational Area	Only West Tasmania Canyons	✓ ✓ ✓ ✓ ✓	N/A	Relevant Government Departments and Agencies Commercial Fishing Indigenous Groups Educational and Research Organisations Environmental Conservation Groups
Conservation Values and Sensitivities – Bass				
World Heritage Properties • Tasmanian Wilderness	N/A	N/A	✓ ✓ ✓ ✓ ✓	Relevant Government Departments and Agencies Indigenous Groups Marine Tourism Land Tourism Environment Conservation Groups
Australian Marine Parks: • Beagle • Boags • East Gippsland • Flinders • Franklin • Tasman Fracture • Zeehan	N/A	✓ ✓ ✓ ✓ ✓ ✓	N/A	Relevant Government Departments and Agencies Indigenous Groups Marine Based Industries Marine Tourism Educational and Research Organisations Environmental Conservation Groups

Environmental Values and Sensitivities	Operational Area	Planning Area: Floating, dissolved, entrained	Planning Area: Shoreline	Relevant Person Categories
National Heritage Places: • Tasmanian Wilderness • Western Tasmania Aboriginal Cultural Landscape	N/A	N/A	✓ ✓ ✓ ✓ ✓ ✓	Relevant Government Departments and Agencies Indigenous Groups Marine Based Industries Marine Tourism Educational and Research Organisations Environmental Conservation Groups
Commonwealth Heritage Place	N/A	N/A	N/A	N/A
Maritime Archaeological Heritage: detailed in Section 6.2.5 • SS Albert	✓	N/A	N/A	Relevant Government Departments and Agencies
Wetlands of International Importance • Lavinia	N/A	N/A	✓ ✓ ✓ ✓ ✓	Relevant Government Departments and Agencies Indigenous Groups Land Tourism Educational and Research Organisations Environment Conservation Groups
Nationally Important Wetlands: Numerous on Victoria, Tasmania, and NSW coast. See Section 6.2.7	N/A	N/A	✓ ✓ ✓ ✓ ✓	Relevant Government Departments and Agencies Indigenous Groups Land Tourism Educational and Research Organisations Environment Conservation Groups
Marine Protected Areas: • Victorian – see Section 6.2.8 • Tasmanian – see Section 6.2.10 • SA – See Section 6.2.12 • NSW – See Section 6.2.13	N/A	✓ ✓ ✓ ✓	Various assessments, depending on location	Relevant Government Departments and Agencies Indigenous Groups Marine Tourism Educational and Research Organisations

Environmental Values and Sensitivities	Operational Area	Planning Area: Floating, dissolved, entrained	Planning Area: Shoreline	Relevant Person Categories
		✓		Environment Conservation Groups
Terrestrial Protected Areas: • Victorian – see Section 6.2.9 • Tasmanian – see Section 6.2.11 • NSW – See Section 6.2.14	N/A	Various assessments, depending on location	Various assessments, depending on location	Relevant Government Departments and Agencies Indigenous Groups Land Tourism Educational and Research Organisations Environment Conservation Groups
Key Ecological Features: • Big Horseshoe Canyon • Shelf Rocky Reefs • Upwelling East of Eden • West Tasmania Canyons – only KEF in Operational Area	Only West Tasmania Canyons	✓ ✓ ✓ ✓ ✓	N/A	Relevant Government Departments and Agencies Commercial Fishing Indigenous Groups Educational and Research Organisations Environmental Conservation Groups

Environmental Values and Sensitivities	Operational Area	Planning Area: Floating, dissolved, entrained	Planning Area: Shoreline	Relevant Person Categories
Ecological Environment – Otway and Bass				
The ecological and physical environment described in Chapter 6 provides the basis for further assessment of values and sensitivities, along with impact and risk assessments (Chapter 7) from planned and unplanned activities. The ecological and physical environment includes: • Benthic habitats and species assemblages • Soft sediment (habitat for various species) • Seagrass (coastline presence) • Algae (coastline presence) • Coral • Carbonate sands and exposed limestone (habitat for various species) • Basalt rises (habitat for various species) • Mangroves • Plankton • Invertebrates • Fish • Birds • Marine reptiles • Cetaceans • Pinnipeds	✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ ✓	Various assessments specific to ecological feature.	Relevant Government Departments and Agencies Commercial Fishing Indigenous Groups Educational and Research Organisations Environmental Conservation Groups

Environmental Values and Sensitivities	Operational Area	Planning Area: Floating, dissolved, entrained	Planning Area: Shoreline	Relevant Person Categories
Threatened Ecological Communities: detailed in Section 6.4.6.	N/A	✓	Various assessments specific to location of ecological community.	Relevant Government Departments and Agencies Indigenous Groups Educational and Research Organisations Environmental Conservation Groups
Socio-economic – Otway and Bass				
Otway Victoria Local Government Areas: • Bass Coast • Colac Otway • Corangamite • Glenelg • Greater Geelong • Mornington Peninsula • Moyne • Queenscliff • South Gippsland • Surf Coast • Unincorporated Vic • Warrnambool City • Wellington Tasmania: • Circular Head • Flinders • Huon Valley • King Island • West Coast	N/A	✓ ✓ ✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ ✓ ✓ ✓	Relevant Government Departments and Agencies Community Indigenous Groups Land Tourism Marine Tourism Educational and Research Organisations Environment Conservation Groups

Environmental Values and Sensitivities	Operational Area	Planning Area: Floating, dissolved, entrained	Planning Area: Shoreline	Relevant Person Categories
Bass Victoria Local Government Areas: • Bass Coast • East Gippsland • South Gippsland • Unincorporated Vic • Wellington NSW Local Government Areas: • Bega Valley • Eurobodalla Tasmania: • Circular Head • Flinders • Huon Valley • King Island • West Coast	N/A	✓ ✓ ✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ ✓ ✓ ✓	Relevant Government Departments and Agencies Community Indigenous Groups Land Tourism Marine Tourism Educational and Research Organisations Environment Conservation Groups
Offshore petroleum industry (non-Beach)	N/A	✓	N/A	Marine Based Industries (offshore oil and gas)
Other infrastructure - Otway Existing: • Victorian Desalination Plant – Planning Area • Indigo Central telecommunications cable – Operational Area Planned in Planning Area: • East Coast Cable System • Hawaiki Submarine Cable • Marinus Link	✓	✓	N/A	Marine Based Industries

Environmental Values and Sensitivities	Operational Area	Planning Area: Floating, dissolved, entrained	Planning Area: Shoreline	Relevant Person Categories
• Sydney-Melbourne-Adelaide-Perth (SMAP) Cable Other infrastructure - Bass Existing in Planning: • Indigo Central telecommunications cable • Bass Strait-1 and Bass Strait-2 telecommunications cable Planned in Planning • East Coast Cable System • Hawaiki Submarine Cable • Marinus Link • Sydney-Melbourne-Adelaide-Perth (SMAP) Cable				
Defence • Restricted Airspace • Unexploded Ordnance Areas	✓	N/A	N/A	Relevant Government Departments and Agencies
Shipping	✓ ✓	✓ ✓	✓ ✓	Relevant Government Departments and Agencies Marine Based Industries
Tourism Recreation (beach walking, fishing, snorkelling, diving, surfing close to coastline)	N/A	✓ ✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ ✓ ✓	Relevant Government Departments and Agencies Community Indigenous Groups Land Tourism Marine Tourism Recreational associations

Environmental Values and Sensitivities	**Operational Area**	**Planning Area:** Floating, dissolved, entrained	**Planning Area:** Shoreline	**Relevant Person Categories**
Commercial fisheries: • Commonwealth • Victoria • Tasmania • SA • NSW	✓	✓	N/A	Commercial Fishing
Seaweed Industry	N/A	✓ ✓	✓ ✓	Business Indigenous Groups
First Nations – Otway and Bass				
Sea Country Native Title Indigenous Groups Protected Areas Indigenous Groups Land Use Agreements	✓	✓	✓	Indigenous Groups
Impacts - Otway and Bass				
Light emissions: may attract light-sensitive species to rig and vessels	✓ ✓ ✓ ✓ ✓	N/A	N/A	Relevant Government Departments and Agencies Commercial Fishing Indigenous Groups Educational and Research Organisations Environmental Conservation Groups
Atmospheric emissions: decrease in air quality, greenhouse gas emissions	✓	N/A	N/A	Relevant Government Departments and Agencies Environmental Conservation Groups
Underwater sound: temporary, during vessel and rig activities, up to 20 km	✓ ✓ ✓	N/A	N/A	Relevant Government Departments and Agencies Commercial Fishing Indigenous Groups

Environmental Values and Sensitivities	Operational Area	Planning Area: Floating, dissolved, entrained	Planning Area: Shoreline	Relevant Person Categories
	✓ ✓ ✓			Educational and Research Organisations Environmental Conservation Groups
Physical presence: • Prelaid anchors: 2 km caution zone for anchors • Rig on location: 500 m PSZ and 2 km caution zone for anchors • Permanent wells: 500 m PSZ	✓ ✓ ✓ ✓	N/A	N/A	Relevant Government Departments and Agencies Commercial Fishing Marine Based Industries Marine Tourism
Seabed disturbance: wells, anchors, drill cuttings	✓ ✓ ✓ ✓ ✓ ✓	N/A	N/A	Relevant Government Departments and Agencies Commercial Fishing Indigenous Groups Marine Based Industries Marine Tourism Environmental Conservation Groups
Marine discharge rig and vessels: putrescible waste, sewerage and grey water, cooling and brine water, bilge water and deck drainage. Marine discharge drilling and P&A: drill cuttings and fluids, P&A fluids, completions fluids, BOP fluids, cement, bulk dry discharges.	✓ ✓ ✓ ✓	N/A	N/A	Relevant Government Departments and Agencies Commercial Fishing Indigenous Groups Environmental Conservation Groups
Risks - Otway and Bass				
Introduction and establishment of invasive marine species	✓ ✓	N/A	N/A	Relevant Government Departments and Agencies Commercial Fishing

Environmental Values and Sensitivities	Operational Area	Planning Area: Floating, dissolved, entrained	Planning Area: Shoreline	Relevant Person Categories
	✓ ✓ ✓			Indigenous Groups Environmental Conservation Groups Educational and Research Organisations
Fauna interaction	✓ ✓ ✓ ✓ ✓	N/A	N/A	Relevant Government Departments and Agencies Indigenous Groups Environmental Conservation Groups Educational and Research Organisations
Loss of waste or materials	✓ ✓ ✓ ✓ ✓	N/A	N/A	Commonwealth Departments / Agencies Commercial Fishing Indigenous Groups Environmental Conservation Organisations
Loss of containment – diesel and condensate	✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓	Relevant Government Departments and Agencies Community Commercial Fishing Indigenous Groups Land Tourism Marine Tourism Educational and Research Organisations Environment Conservation Groups
Spill response activities	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓	Relevant Government Departments and Agencies Commercial Fishing Land Tourism

Environmental Values and Sensitivities	**Operational Area**	**Planning Area:** Floating, dissolved, entrained	**Planning Area:** Shoreline	**Relevant Person Categories**
	✓	✓	✓	Marine Based Industries
	✓	✓	✓	Marine Tourism
	✓	✓	✓	Environment Conservation Groups

Table 4-5: Relevant Persons Research Methods

Activity	Detail
Database Review	Beach's stakeholder database (BeachConnect) contains a significant number of organisations and individuals identified since 2014 for consultation in the development of EPs. A comprehensive review was undertaken in November 2022 for further consultation on the Thylacine Installation and Commissioning EP. Another review was undertaken during January and February 2023 for the Otway Offshore Operations EP review. In preparing for consultation on the OGV Project, a further review of BeachConnect was undertaken. Specific activities have included: • Merged Otway and Bass basin offshore project relevant persons lists to create a consolidated master list for OGV Project. • Reviewed master list of organisations and individuals against relevant person categories identified in assessment of totality of environment values, sensitivities, impacts and risks. • Contacted each organisation or individual where engagements showed no or few responses or where data appeared out of date, verified contact details and if they wished to continue consulting with Beach.
Functions, interests or activities	Identification of potential new relevant persons involved preliminary research into their functions, interests and activities from: • Readily ascertainable information on internet search engines, social media channels and organisation websites. • Prior communication with persons and organisations is reviewed to update the records of functions, interests and activities captured against entity records in BeachConnect. • Beach prepares information sheets that explain the purpose of consultation, the meaning of 'relevant person' in accordance with the regulations (among other things) and invites the reader to advise any other people whom they believe may be a relevant person to contact Beach. • Beach creates ongoing opportunities for relevant persons to participate in consultation through public notice advertisements in local newspapers and radio stations; attending local Beach information sessions. • Through the consultation process, relevant persons functions, interests or activities are updated in BeachConnect when new information is available.
Local knowledge	• Beach's Group Manager Social Performance and Community Relations has carried out wide ranging consultations for offshore and onshore Otway Basin projects since 2014, has extensive knowledge of local community, commercial fishing industry and other relevant persons, and has personally reviewed the relevant persons identifications methodology and consultation plan for this EP. • Beach has previously contracted consultants who live in south-west Victoria and have extensive local knowledge of organisations and persons who may be relevant persons, to undertake research into potentially relevant persons based on the categories identified. • Beach has increased the Victorian Community Engagement function from two persons to four persons to carry out local consultation.
Broad based keyword search	• Searched online for potentially relevant persons using key words including boat; swim; dive; sail; yacht; fish; marine environment; oceans; marine mammals; cultural heritage; maritime heritage. • Combined above terms with place-based search terms of: Warrnambool; Peterborough; Port Campbell; Apollo Bay; Portland; Mount Gambier; Port MacDonnell; Beachport; Robe; Burnie; Flinders Island; Devonport; Stanley; Strahan; King Island; Lakes Entrance; Eden; Bermagui; and Bega. • Investigated and monitored media articles and online campaigns around offshore activity concerns and using the above searches. • Investigated social media channels including LinkedIn, Facebook, and Instagram in the above searches.
Marine Spatial Planning Framework	• Reviewed the submissions to the Marine Spatial Planning Framework being developed in response to the Victorian *Marine and Coastal Act 2018* to identify additional potentially relevant persons.

Activity	Detail
	• Contacted organisations to inquire if they wish to be consulted.
Warrnambool Moyne Shire, and Glenelg Shire Focus	• Beach has an extensive list of relevant persons in Port Campbell, Peterborough, and Timboon with whom engagement has been undertaken for many years. • Whereas relevant persons in Warrnambool, Port Fairy and Portland have historically only involved commercial fishers. • For each relevant person newly identified in Warrnambool and broader Moyne Shire, Beach inquired if they could recommend other relevant persons and this approach successfully identified several additional relevant persons. • Drop-in sessions in Warrnambool, Port Fairy and Portland were added to the schedule.
Bass Coast Shire, South Gippsland Shire, Wellington Shire and East Gippsland Shire etc	• Reviewed existing database contacts. • Identified and contacted relevant Local Government Authorities. • Online search and identification of any commercial fishing and marine tourism businesses in accordance with the Planning Area and assessment criteria identified in our methodology, time to exposure, extent of exposure, volumes ashore and probability of accumulation above threshold. • Public notice ads were advertised in the South Gippsland Sentinel Times and The Advertiser (Bairnsdale).
King Island Focus	• Engagement approach was developed with King Island Council. • Types of organisations engaged include: industry and tourism associations; marine based tourism businesses; coast care groups; fishing industry; and seaweed industry. • King Island Council and King Island Chamber of Commerce also provided additional suggested relevant persons, that Beach contacted.
North-west/west Tasmania focus	• Reviewed existing database contacts. • Identified and contacted relevant Local Government Authorities. • Online search and identification of any commercial fishing and marine tourism businesses in Devonport, Stanley and Strahan in accordance with the Planning Area and assessment criteria identified in our methodology; time to exposure, extent of exposure, volumes ashore and probability of accumulation above threshold.
Sapphire Coast (NSW) focus	• Online search and identification of any commercial fishing and marine tourism business in Eden, Bega and Bermagui in accordance with the Planning Area and assessment criteria identified in our methodology; time to exposure, extent of exposure, volumes ashore and probability of accumulation above threshold. • Ensured inclusion of entities responsible for emergency spill response and commercial fishing sector
Marine Parks	• Contacted Parks Victoria to clarify agency and divisional responsibilities and updated Beach’s database with information on the separate teams dedicated to marine parks and sanctuaries in the 12 Apostles and Apollo Bay areas. • Contacted NSW National Parks & Wildlife Service, Department of Primary Industries NSW (Marine Parks), and Department of Natural Resources and Environment Tasmania (Parks and Wildlife Services). • Engaged with the Director of National Parks as per the NOPSEMA and Director of National Parks guidance note. Shape files were provided as part of the required ‘sufficient information’. • Reviewed database of parties licensed to carry out activities within marine parks.
Conservation Groups	• Based on desktop research of media coverage and organisations, identified further regional and national conservation groups, sought direct engagement, and commenced consultations with organisations who responded. • Given the nature and scale of the activities in this EP, Beach’s methodology was evolved to include both regional and national groups focussing on those with a direct interest in the Otway and Bass basin offshore Oil and Gas industry, groups whose interests are potentially most affected such as marine conservation, and where such consultation could contribute further information that would meet the purpose of consultation to identify concerns and implement mitigations.

Activity	Detail
	• National ENGOs were included where a specific interest or campaign on gas development within Victorian, Tasmanian or Commonwealth waters could be identified.
Tourism Groups	• Researched marine tourism operators active between Portland and Apollo Bay, South and East Gippsland, West Tasmanian Coast, NSW Sapphire Coast and King Island. Identified additional relevant persons offering services such as boat charters, SCUBA diving; equipment hire; sea kayaking. • For locations where shoreline oil is limited to the low threshold, the following is considered for relevant persons identification associated with tourism (i.e. NSW Sapphire Coast and Gippsland?): time to exposure, extent of exposure, volumes ashore and probability of accumulation above threshold. • Shore based tourism focus is where there may be moderate to high shoreline contact in the event of an emergency and adjacent to our Operational Areas.
Local Government	• Contacted local government councils adjacent to operational areas to review the correct personnel to liaise with for Beach activity updates and environmental questions or concerns.

4.6.6 Identifying First Nations Groups or Persons

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

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

First Nations groups who reside along the coasts or on islands believe that Sea Country contains the evidence of creation stories, stories about animals, plants, and people, as well as the creation of landscape features such as islands and reefs. Coastal and Islander communities held cultural responsibilities to ensure sea country is cared for and sea country was managed very carefully. Contemporary First Nations groups including Registered Aboriginal Parties and Native Title Body Corporates are playing an increasingly important role in the management of this Sea Country, through formalised roles and programs with that work alongside various State and Commonwealth government departments or agencies.

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

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

Given these Sea Country values and sensitivities, there is the potential for some First Nations groups and peoples to be considered 'Relevant Persons' in relation to the proposed activities set out in this EP. Beach understands the interconnectedness of Sea Country, along with the importance of respectful and effective consultation with Registered Aboriginal Parties and Registered Native Title Body Corporates. Given this knowledge, Beach's method of identifying potential First Nations Peoples that may be Relevant Persons included:

- Assessed the total values and sensitivities of the physical environment that may be affected by the planned and unplanned activities in the EP, including the spatial extent of the activities.

- Carried out desktop research to identify any published Sea Country, Healthy Country research or Management plans that may identify any culturally significant landscapes, totem species, marine and avian, that may be considered a cultural value or sensitivity relevant to the activities.
- Beach continues to recognise the importance of sea country and researched opportunities to uplift our knowledge of sea country and submerged cultural heritage and to connect further and develop relationships with First Nations groups and leading regulatory bodies, scholars and marine archaeologists.
  - National Sea Country Summit November 2023 in Darwin.
  - Underwater Cultural Heritage Conference 13th – 15th September 2023 in Canberra.
- Understanding and respecting that First Nations Peoples are protective of their cultural sensitivities, and therefore such information may not be published, further research was undertaken to identify First Nations Peoples organisations and persons including:
  - Using the National Native Title database to identify any Native title claims or determinations in the area adjacent to our activities.
  - Using the Victorian Aboriginal Heritage Council online map to identify and Recognised Aboriginal parties in Victoria.
  - Researched the Prescribed Bodies Corporate, Registered Aboriginal Parties, Native Title holders and claimants. This research focussed on Victoria and northern Tasmania given the nature and scale of the planned and unplanned Activities, including the spatial extent of the planning area in the EP.
  - Consulted with First Nations Peoples Legal Research Service to seek their advice on identifying First Nations Relevant Persons.
  - Consulted with First Peoples State relations to seek their advice on our relevant person methodology and identify any additional community groups or individual who may be considered relevant.
  - Consulted with Melbourne Local Aboriginal Networks to identify any individuals not aligned with the Prescribed Body Corporates to self-identify.
  - Consulted with Department of Premier and Cabinet Tasmania to identify any additional First Nations corporations, individuals, or groups.
  - Consulted with Tasmanian Aboriginal Heritage Council to identify any additional First Nations groups/individuals or corporations that may be relevant.
  - Consulted with local Council authorities on King Island to identify additional First Nations residents who may be considered a relevant person.
  - Consulted with NSW Department of Aboriginal Affairs to identify relevant First Nations groups.

- Researched Native title bodies, Heritage representatives and land councils in New South Wales.
- Visit the local government authority websites (the shire or municipal council) who often include an acknowledgement of the local traditional owners.
- Review of Commonwealth, State Marine Park Management Plans, or Indigenous Protected Areas (IPAs) that overlap the planning area which may identify Traditional Custodians or representative bodies to contact regarding Seas Country and any cultural values.
- Asked each First Nations group or person consulted if they could identify any other potentially Relevant Persons (organisations or people) who may wish to be consulted, alternatively if they did not want to identify them to us, we requested they share our project information to them.
- Advertised in the Koori Mail and National Indigenous Times newspapers to invite consultation with any persons who may have a function, interest or activity that may be affected by the activities set out in the EP. This additional step was undertaken to provide an opportunity for any person's unknowable to Beach, notwithstanding the relevant person identification steps undertaken.
- Completed a broad-based online keyword search using: Deakin University Library; Google; Google Scholar; LinkedIn; Facebook; TikTok; and Instagram to identify potential additional relevant persons or organisations using the following search terms:
    - Searched terms relating to potential cultural values and sensitivities including Sea Country; Saltwater Country; cultural sea country; cultural sea values; cultural values; totems; Sea Country Totems; submerged cultural heritage and landscapes; paleo landscapes; songlines; whales; whale songlines; dream time; deep time; dreaming.
    - Combined above terms with indigenous terms: First Nations; Aboriginal; Indigenous; Aboriginal newsletters; Aboriginal news.
    - Combined above terms with industry related terms: gas; offshore gas; fossil fuels; offshore energy.
    - Combined above terms with place-based search terms of: New South Wales, Yuin people, South Coast, Victoria; Tasmania; Warrnambool; Peterborough; Port Campbell; Port Fairy; Flinders Island, and King Island.
- Investigated and monitored media articles identified in the above searches for further relevant persons.
- Investigated LinkedIn pages for connections associated with identified First nations groups.

The land and sea country adjacent to the Otway Basin Drilling and P&A Operational Area and most of the Planning Area is the traditional lands of the Eastern Maar peoples. The Eastern Maar Aboriginal Corporation (EMAC) manages native title rights for the Eastern Maar Peoples. EMAC is a Recognised Native Title Body Corporation and holds native title rights for the sea and landscape features that hold dreamtime and creation stories, such as offshore islands and different marine and avian species that hold deep connections to lore and represent spiritual emblems.

The land and sea country north of the Bass Operational Area and Planning Area, is the Bunurong Land Council Aboriginal Corporation. Bunurong are the Registered Aboriginal Party whom under the Victorian Aboriginal Heritage Act (2006) are recognised as the primary guardians, keepers and knowledge holders of Aboriginal Cultural Heritage and are the primary source of advice and knowledge on matters relating to Aboriginal places or Aboriginal objects within their registered region.

Beach have also identified other First Nations groups who may have an interest in the Drilling Program based on a worst-case scenario of an incident in the Planning Areas. They include:

- Wadawurrung Traditional Owners Corporation
- Gunditj Mirring Traditional Owners Aboriginal Corporation
- Gunaikurnai Land and Waters Aboriginal Corporation
- Aboriginal Land Council Tasmania
- Tasmanian Aboriginal Centre
- Flinders Island Aboriginal Association Inc
- Circular Head Aboriginal Corporation.
- Yuin Nation which is represented by the following local Aboriginal land councils:
    - Eden
    - Bega
    - Merrimans
    - Wagonga
    - Bodalla

Beach Energy’s First Nations Engagement Manager has undertaken extensive research and engagement with Victorian and Tasmanian State Government agencies and other First Nations groups to identify potentially relevant persons. Beach’s methodology for identifying First Nations groups has been endorsed by First Peoples State Relations Victoria and Aboriginal Heritage Council Victoria.

4.6.7 Identifying Commercial Fishers

The commercial fishing sector is a primary category of relevant person due to the potential displacement impacts of the activities in this EP. Beach has an extensive commercial fisher database and long-term positive relationships with peak commercial fishing associations and many individual fishers. Notwithstanding these existing relationships, given the spatial extent of the activities in this EP and the full scope of the proposed OGV Project activities, Beach has undertaken a comprehensive review of its commercial fisher relevant persons. Steps have included:

- Identified and mapped designated State and Commonwealth fishery areas that may operate in the Operational and Planning areas.
- Reviewed Australian Fisheries Management Authority website to verify relevant fishery associations and contact details.
- Reviewed State based fishery authorities for any relevant fishery associations and contact details.
- Reviewed BeachConnect database to verify relevant fishery associations, pertaining to the types of fisheries that may operate in the Operational and Planning areas.
- Requested fishing data from VFA, Fishing Tasmania (formerly DPIPWE) and AFMA to verify fishing effort within designated fisheries in the operational area, in order to seek consultation with relevant fishing associations and commercial fishers.
- Commissioned South East Trawl Fishing Association (SETFIA) who represent Commonwealth South East Trawl Sector; Scalefish Hook Sector; Shark Hook, Shark Gillnet Sectors; small pelagic fishery to draft a comprehensive fishing assessment across both state and commonwealth waters. Reviewed report for any new fishing sectors identified. Report confirmed Beach stakeholder database is current. The SETFIA Commercial Fishing Data report is included in Appendix B.
- Engaged Seafood Industry Victoria (SIV) who represent all State licenced commercial fishers to contact their members to share Beach's OGV Project and Drilling and P&A information sheets to members and inquire if they have any questions or concerns about the activities based on their fishing operations. Formalised service agreement with SIV regarding consultation with SIV leadership and members.
- Engaged SETFIA to request their support in contacting their members, share Beach's OGV Project and Drilling and P&A information sheets, and inquire if they have any questions or concerns about the activities based on their fishing operations.
- Engaged Tuna Australia to contact their members to share Beach's OGV Project and Drilling and P&A information sheets to members and inquire if they have any questions or concerns about the activities based on their fishing operations. Formalised service agreement with Tuna Australia regarding consultation with Tuna Australia leadership and members.
- Reviewed Fisheries Research and Development Corporation website for potentially relevant persons.
- Contacted South Australian Department of Primary Industries and Regions – Commercial Fishing for assistance with identifying relevant commercial fishers.
- Contacted NSW Department of Primary Industries – Fisheries for assistance with identifying relevant commercial fishers.

4.7 Relevant Persons Identified

4.7.1 List of Relevant Authorities – 25(1)(a), (b), (c)

Organisation Name	Roles and Responsibilities
1a Department or Agency of the Commonwealth	
Australian Fisheries Management Authority	The Australian Fisheries Management Authority (AFMA) is responsible for the implementation of Commonwealth fisheries policy. In managing Commonwealth fisheries, AFMA pursues objectives as outlined in the Fisheries Management Act 1991, Fisheries Administration Act 1991 and Torres Strait Fisheries Act 1984. In managing Consultation with Commonwealth agencies Guideline National Offshore Petroleum Safety and Environmental Management Authority N-04750-GL1887 A705589 20/01/2023 Page 14 of 19 Commonwealth fisheries, AFMA applies the principles of ecologically sustainable development and complies with the relevant sections of the EPBC Act. AFMA manages Commonwealth fisheries in consultation with the fishing industry and other user groups, such as those that represent traditional fishing, recreational fishing and the environmental non-government organisations. These management processes are used to implement controls, such as limits on catch or effort levels, and regulations of fishing methods in order to manage Australia's fisheries in a sustainable way. AFMA ensures that any broad-scale impacts of offshore petroleum industry development on commercial fishing in Commonwealth waters are considered in decision making by the Department of Industry, Science and Resources. AFMA provides comment on the annual offshore petroleum exploration acreage release prior to their release (this information is made available to operators as part of the release area notices).
Australian Maritime Safety Authority - Joint Rescue Coordination Centre	The Australian Maritime Safety Authority (AMSA) is a statutory authority, and its principal functions are to: • promote maritime safety and protection of the marine environment. • prevent and combating ship-sourced pollution in the marine environment. • provide infrastructure to support safe navigation in Australian waters. • provide a national search and rescue service to the maritime and aviation sectors. AMSA delivers a range of navigational services, primarily aimed at the levy-paying commercial shipping industry. These services provide ships with the ability to navigate safely around Australia's coastline and to and from its ports. AMSA also implements and enforces a range of legislation relevant to the Commonwealth marine area which gives effect to Australia's obligations under various international treaties and conventions
Department of Agriculture, Fisheries and Forestry – Fisheries, Biosecurity and Marine Pests	The Department of Agriculture, Fisheries and Forestry (DAFF) has primary policy responsibility for promoting the biological, economic and social sustainability of Australian fisheries. DAFF provides policy advice to the Australian Government on a range of economic and environmental fisheries issues, including the conservation of marine ecosystems and biodiversity that support commercially valuable fisheries resources.

Organisation Name	Roles and Responsibilities
	DAFF has primary policy and regulatory responsibility for managing marine pest biosecurity through administering the Biosecurity Act. DAFF's principal functions with respect to marine pest biosecurity are to: • reduce the likelihood of the entry and establishment of exotic marine pests; • provide national leadership in the response to new marine pest incursions and in the management of established marine pests, in cooperation with state and territory governments, and with industry stakeholders; • represent Australia's interests in the establishment of international guidelines and conventions relating to marine pests.
Department of Climate Change, Energy, the Environment and Water -Oceans	The Department of Climate Change, Energy, the Environment and Water (DCCEEW) administers the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act), the Underwater Cultural Heritage Act 2018 and the Environment Protection (Sea Dumping) Act 1981 all of which have some application in the Commonwealth marine area.
Department of Defence - Australian Hydrographic Office	Department of Defence agency responsible for the publication and distribution of nautical charts and other information require for the safety of ships navigating in Australian waters. The AHO issues fortnightly Notices to Mariners for relevant nautical products.
Department of Defence - Infrastructure Division, Defence Support & Reform Group	Manages the development, maintenance and disposal of the Defence estate, including unexploded ordinance (UXO).
Department of Industry, Science and Resources	Responsibilities include offshore oil and gas development and safety, and greenhouse gas storage.
Director of National Parks	The Director of National Parks (DNP) is the statutory authority responsible for administration, management and control of Australian marine parks (AMPs). Under the EPBC Act and subordinate regulations, a range of activities undertaken in an AMP requires approval from the DNP. Petroleum and greenhouse gas activities undertaken in an AMP are assessed by NOPSEMA in accordance with the NOPSEMA EPBC Act Program. Additional assessment by the DNP is therefore not necessary as the NOPSEMA EPBC Act Program considers impacts on marine reserve values. The DNP has authorised offshore petroleum and greenhouse gas exploration activities to occur in certain marine park zones (ICUN VI) by issuing class approvals. The class approvals require that titleholders have an accepted EP and operate in accordance with the EP for the allowable activities accepted by NOPSEMA. Additional assessment by the DNP is not necessary if the activity is authorised by a class approval. For details about the locations of AMPs and the class approvals see: parksaustralia.gov.au/marine. NOPSEMA has published guidance in consultation with the DNP and Parks Australia that outlines key considerations during the preparation of EP submissions for activities that are within or have the potential to impact on the values of an AMP.
Indigenous Land and Sea Corporation	Statutory authority providing assistance for acquiring and managing rights and interests in land, salt water and freshwater country.

Organisation Name	Roles and Responsibilities
National Native Title Tribunal	Commonwealth government authority responsible for administering the native Title Act 1993 (Cth) across multiple functions including reviews, meditations and determinations for: Native title applications, and Indigenous land use agreements (ILUAs)
1b Department or Agency of a State	
Aboriginal Heritage Tasmania	Aboriginal Heritage Tasmania aims to protect and promote Tasmania's unique Aboriginal heritage and facilitate the return of land to Tasmania's Aboriginal people. Aboriginal Heritage Tasmania administers the *Aboriginal Heritage Act 1975*, which establishes the Aboriginal Heritage Council of Tasmania, the *Aboriginal Lands Act 1995*, which establishes the Aboriginal Land Council of Tasmania, and the *Native Title (Tasmania) Act 1994*.
Corangamite Catchment Management Authority	Responsibilities include the protection of estuaries on the southern coast Princetown and Anglesea.
Department of Energy, Environment and Climate Action - Marine &Coasts	Protecting and enhancing our coastline and its waters to support business, tourism, recreation, wellbeing and biodiversity.
Department of Energy, Environment and Climate Action: EarthResources 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.
Department of Infrastructure and Transport - Marine Safety SA	Department taking care of boat and marine safety in South Australian Ocean and inland waters.
Department of Natural Resources and Environment Tasmania -Biosecurity	Working to prevent pests and diseases that could cause serious impacts if introduced to Tasmanian waters.
Department of Natural Resources and Environment Tasmania -Conservation	The Conservation Assessment Team provide advice and comment to a range of key regulators and stakeholders on development activities that have the potential to impact on natural values.
Department of Natural Resources and Environment Tasmania -Marine/Fisheries (Fishing Tasmania)	Responsible for commercial and recreational fishing and the protection of the ocean and marine life and Fishing Tasmania.
Department of Natural Resources and Environment Tasmania -Strategic Projects and Policy	Responsible for policy.
Department of Natural Resources and Environment Tasmania -Tasmania Parks and Wildlife Services	Responsible for managing the State's marine reserves and Tasmanian Wilderness World Heritage site.

Organisation Name	Roles and Responsibilities
Department of Premier and Cabinet - Office of Aboriginal Affairs -(Tasmania)	Tasmanian Aboriginal people of Lutruwita/Tasmania have had a deep connection to Country for over 40,000 years. We acknowledge with respect the deep history of Aboriginal peoples continuous connection to Country, Waterways, Sea and Sky Country. With respect we acknowledge and honour Elders, past and present and their knowledges that have been handed down through the generations. We acknowledge Tasmanian Aboriginal people that share cultural knowledges and practices keeping culture and heritage alive. The Office of Aboriginal Affairs is one part of the new Aboriginal Affairs Partnership Division, which sits in the Division of Communities, Partnerships and Priorities within the Department of Premier and Cabinet. The Office of Aboriginal Affairs is the touch point, providing high-level consultation with Tasmania's Aboriginal people, organisations, and adviser to the Government on policy issues and impacts affecting Aboriginal people of Tasmania. The Office of Aboriginal Affairs team is a dedicated group of people that support and respect the aspirations and goals of Tasmanian Aboriginal people. The team works with Aboriginal people, organisations, and government to better understand and to deliver their policies and programs effectively in an Aboriginal way. The Government is committed to improving the lives of Aboriginal people through the National Agreement on Closing the Gap the Tasmanian Implementation Plan and the Truth-Telling and Treaty further resetting the relationship further with the Tasmanian Aboriginal people. The role of Office of Aboriginal Affairs is to foster exchange between Aboriginal people and the Government of Tasmania to advise the Minister for Aboriginal Affairs and Cabinet on issues impacting Aboriginal people. In partnership with Aboriginal community-controlled organisations and Aboriginal people lead whole of Government and cross-sectoral change to achieve real outcomes for Aboriginal people in Tasmania.
Department of Primary Industries and Regions South Australia -Commercial Fishing	Responsible for protecting aquatic environments, licensing and registration of fisheries and fish processors, fisheries management plans, scientific research and innovation and increasing trade and investment in conjunction with industry.
Department of Transport and Planning: Marine Pollution	Ensures Victoria is adequately prepared for and effectively responds to a marine pollution incident in State coastal waters up to three nautical miles (3 nm) offshore.
Environment Protection Authority (EPA) - South Australia	Protects, restores, and enhances the environment through risk-based regulation of pollution, waste, noise and radiation.
Environment Protection Authority (EPA) Tasmania	Control Agency for a Level 1 / 2 / 3 Pollution emergency in Tasmanian waters.
Environment Protection Authority (EPA) Victoria	Independent statutory authority responsible for regulating Victorian Environment Protection legislation. Focussed on onshore activities, not offshore.

Organisation Name	Roles and Responsibilities
First Peoples - State Relations (Victoria)	Group within the Department of Premier and Cabinet, responsible for nation-leading work in the areas of cultural rights, self- determination, treaty, and truth – an extensive program of priority work with First Peoples. Stated purpose is "Strengthening and engaging communities and managing and protecting cultural heritage".
Heritage Victoria	Protection of maritime heritage / shipwrecks/submerged cultural heritage
Marine and Safety Tasmania	Marine and Safety Tasmania (MAST) is a statutory authority responsible for the safe operation of vessels, provide and manage marine facilities and manage environmental issues relating to vessels.
NSW Department of Primary Industries – Commercial Fishing NSW Advisory Council	Responsible for viability of NSW commercial fishing industry.
NSW Department of Primary Industries – Marine Parks	Statutory Authority responsible for management of Marine Protected Areas, Marine National Parks, Marine Sanctuaries, Marine and Coastal Parks, Marine Parks, and Marine Reserves.
NSW National Parks & Wildlife Service	Statutory Authority responsible for 895 protected areas in NSW.
Office of the Minister for Environment	Advises the Victorian Cabinet on matters relating to environment protection.
Parks Victoria	Statutory Authority responsible for management of Marine Protected Areas, Marine National Parks, Marine Sanctuaries, Marine and Coastal Parks, Marine Parks and Marine Reserves.
Port Authority NSW	Port Authority of New South Wales (Port Authority) manages the navigation, security and operational safety needs of commercial shipping in New South Wales
Transport for NSW	Responsible for emergency response in NSW coastal waters
Transport Safety Victoria - Maritime Safety Victoria	Management of marine safety in Victoria. Relevant in relation to fishers entering PSZ.
Victorian Fisheries Authority	Independent statutory authority established to effectively manage Victoria's fisheries resources.
1c Department of the Responsible State Minister	
Department of Energy, Environment and Climate Action	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.
Department of State Growth - Mineral Resources Tasmania	Regulatory body for oil and gas activities in Tasmania waters. Required to be notified of reportable incidents. Commencement and cessation notifications are only required for drilling and seismic surveys.

4.7.2 List of Relevant Persons – 25(1)(d)

Organisation Name	Type	Functions, Interests or Activities
Name withheld	Commercial Fishing	Commercial fisher.
Atlantis Fisheries Consulting Group	Commercial Fishing	Consulting services to encourage and promote sustainable fishing practices to the commercial fishing industry within Australia.
Australian Southern Bluefin Tuna Industry Association	Commercial Fishing	Peak body representing Southern Bluefin Tuna companies in Australia. The SBTF overlaps the operational area.
Australian Wildcatch Fishing (Corporate Alliance Enterprises)	Commercial Fishing	SESS Fisher.
Bass Strait Scallop Industry Association	Commercial Fishing	No information can be found in relation to the Bass Strait Scallop Industry Association other than it is referenced in the Bass Strait Central Zone Scallop Fishery Management Arrangements Booklet 2019.
Bermagui Fishermen's Co-op	Commercial Fishing	Commercial fisher south-east NSW.
Commonwealth Fisheries Association	Commercial Fishing	Peak incorporated association representing associations for the following Commonwealth fisheries that have catch effort within the Planning Area: SESS (Commonwealth South East Trawl Sector, Scalefish Hook Sector and the Shark Hook and Shark Gillnet Sectors). Southern Squid Jig Fishery.
Coorong Wild Seafood	Commercial Fishing	Fisher and processor based in Port MacDonnell that fishes in local waters for Southern Rock Lobster, Ocean Jacket, Southern Bluefin Tuna, Bight Redfish, Flathead, Boarfish, John Latchet, Knifejaw and Yellowtail Kingfish. Also operates Coorong Wildside Tours.
Ferguson Australia	Commercial Fishing	Fisher and processor based in Port MacDonnell that fishes in local waters for Southern Rock Lobster, Ocean Jacket, Southern Bluefin Tuna, Bight Redfish, Flathead, Boarfish, John Dory, Latchet, Knifejaw and Yellowtail Kingfish.
Fisheries Direct Pty Ltd	Commercial Fishing	Fisheries management consulting services as well as fresh local seafood from Port Welshpool and Tasmania.
Fishwell Consulting	Commercial Fishing	Research advice and consulting services to encourage and promote sustainable fishing practices to the commercial fishing industry within Australia. General interest in Beach activities and service provider to Beach.
Hursey Seafoods	Commercial Fishing	Tasmania commercial fisher – wholesale and restaurant.
King Island Seafoods	Commercial Fishing	Wholesale lobster seller.
Lakes Entrance Fishermen's Co-operative	Commercial Fishing	Lakes Entrance is situated in the most strategic position of the very large South East trawl area of Australia, which stretches from the Victorian/South Australia border around to the Northern New South Wales and includes Tasmania.

Organisation Name	Type	Functions, Interests or Activities
Name withheld	Commercial Fishing	Fishing charter fishing in Portland and Port Phillip Bay.
MacTaggart Marine	Commercial Fishing	Lobster fisher based in Apollo Bay.
Muollo Fishing	Commercial Fishing	SESS Fisher.
Mures Fishing	Commercial Fishing	SESS Fisher.
Petuna Sealord Deepwater Fishing Pty Ltd	Commercial Fishing	SESS Fisher.
RHG Fisheries	Commercial Fishing	SESS Fisher.
Richey Fishing Company	Commercial Fishing	Commercial scallop, salmon and squid fisher and marine charter service.
Scallop Fishermen's Association of Tasmania Inc	Commercial Fishing	The Scallop Fishermen's Association of Tasmania actively promotes and protects the best interests of scallop fishermen and processors and negotiates management and season arrangements with the Tasmanian government, DPIPWE and AFMA.
Seafood Industry Australia	Commercial Fishing	The national peak-body representing members from the wildcatch, aquaculture and post-harvest sectors of the Australian seafood industry.
South East Trawl Fishing Industry Association	Commercial Fishing	Incorporated association representing commercial fishers in: Commonwealth South East Trawl Sector; Scalefish Hook Sector; Shark Hook, Shark Gillnet Sectors; small pelagic fishery.
Southern Fishermen's Association Inc.	Commercial Fishing	Represents the interests of Lakes and Coorong commercial fishers and is pro-active in promoting improved environmental management practices in the fishery across a number of areas.
Southern Shark Industry Alliance (SSIA)	Commercial Fishing	Incorporated association with members from the Southern and Eastern Scalefish and Shark Fishery, Gillnet Hook and Trap.
Strait off the Boat	Commercial Fishing	Commercial fisher in Bass Strait out of Devonport.
Sustainable Shark Fishing Association	Commercial Fishing	Represents fishers in the Southern and Eastern Scalefish and Shark Fishery (SESS), Gillnet Hook and Trap fisheries.
Tasmania Salmonid Growers Association	Commercial Fishing	Tasmania’s peak body representing salmon growers.
Tasmanian Abalone Council Ltd	Commercial Fishing	Peak industry body representing divers, processors and quota holders.
Tasmanian Rock Lobster Fisherman's Association	Commercial Fishing	Peak body representing licenced Tasmanian rock lobster fishers.
Tasmanian Seafood Industry Council	Commercial Fishing	Peak body representing the interests of wild capture fishers, marine farmers and seafood processors in Tasmania.
Tasmanian Seafoods	Commercial Fishing	Fishes for wild abalone, sea cucumber and other seafoods from around the whole of Tasmania, the south coast of Victoria and Western Australia.

Organisation Name	Type	Functions, Interests or Activities
Top Fish Tasmania	Commercial Fishing	Tasmania's only state licenced octopus business, fishing in CWLTH and TAS waters. Also, fish lobster and giant crab. Have processing facility in Stanley for value adding to octopus for packaged products. Family run business.
Tassal	Commercial Fishing	Salmon fisher with presence in Strahan, West Tasmania.
Toberfish	Commercial Fishing	Portland based Southern & Eastern Scalefish and Shark fisher.
Top Fish Tasmania	Commercial Fishing	Tasmania's only state licenced octopus business, fishing in CWLTH and TAS waters. Also, fish lobster and giant crab. Have processing facility in Stanley for value adding to octopus for packaged products. Family run business.
Tuna Australia	Commercial Fishing	Represents statutory fishing rights for owners, holders, fish processors and sellers, and is an associate member of the Eastern and Western tuna and billfish fisheries.
Name withheld	Commercial Fishing	Commercial fisher.
Name withheld	Commercial Fishing	Commercial octopus fisher
Name withheld	Commercial Fishing	Warrnambool based lobster fisher.
Name withheld	Commercial Fishing	Rock lobster fisher based in Portland.
Name withheld	Commercial Fishing	Southern Squid fisher.
Name withheld	Commercial Fishing	Rock lobster fisher active in the Portland area.
Name withheld	Commercial Fishing	Shark and seine fisher based in San Remo.
Name withheld	Commercial Fishing	Port Fairy cray fisher who sells directly to the public. Co-owns 'Off the Boat', selling direct to the public.
Name withheld	Commercial Fishing	Lobster fisher based in Apollo Bay
Name withheld	Commercial Fishing	Rock lobster fisher based in Warrnambool.
Paaratte Eel Company	Commercial Fishing	Eel fisher licensed to operate in the Curdies River, Curdies Inlet and Gellibrand River.
Name withheld	Commercial Fishing	Lobster fisher based in Port Fairy.
Name withheld	Commercial Fishing	Abalone and shark fisher off Portland.
Port Campbell Lobster	Commercial Fishing	Southern Victorian lobster fisher who sells direct to the public.
Port Campbell Professional Fisherman's Association	Commercial Fishing	Representing primarily lobster fishers in Port Campbell and Peterborough. Engage via SIV.
Name withheld	Commercial Fishing	Lobster fisher based in Portland.
Name withheld	Commercial Fishing	Port Fairy home port. Fishes Rock Lobster in Apollo Bay region. Fishes shark long line in Western Zone.

Organisation Name	Type	Functions, Interests or Activities
Name withheld	Commercial Fishing	Rock lobster fisherman and member of Apollo Bay Fisherman's Co-Op.
San Remo Fishing Co-operative	Commercial Fishing	Philip island and Bass Strait fishing co-op
Seafood Industry Victoria	Commercial Fishing	Peak body representing professional fishing, seafood processors and exporters in Victoria. SIV primary contact for State fishers. Prefers to and can engage all licence holders rather than direct contact by Beach.
South Australian Rock Lobster Advisory Council and South Eastern Professional Fishermen's Association	Commercial Fishing	Promotes the South Australian Rock Lobster Industry, with strong links to the South Eastern Professional Fishermen's Association Inc in the Southern Zone Fishery and also the SA Northern Zone Rock Lobster Fishermen's Association Inc in the Northern Zone Fishery. SARLAC is a major stakeholder in Southern Rock Lobster Limited; the national industry body across all of Southern Australia encompassing the relevant fisheries in South Australia, Tasmania, and Victoria.
South Coast Fish Processors	Commercial Fishing	Commercial fisher south-east NSW
South Coast Mariculture	Commercial Fishing	Developing marine leases in Eden.
Southern Rock Lobster Limited	Commercial Fishing	Administers an industry wide levy that funds research, development, and innovation in Australia's Southern rock lobster fishery, underpinning the sustainable harvest of lobsters from the Southern Ocean.
Name withheld	Commercial Fishing	Declared that they fish in the area.
Name withheld	Commercial Fishing	Lobster fisher based in Portland.
Trinsand Fisheries	Commercial Fishing	Squid jig fishing, scallop fishing (in Bass Strait)
Victorian Scallop Fishermen's Association	Commercial Fishing	Represents the interests of scallop fishers operating within the Bass Strait Central Zone Scallop Fishery, the Victorian Scallop Fishery, and the Tasmanian Scallop Fishery.
Warrnambool Professional Fishermen's Association	Commercial Fishing	Members mainly fish for Rock Lobster between Port Fairy and Port Campbell.
Name withheld	Commercial Fishing	Fishes around the Thylacine platform. Commercial Rock Lobster and crab fisher.
Wild Life Fisheries	Commercial Fishing	Based in Rye, Mornington Peninsula. Dive and fish in Port Phillip Bay and Bass Strait. Sea urchin, abalone and line caught fish.
Women in Seafood Australasia	Commercial Fishing	Women in Seafood Australasia (WISA) is the only national organisation representing women working in the seafood industry.
Name withheld	Commercial Fishing	Based in Port MacDonnell. Fishes lobster in Victorian waters from Portland to Cape Otway. Fishes giant crab near King Island.
Aboriginal Land Council of Tasmania	Indigenous	The statutory body established under Tasmanian law to own and manage land on behalf of Tasmania's Aboriginal Community.

Organisation Name	Type	Functions, Interests or Activities
Bega Local Aboriginal Land Council	Indigenous	NSW Aboriginal Land Council
Bodalla Local Aboriginal Land Council	Indigenous	NSW Aboriginal Land Council
Boon Wurrung Foundation	Indigenous	Represents the traditional people and custodians of the lands from the Werribee River to Wilson Promontory, proud members of the Kulin People – the Boonwurrung and Woi wurrung, Dja dja warrung, Wadawurrung, Taungurung (not coast).
Bunurong Land Council Aboriginal Corporation	Indigenous	Registered Aboriginal Party for an on behalf of the Bunurong People, with lands and waters across greater Melbourne, Mornington Peninsula, and the Bass Coast.
Burrandies Aboriginal Corporation	Indigenous	Burrandies Aboriginal Corporation has been serving the Indigenous Community of the South East of South Australia since 1999. Having a strong connection with local community members and a team that is committed to ensuring that every Indigenous person has the opportunity to reach their potential to participate in the workforce with dignity and pride.
Circular Head Aboriginal Corporation	Indigenous	CHAC is governed by the Corporations Aboriginal and Torres Strait Islander (CATSI) Act. As a registered Aboriginal organisation, CHAC is regulated by the Office of the Registrar of Indigenous Corporations (ORIC) as per the CATSI Act.
Eastern Maar Aboriginal Corporation	Indigenous	Registered Aboriginal Party. Native Title Holders along with Gunditj Mirring Traditional Owners Aboriginal Corporation. Eastern Maar Traditional Owner Settlement Agreement claim area includes Sea Country adjacent the project Planning area. Interests include the protection of Sea Country. However formal Sea Country management activities, alongside government agencies do not currently exist in the Planning Area.
Eden Local Aboriginal Land Council	Indigenous	NSW Aboriginal Land Council
First Nations Legal & Research Services Ltd	Indigenous	Native Title Service Provider for Victorian Traditional Owners.
First Peoples Assembly of Victoria	Indigenous	Independent and democratically elected body to represent Traditional Owners and Aboriginal and Torres Strait Islanders in Victoria.
Flinders Island Aboriginal Association Inc	Indigenous	An Aboriginal Community Controlled Organisation. Established in 1971 by a local Aboriginal group, FIAAI is governed by an Aboriginal Board of Management, elected by the local community.
Gunaikurnai Land and Waters Aboriginal Corporation	Indigenous	Recognition and settlement agreement under the Traditional Owner Settlement Act Victoria that does not require recognition or extinguishment of native title under the Native Title Act 1993 (Cth) but provides for the State's recognition of a group of people as the traditional owners for a particular area together with other benefits.
Gunditj Mirring Traditional Owners Aboriginal Corporation	Indigenous	Registered Aboriginal Party. Native Title Holders with Eastern Maar Aboriginal Corporation.
Land and Sea Aboriginal Corporation Tasmania	Indigenous	Land and Sea Aboriginal Corporation Tasmania

Organisation Name	Type	Functions, Interests or Activities
Melythina Tiakana Warrana Aboriginal Corporation	Indigenous	MTWAC is a registered Aboriginal organisation with the Office of the Registrar of Indigenous Corporations (ORIC), under the Corporations (Aboriginal and Torres Strait Islander) Act 2006 (CATSI Act).
Merrimans Local Aboriginal Land Council	Indigenous	NSW Aboriginal Land Council
NSW Aboriginal Land Council	Indigenous	NSW Aboriginal Land Council
Tasmanian Aboriginal Centre	Indigenous	Represents the political and community development aspirations of the Tasmanian Aboriginal community.
Wadawurrung Traditional Owners Aboriginal Corporation	Indigenous	Registered Aboriginal Party for Wadawurrung country ranging from Aireys Inlet to Werribee South.
Wagonga Local Aboriginal Council	Indigenous	NSW Aboriginal Land Council
Name withheld	Indigenous	A Gunditjmara woman, who is part of the Southern Ocean Protection Embassy Collective, led by Gunditjmara Elders and Mob in Protection of The Southern Ocean and Gunditjmara Sea Country.
Aventus Consulting	Business	Aventus specialises in providing environmental, safety and well integrity approvals and advice, auditing to the upstream petroleum and broader energy industry, covering all onshore and offshore activities.
Coastal Planning	Business	Specialises in VCAT appeals, development applications, subdivision applications, strategic planning, panel hearing submissions and general statutory planning advice. Services the Great Ocean Road and Otways.
ConocoPhillips	Business	Oil and Gas industry in offshore Otway Basin.
Cooper Energy	Business	Oil and Gas industry in offshore Otway Basin.
Esso	Business	Oil and Gas industry in offshore Bass Basin.
Schlumberger Australia Pty Ltd	Business	Seismic survey operations, may occur in Otway Basin
TGS (previously Spectrum Geo)	Business	Seismic survey operations, may occur in Otway Basin
Apollo Bay Chamber of Commerce	Business	Partners with local businesses to do better business and promote the local area through events and promotion.
King Island Chamber of Commerce	Business	Supporting local businesses, with the ability to share information to members.
King Island Regional Development Organisation	Business	Supports the development of lifestyle, employment, tourism, and events on King Island.
Savour King Island	Business	Organises the Festival of King Island.
Seamaster Fishing Supplies	Business	Business supplying commercial fishing equipment in Devonport, Tasmania.
Port Campbell Progress Association	Business	Volunteer group with a focus on local business, sustainable development, and new initiatives.

Organisation Name	Type	Functions, Interests or Activities
Twelve Apostles Tourism and Business Group	Business	A membership-based organisation that provides leadership for the development and facilitation of local tourism and business initiatives.
Watersure, Victorian Desalination Plant	Business	Operator of desalination plant providing quality drinking water to the Victorian community.
Apollo Bay Landcare	Environmental Conservation Groups	The group has a strong focus on local environmental issues such as monitoring the nests of the endangered Hooded Plover.
Australian Coastal Society - Victorian Chapter	Environmental Conservation Groups	Contributes to a number of coastal and marine policy reforms happening in Victoria via working groups and submissions.
Australian Conservation Alliance	Environmental Conservation Groups	The Australian Conservation Alliance (ACA) is an organisation comprised of young professionals who advocate for and advance ambitious market-based climate law and policy.
Australian Conservation Foundation	Environmental Conservation Groups	The ACF brings people together to have the biggest possible impact for nature and climate solutions. Advocate against drilling and fracking for gas that could destroy sacred sites.
Australian Marine Conservation Society	Environmental Conservation Groups	Scientists working with research centres around the globe and conservation experts safeguarding the future of Australian oceans.
Beach Patrol 3280	Environmental Conservation Groups	A volunteer organisation keeping Warrnambool's beaches clean of washed-up plastic and rubbish.
Beyond Gas Network	Environmental Conservation Groups	The Beyond Gas Network is a volunteer network of grassroots climate action network. Focus on educating community about the scale and impact of expansion plans proposed by the gas industry to encourage lobbying of state and federal government.
Environment Tasmania	Environmental Conservation Groups	Work with communities on campaigns and initiatives to protect Tasmania's natural environment.
Environment Victoria	Environmental Conservation Groups	Independent charity funded by donations. A community of 40 grassroots member groups and over 200,000 supporters. Campaigning to solve the climate crisis and build a thriving, sustainable society that protects and values nature.
Fight for the Bight	Environmental Conservation Groups	Goal is to protect the Great Australian Bight from exploitation by Big Oil
Friends of Bay of Islands Coastal Park	Environmental Conservation Groups	A community group preserving native vegetation, revegetating, and removal of exotic invasive species.
Friends of the Earth - Melbourne Chapter	Environmental Conservation Groups	Currently running a "No more gas" campaign.
Greenpeace	Environmental Conservation Groups	Have a "Breaking free from fossil fuels" campaign.

Organisation Name	Type	Functions, Interests or Activities
International Fund for Animal Welfare	Environmental Conservation Groups	Global non-profit helping animals and people thrive together. Run various programs including marine mammal rescue and research, and marine conservation.
King Island Landcare	Environmental Conservation Groups	Delivers a wide range of environmental/agricultural projects.
Marine Mammal Foundation	Environmental Conservation Groups	Aims to protect the marine environment - for mammals like Southern Right Whales - through research, community engagement, and education. Supported by the Australian Government.
OceanWatch Australia	Environmental Conservation Groups	OceanWatch Australia is a national not-for-profit environmental company that works to advance sustainability in the Australian seafood industry.
Otway Climate Emergency Action Network (OCEAN)	Environmental Conservation Groups	Community group against seismic testing and gas exploration in the Otway Basin.
Port Campbell Community Group	Environmental Conservation Groups	Volunteer group focussed on environment protection of local fauna.
Protect the West	Environmental Conservation Groups	Interested in SW Vic environment issues.
Surfers For Climate	Environmental Conservation Groups	A sea-roots movement dedicated to positive climate action and heads the campaign 'Don't Drill the Otways'.
Surfrider Foundation Australia	Environmental Conservation Groups	Not-for-profit dedicated to the protection of Australia’s waves and beaches through conservation, activism, research, and education.
Victorian National Parks Association	Environmental Conservation Groups	VNPA is an independent, non-profit, membership-based group that protects Victoria’s unique natural environment and biodiversity through the establishment and effective management of national parks, conservation reserves and other measures. Includes marine parks.
Warrnambool Coastcare Landcare Network	Environmental Conservation Groups	Improving biodiversity in Warrnambool and district and an advocate for the protection of the natural environment.
Wilderness Society Tasmania	Environmental Conservation Groups	Interest in environmental impacts. Against any gas development.
Wilderness Society Victoria	Environmental Conservation Groups	Interest in environmental impacts of activities.
Apollo Bay Police and Ocean Rescue	State Government	Apollo Bay Police activates the ocean rescue volunteer group.
MLC, Member for Western Victoria	State Government	Member of the Victorian Parliament, Legislative Council. Electorate includes South West Victoria.
Bass Coast Shire Council	Local Authorities	Local government area located in the south eastern part of the Victoria.

Organisation Name	Type	Functions, Interests or Activities
Bega Valley Shire Council	Local Authorities	Local government area located in south-east NSW (Sapphire Coast).
Burnie City Council	Local Authorities	Local government area in the north-west of Tasmania.
Cardinia Shire Council	Local Authorities	Local government area in the south-east of Melbourne between Western Port and the Yarra Ranges.
Circular Head Council	Local Authorities	A rural local government body in Tasmania covering the far north-west mainland. Major towns and localities include Arthur River, Marrawah and Stanley, with Smithton being the largest and principal town.
City of Port Phillip	Local Authorities	Local government area on the northern shores of Port Phillip.
Colac Otway Shire Council	Local Authorities	Local government area in the Barwon South West region of Victoria. Opposed to seismic testing for oil and gas in the Otway Basin.
Corangamite Shire Council	Local Authorities	Local government area in the Barwon South West region of Victoria.
District Council of Grant	Local Authorities	Local government area in the Limestone Coast region of South Australia,
East Gippsland Catchment Management Authority	Local Authorities	The Authority is one of ten Catchment Management Authorities throughout Victoria established under the Catchment and Land Protection Act 1994 and the Water Act 1988.
East Gippsland Shire Council	Local Authorities	Local government area in Gippsland, Victoria.
Eurobodalla Shire Council	Local Authorities	Local government area located in south-east NSW (Sapphire Coast).
Flinders Council	Local Authorities	Flinders Council includes the communities within the Furneaux Group and the islands of eastern Bass Strait up to the Victorian border, including the Hogans Group and the Deal Island Group.
Gippsland Ports	Local Authorities	Gippsland Ports’ designated waters stretch over 720 kms from Anderson Inlet to Mallacoota on the south-eastern coastline of Victoria at: Mallacoota Inlet, Snowy River (Marlo), Gippsland Corner Inlet and Port Albert, Anderson Inlet (Inverloch) and four waterways: Lake Tyers, Shallow Inlet, Tamboon Inlet and Sydenham Inlet.
Glenelg Hopkins Catchment Management Authority	Local Authorities	The Authority managing inland waterways, as well as the health of estuaries in the region– analysing water levels and quality, and weather conditions for potential closures and re-openings.
Glenelg Shire Council	Local Authorities	Local government area including the towns of Casterton, Heywood, Merino, and Portland.
Great Ocean Road Coast and Parks Authority	Local Authorities	Delivers better protection and management of the iconic coast and parks of Victoria’s Great Ocean Road.
Greater Geelong Council	Local Authorities	Local government area in the Barwon South West region of Victoria.
Huon Valley Council	Local Authorities	Local government area in south-west Tasmania.
King Island Council	Local Authorities	Local government body in Tasmania, encompassing King Island.

Organisation Name	Type	Functions, Interests or Activities
Mornington Peninsula Shire Council	Local Authorities	Local government area in south eastern Metropolitan Melbourne, Victoria.
Moyne Shire Council	Local Authorities	Local government area in the Barwon South West region of Victoria.
Otway Water	Local Authorities	Strong interest in groundwater extraction.
Robe District Council	Local Authorities	Local government area located in the Limestone Coast area of South Australia.
South Gippsland Shire Council	Local Authorities	Local government area in Gippsland.
Surf Coast Shire Council	Local Authorities	Local government area in the Barwon South West region of Victoria. Opposed to oil and gas development in the Otway Basin.
Waratah Wynyard Council	Local Authorities	Waratah-Wynyard north- west Tasmania, includes the coastal towns and villages of Wynyard, Somerset, Boat Harbour and Sisters Beach, the rural town of Yolla and the former mining towns of Waratah and Corinna
Warrnambool City Council	Local Authorities	Services to residential and business rate payers to provide infrastructure and services for economic development, safety, and amenity.
Wattle Range Council	Local Authorities	Local government area located in the Limestone Coast area of South Australia.
Wellington Shire Council	Local Authorities	Local government area in eastern Victoria.
West Coast Council	Local Authorities	Local government area in western Tasmania.
West Gippsland Catchment Authority	Local Authorities	Manage land and water resources in the West Gippsland region
AusOcean	Education and Research Organisations	Australian Ocean Lab (AusOcean) mission is to help our oceans through technology. Develop and apply open-source ocean technology to help solve ocean science and conservation challenges.
Blue Whale Study Inc	Education and Research Organisations	Primary research into the ecology of endangered blue whales in south-east Australia.
Deakin University - School of Life and Environmental Sciences	Education and Research Organisations	Research interests in various environment values and sensitivities and support for further research programs with common interests.
King Island Marine Research	Education and Research Organisations	Lobster breeding - research and development.
Dolphin Research Institute	Education and Research Organisations	DRI's research is focused primarily on the south-eastern region of Victoria, especially Port Phillip, Western Port, and the Gippsland Lakes.
Fisheries Research and Development Corporation	Education and Research Organisations	A co-funded partnership between the Australian Government and the fishing and aquaculture sectors, to plan and invest in fisheries research, development, and extension activities in Australia.

Organisation Name	Type	Functions, Interests or Activities
Institute for Marine and Antarctic Studies, University of Tasmania	Education and Research Organisations	A collaborative research body in marine and Antarctic science between the University of Tasmania, CSIRO Marine and Atmospheric Research, the Australian Antarctic Division and other agencies. Research interests in various environment values and sensitivities and support for further research programs with common interests.
Basslink	Marine Based Industries	Subsea cable in Bass Strait within the Bass Operational Area.
Bass Strait Freight	Marine Based Industries	Bass Strait Freight is a shipping company based in Bridport, a small coastal town, on the North-East Coast of Tasmania. Bridport's close proximity to Flinders Island make it ideally suited to provide regular services to the Furneaux Group of Islands, including Flinders Island, Cape Barren Island and 'as required services' to King Island and Port Welshpool (Victoria).
Bass Strait Transport	Marine Based Industries	Operate a comprehensive freight consolidation and transport service between Mainland Australia and Tasmania daily, specialising in general, time-sensitive, hazardous, and out of gauge/oversize freight
BW Digital	Marine Based Industries	Subsea cable in Bass Strait, Hawaiki Nui Project outside of the Operational Areas.
CRE Solutions	Marine Based Industries	Specialising in Trans-Bass (Bass Strait) movements from/to mainland Australia and Tasmania.
Currie Cargoes	Marine Based Industries	Cargo shipping between King Island and Melbourne and King Island and Devonport.
Eastern Line Shipping	Marine Based Industries	Ship cattle to and from King Island and also ship freight from Stanley plus out of Welshpool in Victoria.
Freight Connections	Marine Based Industries	Tasmanian cargo services.
Fresh Freight Tasmania	Marine Based Industries	Operate a door-to-door freight forwarding between Tasmania and Mainland Australia, 7 days a week.
Indigo Subsea Cable Consortium	Marine Based Industries	Subsea cable consortium in Bass Strait near Yolla pipeline.
Kelp Industries Pty Ltd	Marine Based Industries	Source bull kelp from the shores of King Island and process it at their mill. Most product shipped to Norway where alginates are extracted.
Kina Commercial Diving	Marine Based Industries	Kina Diving specialises in commercial and scientific diving and marine services which include underwater inspection and construction, ship surveys and repair, fishery and environmental surveys, instrument deployment and recovery, project design and management, salvage services and vessel charter.
King Island Shipping Group	Marine Based Industries	A new group of community, industry and government representatives who have an interest in improving King Island's shipping and freight services.
Marinus Link	Marine Based Industries	Marinus Link is a proposed 1500-megawatt capacity undersea and underground electricity connection to further link Tasmania and Victoria as part of Australia's future electricity grid. The cable is located outside of the Operational Areas.
Optus	Marine Based Industries	Telecommunications
Port Anthony	Marine Based Industries	Shipping facility located east of Melbourne in Corner Inlet.

Organisation Name	Type	Functions, Interests or Activities
Port of Port Fairy	Marine Based Industries	Operated and managed by Moyne Shire Council, the port is used by commercial fishing enterprises and recreational boaters and anglers. Situated on the Moyne River in Port Fairy.
Port of Portland	Marine Based Industries	Strategically located on the south-west coast between Melbourne and Adelaide, the Port of Portland is Victoria’s only naturally deep-water port, providing a logistics gateway to the rest of Australia and the world, with connectivity to national and rail networks.
Qube Ports	Marine Based Industries	Impact on shipping
SeaRoad Holdings Pty Ltd	Marine Based Industries	Sea freight services. Operate in Bass Strait.
Spirit of Tasmania	Marine Based Industries	Sails from the Port of Melbourne to Devonport. The ferry crosses Port Phillip Bay and Bass Strait and they travel at both day and night.
Star of the South	Marine Based Industries	Offshore Wind developer in Bass Strait.
TasKelp	Marine Based Industries	Source bull kelp from the shores of King Island and the West Coast of Tasmania and process it at their mill. Product shipped to Scotland where alginates are extracted.
Tasports	Marine Based Industries	Takes care of Tasmania’s passenger, cargo, and community ports. Also runs Bass Island Line; a dedicated shipping service for the King Island community offering a weekly direct service from Devonport.
Toll Group	Marine Based Industries	The Toll Group is an Australian transportation and logistics company with operations in road, rail, sea, air, and warehousing. Their sea routes go through Bass Strait region. Toll Shipping transport goods from Melbourne to Tasmania, straight through our permit areas for Prion, also Trefoil Drilling and P&A area.
SUBCO	Marine Based Industries	Potential future subsea cable (SMAP) in Bass Strait near Yolla Pipeline. Proposed onshore entry at Torquay.
Superloop	Marine Based Industries	Interest in subsea Indigo Central communications fibre cable that connects Singapore to Perth to Sydney and is within the Otway Operational Area.
Telstra	Marine Based Industries	Telstra Corporation Limited is an Australian telecommunications company which builds and operates telecommunications
MP, Federal Member for Braddon	Commonwealth Government	Member of the Australian Parliament, House of Representatives. Electorate includes King Island.
MP, Federal Member for Wannon	Commonwealth Government	Member of the Australian Parliament, House of Representative. Electorate includes South West Victoria.
Name withheld	Community	Commented on OGV project and is against any gas development
Name withheld	Community	Commented on OGV supporting the requirement for more gas East Coast of Australia.

Organisation Name	Type	Functions, Interests or Activities
French Island Community Group	Community	French Island is an unincorporated territory with no local government. Instead, the community manages its own affairs as well as some public facilities.
Name withheld	Community	Interest in local environmental issues
Name withheld	Community	Commented on OGV at Portland community drop-in. Has broad environmental concerns
Lang Lang Gas Plant Environment Liaison Group	Community	Activities associated with the Lang Lang Gas Plant. Half yearly (6 months) meetings with the group. Basis for determination of relevant persons: Activity or impact to Lang Lang Gas Plant. Beach may send information on offshore activities to individual members if requested.
Lang Lang District Business and Community Group	Community	Work collectively to enable opportunities that enrich the lives of our diverse community.
Name withheld	Community	Commented on OGV requesting information on methods of engagement. Is not local and there is no impact.
Name withheld	Community	Commented on OGV at community drop-in session. Interested in whale migration
Port Fairy Boardriders	Community	A social surfing group that also works on local environmental projects.
Timboon Action Group	Community	Volunteer group committed to the promotion and development of the town and community.
Name withheld	Community	Lobster fisher.
Name withheld	Community	Commented on past EPs and Beach has continued to engage.
12 Apostles Helicopters & Port Campbell Heliport	Tourism/Recreation	Port Campbell based tourism operator that offers helicopter flights over the 12 Apostles area.
Apollo Bay Dive Centre and Surf n Fish	Tourism/Recreation	Ocean based activities for locals and visitors.
Apollo Bay Fishing Charters	Tourism/Recreation	Ocean based activities for locals and visitors.
Apollo Bay Fishing Tours	Tourism/Recreation	Ocean based activities for locals and visitors.
Apollo Bay Surf & Kayak	Tourism/Recreation	Ocean based activities for locals and visitors.
Apollo Bay Visitor Information Centre	Tourism/Recreation	Providing information for tourists to the region.
Australian Recreational Fishing Foundation	Tourism/Recreation	The Australian Recreational Fishing Foundation is the peak representative body to the Australian Federal Government.
Dive Industry Association of Australia	Tourism/Recreation	Encourages the exchange of ideas and information on diving- related issues; to seek solutions to matters of common concern, and to offer practical advice and support to its constituent membership.
Far Out Fishing Charters	Tourism/Recreation	Far Out operates Off-Shore Fishing Charters in Lakes Entrance. Off-shore fishing for Gummy Shark, Snapper, Mako Sharks or Flathead.
Game Fishing Association of Australia	Tourism/Recreation	Peak body for recreational game fishers.

Organisation Name	Type	Functions, Interests or Activities
Game Fishing Association of Victoria	Tourism/Recreation	Peak body for recreational game fishers.
Great Ocean Road Regional Tourism	Tourism/Recreation	Independent peak body for tourism operators along the Great Ocean Road and Surf Coast.
King Island Boat Club	Tourism/Recreation	Based at Grassy Harbour, and the finish to the annual Queenscliff to Grassy Yacht Race.
King Island Tourism/Visitor Information Centre	Tourism/Recreation	Providing information for tourists to the region.
Mersey Yacht Club	Tourism/Recreation	Yacht club based in Devonport TAS. Hosts Ocean racing events Melbourne to TAS.
Ocean Racing Club of Victoria	Tourism/Recreation	Various ocean racing events from Brighton.
Outthere Outdoor Activities	Tourism/Recreation	Sea Kayaking and snorkelling.
Pioneer Kayaking	Tourism/Recreation	Sea kayaking – Churchill Island Marine Park
Port Campbell Visitor Information Centre	Tourism/Recreation	Providing information for tourists to the region.
Port Fairy Yacht Club	Tourism/Recreation	The Club conducts yacht racing offshore from Port Fairy and Portland in the Southern Ocean and Bass Strait, including hosting the Ocean Racing Victoria " Queenscliff to Port Fairy. Club members also compete in the Melbourne Hobart and Melbourne King Island races and are involved in the Clean Oceans initiative and therefore have an interest in the area.
Port Fairy Angling Club	Tourism/Recreation	Recreational angling club for Port Fairy.
Portland SCUBA	Tourism/Recreation	Offers open water diving courses around Portland.
Portland Sport Fishing Club	Tourism/Recreation	Mainly fish on the open ocean near Portland but also fish the Victorian championships in Gippsland.
Portland Yacht Club	Tourism/Recreation	Members sail inside the harbour as well as access ocean sailing in and around Portland Bay.
Recreational Fishing Alliance of NSW	Tourism/Recreation	Peak body representative for NSW recreational fishers.
Royal Yacht Club of Tasmania	Tourism/Recreation	Yacht club involved in local (Hobart / river) and ocean sailing activities and events.
SCUBA Divers Federation of Victoria	Tourism/Recreation	Peak body representing over 25 amateur dive clubs reaching 2500 members.
South Gippsland Yacht Club	Tourism/Recreation	Recreational activity.
Southern Coast Charters	Tourism/Recreation	Marine tourism activity.
Surfcoast Anglers	Tourism/Recreation	A Facebook page dedicated to recreational anglers on Victoria's surf coast and beyond.
TARFish	Tourism/Recreation	Tasmania recreational fishing peak body. Able to communicate on our behalf to all licenced recreational fishers.
Timboon Recreational Fishing Club	Tourism/Recreation	Regional recreational fishing club accessing the Port Campbell jetty boat launch facility.

Organisation Name	Type	Functions, Interests or Activities
VR Fish	Tourism/Recreation	Victorian recreational fishing peak body. Able to communicate to all licenced recreational fishers.
Warrnambool Offshore & Light Game Fishing Club	Tourism/Recreation	Recreational fishing in Otway offshore waters.
Warrnambool Visitor Information Centre	Tourism/Recreation	Providing information for tourists to the region.
Warrnambool Yacht Club	Tourism/Recreation	Only operates in Lady Bay, no ocean racing.
MP, Tasmanian Member for North West, West Coast and King Island	State Departments/Agencies	Member of the Tasmanian Parliament, House of Assembly and Minister for Resources. Electorate includes King Island.
MLC, Member for Western Victoria	State Departments/Agencies	Member of the Victorian Parliament, Legislative Council. Electorate includes South West Victoria.
Office of the Member for Northern Victoria Region	State Departments/Agencies	Member of the Victorian Parliament, Legislative Council.
Office of the Member for Polwarth	State Departments/Agencies	Member of the Victorian Parliament, Legislative Assembly. Electorate includes the Otways and Great Ocean Road.
Office of the Member for South West Coast	State Departments/Agencies	Office of the Member of the Victorian Parliament, Legislative Assembly. Electorate spans from Portland to Warrnambool.
Office of the Member for Western Victoria	State Departments/Agencies	Member of the Victorian Parliament Legislative Council. Electorate includes South West Victoria.
State Member for Western Victoria Region	State Departments/Agencies	Upper House Member of the Victorian Parliament.
State Member for Western Victoria Region	State Departments/Agencies	Upper House Member of the Victorian Parliament.
Victorian Marine and Coastal Council	State Departments/Agencies	The state's peak advisory body providing independent advice on marine and coastal issues to the Minister for Energy, Environment and Climate Change.
MP State Member for Port Adelaide	State Departments/Agencies	Deputy Premier and Minister for Climate, Environment and Water
Coastlife	Marine Tourism	Ocean based activities on Sapphire Coast.
Fishbermi	Marine Tourism	Tourist cruise boat out of Bermagui
Game On Charters	Marine Tourism	Portland based fishing charter targeting Bluefin tuna, gummy shark, big flat head, snapper and nannygai fish.
Go Surf School	Marine Tourism	Ocean based activities for locals and visitors.

Organisation Name	Type	Functions, Interests or Activities
Gone Fishing Charters	Marine Tourism	Fishing charter that fishes in Portland (tuna) and Queenscliff (king fish, snapper, gummy shark).
King Island Surf Safaris	Marine Tourism	Ocean based activities for locals and visitors.
King Island Tours	Marine Tourism	Ocean based activities for locals and visitors.
Lakes Entrance Offshore Charters	Marine Tourism	Offers skippered boat charters, fishing trips, crabbing as well as sightseeing charters in the Bass Strait where they catch snapper, gummy shark, flathead, and a range of ocean reef fish.
Port Campbell Boat Charters	Marine Tourism	Fishing and diving charter services. Currently in hiatus but would like to be kept informed of Beach projects.
Pro Red Fishing Charters	Marine Tourism	Charters in and around Melbourne in Port Phillip Bay, Westernport Bay, Bass Strait, and Portland.
Pro-line Fishing Charters	Marine Tourism	Operating from the Southern Ocean, Bass Strait, and Port Philip Bay region.
Reel Affair Fishing Charters	Marine Tourism	Operating from Merimbula.
Salty Dog Charters	Marine Tourism	Marine tourism activity.
Sapphire Coastal Adventures	Marine Tourism	Operating from Merimbula.
Sea Myth Fishing Charters	Marine Tourism	Deep sea charters.
Sharkmen Charters	Marine Tourism	Fishing charter operating tours from Melbourne to Portland.
South-west Expeditions	Marine Tourism	Tourist business West Tasmania, Strahan.
South West Fishing Charters	Marine Tourism	South West Charters offers Deep Sea Fishing, Game Fishing, Bay Fishing, Whale watching, Diving Service
Spindrift	Marine Tourism	Sea kayaking operator
Think Big Fishing Charters	Marine Tourism	Fishing charter for Snapper, Whiting, Gummy Shark, Squid
Wildlife Coast Cruises	Marine Tourism	Licensed tour operator Corner Inlet Marine and Coastal Park.
Apollo Bay Surf Life Saving Club	Volunteer Emergency Services	Responsible for keeping local beaches safe and responding to local rescues.
Beachport Surf Life Saving Club	Volunteer Emergency Services	Responsible for keeping local beaches safe and responding to local rescues.
Lakes Entrance Surf Life Saving Club	Volunteer Emergency Services	Responsible for keeping local beaches safe and responding to local rescues.
Port Campbell Surf Life Saving Club	Volunteer Emergency Services	Responsible for keeping local beaches safe and responding to local rescues.

Organisation Name	Type	Functions, Interests or Activities
Port Fairy Surf Life Saving Club	Volunteer Emergency Services	Responsible for keeping local beaches safe and responding to local rescues.
Portland Surf Life Saving Club	Volunteer Emergency Services	Responsible for keeping local beaches safe and responding to local rescues.
Seaspray Surf Life Saving Club	Volunteer Emergency Services	Responsible for keeping local beaches safe and responding to local rescues.
Venus Bay Surf Life Saving Club	Volunteer Emergency Services	Responsible for keeping local beaches safe and responding to local rescues.
Warrnambool Surf Life Saving Club	Volunteer Emergency Services	Responsible for keeping local beaches safe and responding to local rescues.
Wonthaggi Surf Life Saving Club	Volunteer Emergency Services	Responsible for keeping local beaches safe and responding to local rescues.
Woolamai Beach Surf Life Saving Club	Volunteer Emergency Services	Responsible for keeping local beaches safe and responding to local rescues.
Wye River Surf Life Saving Club	Volunteer Emergency Services	Responsible for keeping local beaches safe and responding to local rescues.

4.7.3 List of Other Persons – 25(1)(e)

Beach has identified the following persons or organisations as a relevant person under regulation25(1)(e).

Organisation Name	Type	Functions, Interests or Activities
3D Oil Ltd	Marine Based Industries	Oil and Gas industry in offshore Otway Basin. Has current permit areas within the Planning Area but no infrastructure or operations.
Australian Energy Producers (AEP)	Marine Based Industries	AEP is the voice of the oil and gas industry on the issues that matter, working collaboratively with industry and the community.
Australian Communications and Media Authority	Commonwealth Government	Australian government agency responsible for the regulation of broadcasting the internet, radio communications and telecommunications. Relevant stakeholder to obtain information in relation to subsea cables or if predicted impact to subsea cables.
Australian Border Force - Maritime Border Command	Commonwealth Government	Responsible for maritime security. Deters and prevents illegal activities in the Australian Marine Domain.
National Offshore Petroleum Safety Environment Management Authority (NOPSEMA)	Commonwealth Government	Regulator for health and safety, structural (well) integrity and environmental management for all offshore oil and gas operations and greenhouse gas storage activities in Commonwealth waters, and in coastal waters where regulatory powers and functions have been conferred.
CO2CRC	Business	A carbon capture and storage research organisation, with its Otway International Test Centre in Nirranda South.
Australian Oceanographic Services Pty Ltd	Business	Services to offshore energy development companies.
Extent	Business	Sea country and cultural heritage
Frying Nemo Fish and Chips	Business	Local tourism trade.
Grassroots Deli Cafe	Business	Local tourism trade.
Great Ocean Road Tourist Park	Business	Accommodation providers in Peterborough.
Lochard Energy	Business	Oil and Gas industry in onshore Otway Basin and owns the Iona Gas Plant in Port Campbell.
Peterborough General Store and Takeaway Food	Business	Local tourism trade.
Peterborough Golf Club	Business	Golf club for locals and tourists.
Peterborough House	Business	Accommodation services.

Organisation Name	Type	Functions, Interests or Activities
Peterborough Licensed grocers	Business	Local tourism trade.
Port Campbell Hotel	Business	Local tourism trade.
Port Campbell Take Away	Business	Local tourism business
Port Campbell Trading Co.	Business	Local tourism business
Port Central Apartments	Business	Local tourism business
Port O' Call Motel	Business	Local tourism business
REAL Pizza Pasta Salads	Business	Local tourism business
Sea Foam Villas Port Campbell	Business	Local tourism business
South West Regional Executive Forum	Business	A forum of local business owners and Government leaders who meet monthly.
Waves Cafe, Bar and Restaurant	Business	Local tourism trade.
Wessex Archaeology	Business	Sea country and cultural heritage
Life Saving Victoria	Community	Water safety
Otway Gas Plant Community Reference Group	Community	Ongoing community representation to receive activity updates on Beach's operations and projects, and have the opportunity to ask questions, raise concerns, and seek feedback. The CRG meets every 4 months, Beach tables reports on operations, projects, safety and environment performance, and social performance initiatives.
Peterborough Residents Association	Community	Volunteer community development and / or environment protection groups in towns adjacent planning area.
Port Campbell Board Riders Association	Community	Surfing and advocating for healthy oceans.
Port Campbell Rifle Range	Community	Local sporting club.
Name withheld	Community	Previously requesting information sheets by post. Beach has continued to share information.
Name withheld	Community	Contacted Beach after seeing public notice. Interested in future gas supplies for Victoria and exports.
Office of the Minister for Agriculture and Minister for Regional Development	State Departments Government	Advises the Victorian Cabinet on matters relating agriculture and regional development.
RecFish West	Tourism/Recreation	Peak body representing game fishers in WA.

4.8 Sufficient Information

4.8.1 Types of Information

Beach has prepared and delivered sufficient information cognisant of regulatory requirements, guidelines, and standards. Information must be sufficient to allow the relevant person to make an informed assessment of the possible consequences of the activity on their functions, interests or activities. The depth of information required, the way it is prepared (short copy, long copy, questions and answers, diagrams, maps), and the way it is delivered, has been adapted to different relevant persons needs and the degree to which they may be affected.

Key types and delivery, purpose and key content and the relevant person focus for the provision of sufficient information are set out in Table 4-6 in chronological order. Copies of information are provided are in Appendix C.

Table 4-6: Provision of Sufficient Information

Information Type	Purpose	Key Content	Relevant Person Focus	Date
OGV Project Summary Information Sheet. Accompanying email.	Introduce context and overview of a range of activities in the OGV Project, including Drilling and P&A, which will require consultation for development of different EPs. Commence review of relevant persons.	• Project overview • Phases & timings • Maps • Regulations • Consultation purpose • How to find out more & consult with Beach • Advice regarding sensitive information.	All in BeachConnect database assigned by Beach to OGV Project as potentially relevant persons	29/05/2023
Beach website.	Information on Beach website provides opportunity for new relevant persons to seek information, self-identify and request consultation.	• OGV Project overview • OGV Project information sheet including Drilling and P&A activity summary.	New potentially relevant persons.	29/05/2023
Drilling and P&A Information Sheet. Accompanying email. Beach website updated.	Provide sufficient information on the Drilling and P&A activities to enable potentially relevant persons to contact Beach to seek further information or consult with Beach. Email to introduce Drilling and P&A information sheet. Invited participation in Beach's community drop-in information sessions.	• Project overview • Phases & timings • Maps • Activity descriptions • Activity diagrams • Environment description • Regulatory approvals • Maritime safety • Q&As on key concerns • How to find out more & consult with Beach • Drop-in information session dates, times, locations	Any organisations or individuals whose functions, interests or activities may be affected by the activity in the EP. Issued to all in BeachConnect *(if not opted out).*	14/07/2023
Public Notice Advertisements: Information Sessions. Webinar.	Announce OGV Project including Drilling and P&A to unknown potentially relevant persons, advise how to find out more, invite consultation, advise public Beach information sessions.	• Start of planning and consultation for OGV Project, including and Drilling and P&A • Consultation purpose • Information sessions • QR code for more info	Unknown potentially relevant persons in regional locations adjacent activity areas and areas of the drop-in information sessions.	July, September, October 2023 *(see schedule below)*
Public Notice Advertisements: Relevant persons identification.	Encourage unknown relevant persons who may be impacted to consult with Beach.	• Project purpose • Activities and timings • EPs and regulations • Consultation purpose • QR code for more info	Unknown potentially relevant persons in regional locations adjacent activity areas.	July, September, October 2023 *(see Advertising schedule below)*

Information Type	Purpose	Key Content	Relevant Person Focus	Date
Radio Advertisements	Encourage unknown relevant persons who may be impacted to consult with Beach.	30 second commercial with overview of OGV Project over several phases, inviting consultation, how to contact Beach.	Unknown potentially relevant persons in regional locations adjacent activity areas.	October 2023 *(see Advertising schedule below)*
Drop-in information sessions	Provide opportunity to consult with Beach technical staff and ask questions or raise concerns. Locations are focussed on community towns adjacent the activity areas.	• Attended by Beach technical staff from environment, drilling, Drilling and P&A project manager and community team. • Information sheets provided. • Posters of maps and diagrams shown.	Key focus is for relevant persons whose functions, interests or activities may be affected by the activity in the EP. Relevant persons in BeachConnect were advised of the sessions via email and sessions were advertised publicly.	July, August, September 2023 *(See summary of information sessions dates, locations and outcomes below)*
Engage Beach online hub	Dedicated engagement website to deliver project and EP consultation information with streamlined navigation, content delivered in multiple different formats, providing another channel to facilitate feedback and inquiry from relevant persons. A prominent link to Engage Beach was included on the home page of Beach's corporate website.	• Long and short content • Q&A on common concerns • Maps • Diagrams • Summary table of risks, impacts, controls for Drilling and P&A Activities • Downloadable information sheets • Purpose of consultation • Questions and feedback form • Invitation to identify functions, interests or activities and join mailing list	Key focus is for relevant persons whose functions, interests or activities may be affected by the activity in the EP, providing detailed information in different formats. Secondary focus is new potentially relevant persons who can request further information and register for ongoing consultation.	10/10/2023
Email	Additional consultation opportunity. Announce Engage Beach online hub. Webinar details.	• Invitation to participate in Drilling and P&A Webinar hosted by Beach technical staff. • Reminder of purpose of consultation. • Link to Engage Beach online hub. • EP will be submitted end of October. • Further EPs will be developed for OGV Project phases.	Key focus is for relevant persons whose functions, interests or activities may be affected by the activity in the EP, and who may not have attended public information sessions but want more information or to ask questions.	11/10/2023
Online Webinar	Provide additional opportunity for consultation and to engage with Beach technical staff about the drilling and P&A activities.	• Presentation including: ○ OGV Project overview ○ Drilling and P&A activities ○ Emergency response planning • Q&A session	Key focus is for relevant persons whose functions, interests or activities may be affected by the activity in the EP, and who may not have attended public information sessions but want more information or to ask questions.	17/10/2023
Fair Ocean Access Information Sheet	Simple explanation of Beach's fishers compensation protocol	Summary of protocol	Potentially impacted commercial fishers	Provided to commercial

Information Type	Purpose	Key Content	Relevant Person Focus	Date
		How to find out more information		fishers on request
Email	Additional consultation opportunity Links to Engage Beach online hub and relevant information sheets.	Confirmed submission of Seabed Assessment EP Reminder of purpose of consultation for Drilling and P&A Invitation to participate in Drilling and P&A Webinar hosted by Beach technical staff.	Key focus is for relevant persons whose functions, interests or activities may be affected by the activity in the EP, and who may not have attended public information sessions but want more information or to ask questions.	14/11/2023
Email	Additional consultation opportunity. Webinar reminder	Reminder to participate in Drilling and P&A Webinar hosted by Beach technical staff.	Key focus is for relevant persons whose functions, interests or activities may be affected by the activity in the EP, and who may not have attended public information sessions but want more information or to ask questions.	21/11/23
Drop-in information session	Provide opportunity to consult with Beach technical staff and ask questions or raise concerns. Location focussed on Lakes Entrance adjacent to the Bass activity area.	Attended by Beach technical staff from environment, drilling, Drilling and P&A project manager and community team. Information sheets provided. Posters of maps and diagrams shown.	Key focus is for relevant persons whose functions, interests or activities may be affected by the activity in the EP. Relevant persons in BeachConnect were advised of the sessions via email and sessions were advertised publicly.	29 November 23 (See summary of information sessions dates, locations and outcomes below)
Online webinar x3	Provide additional opportunity for consultation and to engage with Beach technical staff about the drilling and P&A activities.	Webinar 1 Drilling and P&A Overview Webinar 2 Technical P&A Webinar 3 Technical Drilling	Key focus is for relevant persons whose functions, interests or activities may be affected by the activity in the EP, and who may not have attended public information sessions but want more information or to ask questions. Specific technical webinars were held for both drilling and P&A activities for those wanting a deep dive.	22/11/23 - 30/11/23
Email	Additional consultation opportunity.	Reminder of purpose of consultation. Link to Engage Beach online hub. EP will be submitted end of January 2024. Further EPs will be developed for OGV Project phases.	All in BeachConnect database assigned by Beach to OGV Project as potentially relevant persons.	8/01/24

4.8.2 Information Sessions & Webinar

Beach advertised and held eight regional community drop-in sessions, with flexible timing to facilitate different work and family needs. The purpose of the sessions was to provide an opportunity for consultation directly with Beach technical staff members about the OGV Project and specifically about the Drilling and P&A activities. Face to face consultation gives an opportunity for people with concerns to be listened to, for two-way dialogue and genuine collaboration on control measures where applicable, and a consultation method for those less comfortable with exchanging emails or phone contact. Beach also advertised and held an online webinar, which received a stronger attendance than the drop-in sessions, with representatives from 12 organisations.

Table 4-7 details the schedule of information sessions and the webinar locations, dates, attendees, and consultation summary.

Table 4-7: Summary of Information Sessions and Webinar

Location	Date	Attendees	Concerns, objections, responses where applicable
Port Campbell 4 attendees	24 Jul 2023	Local fisherman & partner	Concerns about fishing impacts from seismic surveys, no interest in OGV Project or Drilling and P&A.
		Community member	OGV Project overview, no questions on Drilling and P&A activities. Beach's sustainability strategy.
		Industry member	Beach's sustainability strategy.
Portland 1 attendee	25 Jul 2023	Community member	General discussion on project overview.
Warrnambool 4 attendees	26 Jul 2023	eNGO group members	Concerns about marine life impact from seismic surveys, Beach explained the OGV Project doesn't require seismic surveys.
		Community member	Asked about Carbon Capture and Storage, Beach shared knowledge and approach in Beach's Sustainability Report.
		LGA staff member	Impacts to local fishing industries and OGV Project location and timeframes. Beach explained its fishing area assessments, consultation with fishers, compensation approach.
Port Fairy 4 attendees	30 Aug 2023	eNGO group members	Impact to Port Fairy generally and why is Beach there. Beach explained its aware of offshore activity interest in the community and wanted to be available for consultation. Asked about Drilling and P&A activities, in particular if it's not a seismic survey then what are we looking for. Explained they are a safety measure to avoid seabed and shallow geological hazards, the equipment used, activities on the sea floor and shallow coring.
		Community member	Asked about OGV Project location and timeframes, Beach explained.
Commercial Fishing Peak Body Forum	31 Aug 2023	Seafood Industry Victoria Seafood Industry Australia	• General discussion on OGV Project and specific discussion on Drilling and P&A activities. Interest in Drilling and P&A was confirmation of the locations of the activity areas, and this was discussed in relation to

Location	Date	Attendees	Concerns, objections, responses where applicable
Warrnambool /Online 3 attendees		Tuna Australia	their fishing areas. No concerns raised about Drilling and P&A activities. • Further general discussions Beach's compensation approach and industry research. Beach compensation policy circulated post forum.
Commercial Fishers Drop-in information session Warrnambool 8 attendees	31 Aug 2023	Seafood Industry Victoria Abalone Council Victoria Abalone Fishermen Southern Rock Lobster Fishermen	• General discussion on OGV Project and specific discussion on Drilling and P&A activities. Asked about impacts to local fishing industries from Beach's activities and timeframes and raised concerns about marine seismic surveys. Beach explained its OGV Project including the Drilling and P&A activities do not require the use of seismic surveys. • Interest in Drilling and P&A was confirmation of the locations of the activity areas, and this was discussed in relation to their fishing areas. No concerns raised about Drilling and P&A activities. • Concerns raised about multiple proponent activities leading to confusion and stakeholder fatigue. Beach explained OGV Project and Drilling and P&A activities and timeframes. • Concerns raised that the compensation approach is based on previous catch rates and does not consider future impact on catch. Beach explained that its compensation procedure does account for future claims where it can be proved impact was caused by Beach activity.
Burnie	20 Sep 2023	Nil attendees	N/A
King Island	21 Sep 2023	Nil attendees	N/A
Webinar online	17 Oct 2023	EPA SA Savour King Island Protect the West Game Fishing Association Australia Recfishwest Corangamite Council Marinus Link Wye River SLSC Department of Natural Resources and Environment Tasmania Land and Sea Aboriginal Corporation Tasmania South Gippsland Council Life Saving Victoria	Beach received questions pertaining to spill response, P&A and seabed footage: • What is the extent or capacity of resources for emergency response? Beach explained it has a contract with AMOSC to manage emergency response. AMOSC have significant resources in terms of people and equipment. Gas proponents would work together to offer expertise and support as well. Beach's emergency response plans have to include its preparedness arrangements, be included in EPs, and be reviewed and accepted by the regulator. • What is the financial capacity to address emergencies? Beach explained that it has insurance in place for these matters. • Asked if the only source of hydrocarbon for a spill risk is diesel? Beach confirmed this was correct and explained that the risk was no more than that from any other ship in the area. • Asked if the seabed footage be available to the public? Beach advised the footage is not usually released to the public. Relevant photos are often included in the EP. We

Location	Date	Attendees	Concerns, objections, responses where applicable
			will share footage with the relevant agencies or any interested parties such as academic or research organisation should they be interested.
Otway Gas Plant Community Reference Group 6 attendees	18 Oct 2023	Corangamite Shire Council Community Reference members	Beach provided an overview of OGV activities. Asked is the Drilling and P&A included seismic surveying. Beach confirmed it does not. No further questions raised.
Webinar online	22 Nov 23	Protect the West	Beach provided an overview of drilling and P&A activities.
Lakes Entrance	29 Nov 2023	Local fishermen	General concern around offshore activities displacing fishing. Particular concern with offshore wind footprint. Requested copies of operational maps which were provided via email.
Webinar online	29 Nov 2023	Moyne Shire Council Greater Geelong Council	Beach provided information specific to our proposed drilling activities. Some questions around the history of abandoned wells. Assurance around no new major infrastructure.
Webinar online	30 Nov 2023	Moyne Shire Council Protect the West	Beach provided information specific to our proposed P&A activities. Questions around timing of P&A activities.

4.8.3 Advertising Schedule

Beach has published two types of public notice advertisements and one type of radio commercial. The purpose, content and relevant person focus for these is explained in Section 4.8.1. The locations, publisher and dates are shown in Table 4-8. Copies of advertisements are provided are in Appendix C.

Table 4-8: Public Notice Advertisements

Local Government Area	Date	Media	Key Purpose
Corangamite Shire, VIC	12 July 2022	Cobden Timboon Coast Times	Advertise information session in Port Campbell
Glenelg Shire, VIC	14 July 2022	The Portland Observer	Advertise information session in Portland and Warrnambool
Corangamite, Moyne, Warrnambool	15 July 2023	The Warrnambool Standard	Advertise information session in Portland and Warrnambool
Corangamite Shire, VIC	26 July 2023	Cobden Timboon Coast Times	Identify unknown potentially relevant persons
Colac Otway Shire, VIC	28 July 2023	Colac Herald	Identify unknown potentially relevant persons
Corangamite, Moyne, Warrnambool, VIC	29 July 2023	The Warrnambool Standard	Advertise information session in Port Fairy

Local Government Area	Date	Media	Key Purpose
Mt Gambier, Limestone Coast, SA	1 Sep 2023	The Border Watch	Identify unknown potentially relevant persons
Burnie, TAS	11 Sep 2023	The Advocate	Advertise information session in Burnie
King Island, TAS	14 Sep 2023	King Island Courier	Advertise information session in King Island
National reach to First Nations audiences	20 Sep 2023	The Koori Mail	Identify unknown potentially relevant persons
National reach to First Nations audiences	26 Sep 2023	National Indigenous Times	Identify unknown potentially relevant persons
South Gippsland Shire, VIC	10 Oct 2023	South Gippsland Sentinel-Times	Identify unknown potentially relevant persons and advertise webinar
East Gippsland Shire, VIC	11 Oct 2023	Bairnsdale Advertiser	Identify unknown potentially relevant persons and advertise webinar
Corangamite Shire, VIC	23 Oct 2023	Cobden Timboon Coast Times	Media release, consultation focus, encouragement to contact Beach
South West VIC	11 – 24 Oct	3CS; Mixx Colac; 3YB; Coast FM	Identify unknown potentially relevant persons
Burnie, TAS	18 November 2023	The Advocate	Identify unknown potentially relevant persons and advertise webinars
Corangamite, Moyne, Warrnambool, VIC	18 November 2023	The Warrnambool Standard	Identify unknown potentially relevant persons and advertise webinars
Glenelg Shire, VIC	21 November 2023	Portland Observer	Identify unknown potentially relevant persons and advertise webinars
South Gippsland Shire, VIC	21 November 2023	South Gippsland Sentinel-Times	Identify unknown potentially relevant persons and advertise webinar
Corangamite Shire, VIC	22 November 2023	Cobden Timboon Coast Times	Identify unknown potentially relevant persons and advertise webinars
Mt Gambier, Limestone Coast, SA	22 November 2023	The Border Watch	Identify unknown potentially relevant persons and advertise webinars
Circular Head, TAS	22 November 2023	Circular Head Chronicle	Identify unknown potentially relevant persons and advertise webinars
East Gippsland Shire, VIC	22 November 2023	Bairnsdale Advertiser	Identify unknown potentially relevant persons and advertise webinar

Local Government Area	Date	Media	Key Purpose
King Island, TAS	23 November 2023	King Island Courier	Identify unknown potentially relevant persons and advertise webinars
Colac Otway Shire, VIC	30 November 2023	Colac Herald	Identify unknown potentially relevant persons and advertise webinars
Corangamite Shire, VIC	23 Oct 2023	Cobden Timboon Coast Times	Media release, consultation focus, encouragement to contact Beach
South West VIC	20 Nov – 1 Dec	3CS; Mixx Colac; 3YB; Coast FM	Identify unknown potentially relevant persons and promote Engage Beach

4.9 Reasonable Period

Consultation on the OGV Project, which includes the Drilling and P&A phase of activities, commenced on 29 May 2023 with a project overview of activities, timings, and locations to initiate requests for further information and engagement.

A detailed information sheet on the Drilling and P&A activities was emailed to relevant authorities, relevant persons and other persons identified by Beach on 14 July 2023. Further information and different consultation opportunities were provided up to the 18 January 2024, as set out in Section 4.8.

Throughout the consultation for this EP, relevant persons were advised that the purpose of consultation was to ensure potential impacts and risks have been identified and appropriate measures adopted because of the consultations, and encouraged to contact Beach if they required further information or wished to discuss how the Drilling and P&A activities may affect their functions, interests, and activities.

Beach understands that what constitutes a reasonable period for consultation should be considered on a case-by-case basis, with reference to the nature, scale, and complexity of the activity. During the consultation for this EP, minimal additional information has been sought, minimal consultation has been sought, no concerns have been raised regarding insufficient time, some minor concerns regarding the Drilling and P&A activities have been raised and resolved.

Commercial fishing peak bodies have been engaged throughout the process and understand that further consultation will be required with specific fishers potentially impacted once Beach has completed its studies and is able to confirm specific well locations.

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

4.10 Consultation Methods

Beach understands its regulatory requirements for consultation and that genuine consultation involves a two-way dialogue. Beach also understands that consultation is voluntary for relevant persons, and they are increasingly citing ‘stakeholder fatigue’. Therefore, Beach’s approach to consultation starts with a focus on building long-term relationships with key relevant persons groups by demonstrating understanding for their needs, timelines, the types of information they need and their preferred consultation pathways. Beach has actively sought out consultation with potentially impacted relevant persons and has successfully managed to create consultation opportunities, in particular with key Commercial Fishing groups and First Nations groups despite their stated stakeholder fatigue'.

In October 2023, Beach launched OGV Project – Drilling and P&A information and consultation pages on its online consultation hub, Engage Beach. In November 2023, Beach distributed emails to relevant persons promoting three upcoming information webinars and directing recipients to Engage Beach for further project information and another opportunity to consult. The OGV Project – Drilling and P&A pages saw increased activity with 25 unique visitors and 32 views on the day the email was distributed. A follow up email was sent a week later reminding recipients to register for the upcoming webinars. The pages again saw increased activity with 24 unique visitors and 39 views on the day the email was distributed. Since the OGV Project – Drilling and P&A pages were launched, the pages have had 191 unique visitors and 461 views.

Beach used radio adverts for the first time in our recent Seabed Assessment consultation and observed no benefit from this campaign in identifying any new relevant persons. We ran a further radio campaign in South West Victoria during November for the drilling consultation to trial the medium again. The South West Victoria region was chosen as our major gas plant is ion the region and the firm wells for the OGV project are offshore of this region. No benefit was seen from the further campaign and Beach decided to not pursue radio adverts further at this time.

Beach recognises that the level of consultation is dependent on the nature and scale of the activity, and the potential impacts on the relevant persons functions, interests, or activities. Therefore, that the consultation process should be appropriate for the category of relevant persons and that not all persons or organisations will require the same level of engagement. Table 4-9 shows how Beach has adapted the IAP2 Spectrum of Public Participation model, noting that the fifth level of participation being 'empower' is not applicable in the context of safely performing offshore petroleum activities in accordance with OPGGS(E)R.

Table 4-9: IAP2 Spectrum of Public Participation – Applied for consultation on this EP

	Inform	Consult	Involve	Collaborate
Relevant person focus	• Relevant persons identified from Beach methodology and desktop research. • Self-identified relevant persons from public notices and meetings.	• Those seeking further information or who raise concerns. • Fishing associations. • First Nations groups. • Relevant government departments and agencies.	• Potentially impacted commercial fishers and marine users. • First Nation groups to identify cultural values and sensitivities. • Relevant government departments and agencies.	• Impacted commercial fishers/ • Industry proponents who may be conducting activities in similar locations and times.
Consultation methods	• Information sheets • Beach Website. • Email to Beach database. • Beach online Engagement Hub • Regional public notices introducing the project and inviting self-identification as relevant person. • Targeted public notices for drop-in information session. • Media releases.	• Direct response to questions & concerns (email/phone/meetings) • Phone follow up to potentially impacted RPs who haven't replied. • Email follow up to other no-replies. • Beach online Engagement Hub to encourage questions and consultation. • Request meetings with regional community groups. • Hold community drop-in information sessions.	• Follow up non-responses to verify contact details, receipt of Beach emails, if they wish to be consulted. • Request meeting to confirm functions, interests and activities, and potential impacts to fishers. • Request meetings with First Nations Groups to identify consultation preferences, cultural values & sensitivities. • Director of National Parks • Seek input from relevant marine park management authorities/ • Replies to government responses such as UXO	• Request meetings / workshops with associations (in the first instance) to agree on impact assessments, mitigation measures, any research requirements, and compensation approach where applicable. • Individual meetings with commercial fishers confirmed as impacted, to identify mitigations or control measures, and where required, agree on compensation.

4.11 Consultation to Minimise Impacts on Relevant Person's Rights

In accordance with sections 280 and 460 of the OPGGS Act, petroleum activities must not interfere with navigation, fishing, conservation of resources of the sea and seabed, other offshore electricity infrastructure and petroleum activities, and the enjoyment of native title rights and interests (within the meaning of the Native Title Act 1993) to a greater extent than is necessary for the reasonable exercise of the titleholder's rights and obligations.

Beach has consulted with other petroleum industry operators in the vicinity of its proposed Drilling and P&A and no concerns were raised.

With regard to native title rights, Beach has detailed how it has undertaken and extensive assessment of First Nations relevant persons (Section 4.6.6) and its approach to consulting with First Nations groups (Section 4.5.2) to ascertain whether the Drilling and P&A activities would impact their functions, interest and activities, and where applicable, their native title rights. No concerns were raised about the Drilling and P&A activities.

4.11.1 Commercial Fishing Industry Consultation

Beach has developed long-term respectful relationships with the Commercial Fishing industry operating in the Otway and Bass Basins. After consulting with key industry associations, Beach established a peak body round table group to facilitate efficient, productive, and transparent consultation across the different fisheries.

For the initial meeting of the peak body groups, Beach invited:

- Seafood Industry Victoria (SIV)
- South East Trawl Fishing Industry Association (SETFIA)
- Commonwealth Fishing Association (CFA)
- Seafood Industry Australia (SIA)
- Seafood Industry Tasmania (SIT) (formerly TSIC)
- Tuna Australia (TA)
- Victorian Fisheries Authority (VFA)

The first meeting was attended by: SIV; SIA; and Tuna Australia. Further meetings will be held on an as-needs basis (as per direction from the groups). General matters discussed included fisheries impacts research, stakeholder fatigue, compensation approach, and petroleum exclusion zones, but no specific concerns were raised regarding Drilling and P&A due to the minimal disturbance impacts over a short time frame.

Other groups intending to participate include: SETFIA, VFA, and SIT. The CFA advised they were unable to participate in consultation due to limited resources and directed Beach to dedicated fishery associations, which Beach understands given their role as an umbrella group.

Given the shared marine rights and protections afforded for both the offshore petroleum and commercial fishing industries, Beach respects those rights an undertakes a methodical approach to identifying fishing operations within its operating areas, the potential impacts of its activities, assessing mitigations and controls that may include compensation where there is no effective mitigation or control. The following key steps set out the approach Beach has taken for consultation in this EP, and that Beach would continue to take in the event of a new relevant person being identified or new information emerging regarding an impact:

- Provide information sheet to relevant fishing associations, request direct meetings to provide opportunity for detailed discussion, response to questions, concerns and further information requests.
- Seek information on actual fishing effort and seek support (including costing proposals where applicable) for engagement with their members, either directly or via the association as applicable.
- Provide additional information to interested fishery groups where requested.
- Send follow up emails and phone key associations and fishers who may fish in the operating area.
- Where fishers have advised they may be potentially impacted by the activity the following steps would be followed:
  - For fishers who have contacted their associations, Beach would consult with the association to gather information about the fisher's fishing patterns and locations and to establish contact for ongoing consultation throughout the activity.
  - For fishers who have contacted Beach directly, engage with them and gather information about their fishing patterns and locations and to establish contact for ongoing consultation throughout the activity.
  - Where fishers provide Beach with sensitive fishing data, advise the information will be treated as 'sensitive' and not published by NOPSEMA. Provide Beach's privacy policy where requested.
- Beach has previously and will continue to offer SMS messaging to commercial fishers and their associations to provide updates before, during and after the activity.
- Beach will provide regular updates on the locations that the vessel will be operating in as well as the expected duration so fishers can plan their fishing activities with the least disruption.
- Beach has a stated position that fishers should not suffer an economic loss as a result of our activities. Beach's Fair Ocean Access – Procedure for Compensation Claims from Commercial Fishers is explained in clear and simple language in the Fair Ocean Access Information Sheet (Appendix D). It summarises Beach's procedures for minimising and mitigating potential impacts to commercial fishing and procedures for compensation claims from commercial fishers. Beach will ensure that the evidence required is not burdensome on the fisher while ensuring genuine claims are processed.

4.12 Assessment of Merit of Objections or Claims

Any objections or claims raised during consultation will be substantiated via evidence such as publicly available credible information and/or scientific or fishing data. Where the objection or claim is substantiated, where applicable, it will be assessed as per the Beach impact and risk assessment process and controls applied where appropriate to manage impacts and risks to an acceptable level and ALARP.

Relevant persons 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 an acceptable level and ALARP.

If an objection or claim is raised after acceptance of this EP and the matter necessitates a revision of the EP this will be managed in accordance with Beach Management of Change processes (Section 8.3.4) and the relevant person will be advised of the process.

4.13 Measures Adopted as a Result of Consultation

Objection or Claim Raised	Beach's Assessment of Merit for Drilling and P&A Activities	Measures Adopted
Director of National Parks (DNP) requested Beach Energy review the BIAs as outlined in the Australian Marine Parks Science Atlas and if required, update the BIA tables accordingly for these project. BIAs and KEF are identified values of the South-east Network of Marine Parks, and it is expected that activities that could affect these BIAs are managed accordingly.	Beach has been using the South-east Commonwealth Marine Reserves Network Management Plan 2013 -2023 to identify values of the AMPs. We have looked at the Australian Marine Parks Science Atlas upon guidance from DNP.	Beach updated the EP (Section 6.2.2) to include the BIAs and KEF associated with the AMPS as per the Australian Marine Park Science Atlas. These values were included in the impact and risk assessment sections where relevant to: • manage impacts and risks to Australian marine park values (including ecosystem values) to an acceptable level and consider all options to avoid or reduce them to as low as reasonably practicable. • clearly demonstrate that the activity will not be inconsistent with the relevant legislation listed in the class approval.
DNP considers operational areas to encompass the active source and acquisition areas and includes operational activities such as line turns / repositioning, equipment maintenance, deployment and recovery, crew change and resupply. These are offshore petroleum activities and should be identified in the EP to ensure risks to AMPs are assessed and effective mitigation applied.	Beach confirmed that there will be no seismic activity, active source etc. as part of the Drilling Program. Crew change and resupply of the drill rig will occur within the Operational Area.	Additional measures not deemed necessary.
DNP would like notification of activity start and end dates plus notification of any spill.	Beach acknowledged DNP response and confirmed that the EP has been updated to include the following: • Emergency responses reporting requirements. • Activity commencement and cessation notifications.	Section 8.3.1 was updated to include DNP emergency responses reporting requirements. Section 4.16 was updated to include DNP Activity commencement and cessation notifications.
Department of Defence – Australian Hydrographic Office	Beach has mapped our activity operational areas with the available UXO information from the Department of Defence database. This has identified that the Operational Areas in the Otway Basin overlap UXO Zone 1052 King Island which is within the 'slight	A seabed survey (CM05: Seabed Survey) will be undertaken prior to the commencement of the Drilling Program to allow for the consideration of unexploded ordinances in the final selection of well locations and drill rig position and location of mooring equipment

Objection or Claim Raised	Beach's Assessment of Merit for Drilling and P&A Activities	Measures Adopted
	potential' category' and UXO Zone SDG087 'Sea Dumping – King Island'. Prior to any seabed disturbance activities a geophysical survey will be undertaken to identify any potential UXO.	(CM06: Drill Rig Mooring Plan and CM09: Drilling Program).
South East Trawl Fishing Industry Association (SETFIA).	Beach commissioned SETFIA to produce a comprehensive report of fishing effort plus a risk analysis and identification of fishing gear in the proposed OGV Project areas. SETFIA highlighted that most fishing effort, particularly trawl is between 400 and 1,000m isobath. Beach values its ongoing constructive relationship the commercial fishing sector as a priority and is committed to its Fair Ocean Access Policy. Beach acknowledges the advice provided by commercial fishing experts. Beach will continue to seek full support from fishing peak bodies to engage with any members potentially impacted prior to the commencement of the next activities. Should new information be received on fishing locations in relation to the activities in this EP, Beach will assess any new matters and where appropriate, Beach will apply its Management of Change Standard (section 8.3.4).	CM09: Drilling Program. Beach will implement an activity limitation where wells will not be located in water depths >400 m. This applies to the T/30P Operational Area where waters depths range from 55 – 992 m (T/30P South OA) and 111 – 578 m (T/30P North OA). Water depths > 400 m have not been fully excluded from the activity as anchors may be required in these waters depths depending on the final well location. This limitation reduces any potential impact to commercial trawl and giant crab fisheries that were identify by SETFIA (2023) as having most fishing effort between the 400 and 1,000 m isobath. SETFIA (2023) recommended that Beach avoid depths between the 400 - 1000m isobaths to minimise the impact on fishing. CM03: Consultation for Implementation of EP Consultation with commercial fishing associations (and individual commercial fishers where identified) regarding well locations, the ongoing communication of Beach activities to their members, and applying CM04: Beach Fair Ocean Access Procedure.
Wildlife Coast Cruises asked whether our environmental plans aim to engage with local stakeholders such as themselves to obtain ongoing and historical data of the humpback and southern right whale migration that may be affected by this project.	The EP includes a description of the available historical data for humpback and southern right whale migration in the Otway and Bass areas (Section 6.4.7.6). It also assesses potential impacts from the rig and support vessels such as underwater sound (Section 7.4) and vessel collision (Section 7.10) to	Additional measures not deemed necessary.

Objection or Claim Raised	Beach's Assessment of Merit for Drilling and P&A Activities	Measures Adopted
	whales and details the controls such as vessel speeds, separation distances and use of marine mammal observers to ensure impacts are of an acceptable level. Beach contacted stakeholder welcoming any ongoing and historical data for humpback and southern right whales. Beach has followed up but has had no reply.	
Heritage Victoria and First People State Relations highlighted that proponents should be mindful that traditional owners do not always recognize state boundaries.	Beach does not consider state boundaries when assessing the marine environment. The environment is transboundary, so we assess the existing environment (including socio-economic) in a spatial extent rather than referring to specific state boundaries.	Additional measures not deemed necessary.
Heritage Victoria and First People State Relations said that the UNESCO protection of underwater cultural heritage standards likely be ratified "soon".	Section 5 identifies in-force legislation including the Underwater Cultural Heritage Act 2018. Beach will take into consideration any new UNESCO Protection of Underwater Cultural Heritage standards to the extent that is applicable to the activities in this EP.	Additional measures not deemed necessary.
Heritage Victoria and First People State Relations recommended that Beach undertake an underwater cultural heritage assessment and the methodology and procedure for cultural heritage findings should be informed/endorsed by an archaeologist. Archaeologist should have experience with Aboriginal submerged landscape	Beach acknowledges the recommendation. In the event that cultural heritage is found, an appropriate cultural heritage management plan may be required, and, in such case, Beach will consult with an appropriately qualified underwater archaeologist.	CM05: Seabed Survey A seabed survey will be undertaken prior to the commencement of the Drilling Program to allow for the consideration of the submerged cultural heritage and landscapes in the final selection of well locations and drill rig position and location of mooring equipment. Data from seabed surveys will be provided to an appropriately qualified underwater archaeologist to identify submerged cultural heritage and landscapes and provide an Underwater Cultural Heritage Report to Beach. Beach will assess the report and identify any areas of overlap and potential risks from proposed activities defined in this EP.

Objection or Claim Raised	Beach's Assessment of Merit for Drilling and P&A Activities	Measures Adopted
		Beach will share relevant information and assessments from the Seabed Survey, relevant to submerged cultural heritage and landscapes with relevant First Nations groups as identified in Section 6.6.2. Should any submerged cultural heritage be identified, Beach will report the findings in accordance with the *Underwater Cultural Heritage Act* 2018, and will consult with the relevant First Nations groups (as identified in Section 6.6.2) and determine any exclusion areas or further cultural heritage management procedures that may be required. Should any potential submerged cultural landscapes be identified, in consultation with the qualified underwater archaeologist, Beach will assess the report and identify any areas of overlap and potential risks from proposed activities defined in this EP. Beach will also consult with relevant First Nations groups (see 6.6.2) and determine any exclusion areas or further cultural heritage management procedures that may be required. The findings of Munkura v Santos will be applied in the assessment and consultation processes set out above.
Heritage Victoria and First People State Relations recommends inductions for staff on cultural heritage informing what to look out for and developing an understanding of First Nations connection to sea country.	Beach acknowledges that cultural awareness in the offshore Sea Country environment may be beneficial for increased awareness of relevant First Nation's groups by staff and contractors.	Beach will include Sea Country awareness applicable to the Operational Areas in the Drilling Program induction materials (Section 8.2.2).
Heritage Victoria and First People State Relations requested Beach consider publishing reports as and when cultural heritage data is available.	Beach acknowledges that it may be beneficial to publish information that may build knowledge of underwater cultural heritage. However, Beach is cognizant that some information may be sensitive to relevant First	CM05: Seabed Survey.

Objection or Claim Raised	Beach's Assessment of Merit for Drilling and P&A Activities	Measures Adopted
	Nations groups, and is prepared to consider this suggestion in consultation with relevant First Nations groups, on a case by case basis.	
Seafood Industry Tasmania SIT)/Tasmanian Seafood Industry Council (TSIC) questioned whether King Island fishers had been adequately consulted.	Beach has been sharing information with SIT/TSIC since May 2023. Beach visited King Island twice to meet with both council and other relevant persons following advertised public information sessions. SETFIA report and Tasmanian fishery data identify a low level of fishing for the rock lobster fishery in T/30P and Bass. Beach will continue to consult after final drilling locations are determined for implementation of this EP.	CM03: Consultation for Implementation of EP CM04: Beach Fair Ocean Access Procedure
Seafood Industry Victoria's Victorian Rock Lobster Committee raised that compensation mechanisms need to reflect the unique attributes of the species and the Victorian coastline and habitat.	Beach's current compensation procedure purposely includes a mechanism for an adaptive methodology where applicable. Beach would seek to use an adaptive mechanism where required for Relevant Persons directly impacted, recognising no location, activity or species is the same. Beach and SIV agreed to have further discussions once the exact well locations are known, and impacted parties are identified. This will include the development of any adaptive compensation mechanisms that may be required.	CM03: Consultation for Implementation of EP CM04: Beach Fair Ocean Access Procedure

4.14 Sensitive Information

Within information sheets and online content, Beach has included the following information:

"Relevant persons may request that the information they provide not be published, and it will be identified a s sensitive information and not published in the Environment Plans."

4.15 Report on Consultations

The report on consultations provides details of the information sent to relevant persons, response received including concerns raised about impacts and risk to their functions, interests, and activities from the activities in the EP, assessments of the concerns raised, and responses to those concerns.

Where an objection or claim was raised by a relevant person, 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 an acceptable level and ALARP. Where an objection or claim was substantiated via evidence such as publicly available credible information and/or scientific or fishing data, this was assessed as per the impact and risk assessment process detailed in Section 2 and controls applied where appropriate to ensure impacts and risks are managed to an acceptable level and ALARP.

The report on consultations can be found in Appendix A.

Copies of the full text of any response by a relevant person have been provided to NOPSEMA as a Sensitive Information under Section 26(8) of the OPGGS(E)R.

4.16 Consultation for Implementation of EP

Consultation in the course of preparation of the EP has been completed in accordance with the OPGGS(E)R. Beach engages in ongoing consultation and communications during the implementation of this EP and Relevant Persons can provide feedback to Beach on any new relevant matters that may emerge. Beach will assess any new matters and where appropriate, Beach will apply its Management of Change Standard (Section 8.3.4).

Beach will continue to consult with relevant persons to meet Section 22(15) of the OPGGS(E)R. This includes providing updates and notices for the OGV Project phases and other future activities, including the Drilling and P&A, to keep relevant persons informed as information becomes available. This will be done via one-on-one communications, emails, and provision of information on the Beach website. Records of ongoing consultations will be maintained in Beach's database BeachConnect.

Table 4-10 details the ongoing consultation requirements for implementation of the activity.

Table 4-10: Consultation Requirements for Implementation of EP

Relevant person	Consultation	Timing
All relevant persons	Activity updates including acceptance of EP and start and completion of activities.	As required
Relevant First Nations groups (section 6.6.2)	Consultation regarding identified cultural heritage and cultural landscapes in accordance with Control Measure 19: Seabed Survey in this EP.	As required

Relevant person	Consultation	Timing
Relevant Commercial Fishing Associations	Consultation regarding well locations, the ongoing communication of Beach activities to their members, and applying Control Measure 04: Beach Fair Ocean Access Procedure.	After determination of well locations
Relevant persons identified as marine users and relevant government departments and agencies	Notifications of activity commencement, including: • type of activity, including pre-lay of anchors and buoys, towing of the drilling rig to first and subsequent locations, supply vessel contact details and proposed routes. • location of activity, coordinates, and map. • timing of activity: expected start and finish date and duration. • sequencing of locations if applicable. • vessel details including call sign and contact. • any safety exclusion zones required. • Beach contact details. Note: coordinates to be provided as degrees and decimal minutes referenced to the WGS 84 datum.	2 weeks prior to activity commencing
AHO	Vessel contractor to issue notification of activity for publication of notices to mariners (NOTMAR), including: • type of activity. • geographical coordinates of activity. • any exclusion zones required. • period that NOTMAR will cover (start and finish date). • vessel details including name, Maritime Mobile Service Identity (MMSI)), satellite communications details (including INMARSAT-C and satellite telephone), contact details and call signs. • Beach and vessel Contractor contact details. Update AHS of progress, changes to the intended operations including if activity start or finish date changes.	4 weeks prior to activity commencing
AMSA - JRCC	Vessel Contractor to issue notification of activity for promulgation of radio navigation warnings, including: • type of activity. • geographical coordinates of activity. • any exclusion zones required. • period that warning will cover (start and finish date). • vessel details including name, call-sign and Maritime Mobile Service Identity (MMSI)), satellite communications details (including INMARSAT-C and satellite telephone numbers), contact details and calls signs. • any other information that may contribute to safety at sea. • Beach and vessel Contractor contact person. Update AMSA JRCC of progress, changes to the intended operations including if activity start or finish date changes.	48 – 24 hrs prior to activity commencing
NOPSEMA and Director of National Parks	Regulatory notification of start of activity.	10 days prior to activity commencing

Relevant person	Consultation	Timing
Relevant Persons who have requested vessel location information.	SMS or email messaging undertaken where requested by Relevant Person.	During activity
NOPSEMA and Director of National Parks	Regulatory notification of cessation of activity.	Within 10 days of activity completion

5 Environmental Requirements

This section provides information on the requirements that apply to the activity, and includes 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 in Commonwealth waters. Commonwealth legislation including relevant international conventions and other requirements relevant to the Drilling Program are summarised in Table 5-2.

On the basis that a worst-case credible spill has the potential to intersect Victorian, Tasmanian and New South Wales (NSW) waters. Relevant Victorian requirements are described in Table 5-3. Relevant Tasmanian requirements are described in Table 5-4 and NSW requirements are described in Table 5-5.

Recovery plans, threat abatement plans and species conservation advice applicable to species are detailed in the description of threatened and migratory species (Section 6).

5.1 EPBC Act Primary Approval

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

In February 2014, NOPSEMA became the sole designated assessor of petroleum and GHG activities in Commonwealth waters in accordance with the Minister for the Environment's endorsement of NOPSEMA's environmental authorisation process under Part 10, section 146 of the EPBC Act. Under the streamlined arrangements, impacts on the Commonwealth marine area by petroleum and GHG activities are assessed solely through NOPSEMA.

NOPSEMA are the regulator for the OPGGS(E)R that requires that:

6 (1). Before commencing an offshore project, a person must submit an offshore project proposal for the project to NOPSEMA.

6 (2) However, subregulation (1) does not apply if the Environment Minister:

(a) has made a decision under section 75 of the EPBC Act that an action that is equivalent to or includes the project is not a controlled action; or

(b) has made a component decision under section 77A of the EPBC Act that a particular provision of Part 3 of that Act is not a controlling provision for an action that is equivalent to or includes the project, because the Minister believes the action will be taken in a particular manner; or

(c) has approved, under Part 9 of the EPBC Act, the taking of an action that is equivalent to or includes the project.

The drilling of exploration and appraisal wells and P&A activities within the scope of this EP do not trigger the requirements for an offshore project proposal (OPP) as the activity is not an offshore project under the definition of the regulations.

The completion of Yolla 7 in production licence T/L1 does trigger the OPP requirement, however, this activity is covered by an existing Environmental Impact Statement (EIS) and resulting EPBC Decision 2001/321. Thus, an OPP is not required to be submitted to NOPSEMA for this activity.

EPBC Decision 2001/321 gave the previous titleholder approval, with conditions, to construct and operate the production wells in the Yolla gas field, the Yolla offshore production facility, the onshore and offshore pipelines, an onshore gas treatment and compression plant and an onshore pipeline. As the development includes drilling of production wells, approved under Part 9 of the EPBC Act, no further approvals are required.

On 14 June 2015, the approval conditions under EPBC 2001/321 were subject to a variation given the transfer of powers under the EPBC Act to NOPSEMA under the OPGGS Act. Specifically, conditions that are relevant to this EP are included in Table 5-1. Conditions are based on those in the Variation to Conditions Attached to Approval issued on the 14 June 2015.

Table 5-1: Conditions from the Yolla Gas Field Development Project (EPBC 2001/321) Applicable to the T/L1 (Yolla 7) Well

Condition No.	Condition	Relevant Section of EP
1	The person taking the action must submit for the Minister's approval, prior to commencing offshore drilling, an Offshore Environmental Management Plan which addresses the following matters: • monitoring acoustic noise during construction and operation; and • details of hydrotest water additives and drilling muds to demonstrate low toxicity. The approved plan must be implemented.	See Condition 5
3	The person undertaking the action must not commence decommissioning unless an environment plan that includes measures related to decommissioning is in force under the OPGGS Environment Regulations. The person taking the action must comply with the environment plan.	This Environment Plan is taken to fulfil the commitments under EPBC 2001/321.
5	A plan required by Condition 1 is automatically deemed to have been submitted to, and approved by, the Minister if the measures (as specified in the relevant condition) are included in an environment plan (or environment plans) relating to the taking of the action that: a) was submitted to NOPSEMA after 27 February 2014; and b) either: i) is in force under the OPGGS Environment Regulations; or ii) has ended in accordance with regulation 25A of the OPGGS Environment Regulations.	This Environment Plan is taken to fulfil the commitments under EPBC 2001/321.
5A	Where a plan required by Condition 1 has been approved by the Minister and the measures (as specified in the relevant condition) are included in an environment plan (or environment plans that: a) was submitted to NOPSEMA after 27 February 2014; and b) either: i) is in force under the OPGGS Environment Regulations; or	N/A

Condition No.	Condition	Relevant Section of EP
	ii) has ended in accordance with regulation 25A of the OPGGS Environment Regulations. the plan approved by the Minister no longer needs to be implemented.	
5B	Where an environment plan, which includes measures specified in the conditions referred to in Conditions 5 and 5A above, is in force under the OPGGS Environment Regulations that relates to the taking of the action, the person taking the action must comply with those measures as specified in the environment plan.	N/A

5.2 Commonwealth Requirements

Table 5-2: Commonwealth Environmental Requirements Relevant to the OGV Drilling Program

Requirements	Scope	Related International Conventions	Administering Authority
Aboriginal and Torres Strait Islander Heritage Protection Act 1984	The Aboriginal and Torres Strait Islander Heritage Protection Act 1984 enables the Australian Government to protect important Indigenous areas and objects under immediate threat, if it appears that state or territory laws have not provided effective protection. Areas or objects protected under this Act are included in the National Heritage List and Commonwealth Heritage List. **Application to activity**: Areas or objects protected under this Act may be present within the Operational and Planning Areas as detailed in Section 6.6.	-	Department of Climate Change, Energy, the Environment and Water (DCCEEW)
Australian Ballast Water Management Requirements (CoA 2020)	The Australian Ballast Water Management Requirements set out the obligations on vessel operators with regards to the management of ballast water and ballast tank sediment when operating within Australian seas. **Application to activity**: Provides requirements on how vessel and rig operators should manage ballast water when operating within Australian seas to comply with the Biosecurity Act. Section 7.9 details how the requirements applicable to the activity will be met.	International Convention for the Control and Management of Ships' Ballast Water and Sediments (adopted in principle in 2004 and in force on 8 September 2017)	Department of Agriculture, Fisheries and Forestry (DAFF)
Australia Biofouling Management Requirements (DAWE 2022)	The Australian biofouling management requirements set out vessel operator obligations for the management of biofouling when operating vessels under biosecurity control within Australian territorial seas. **Application to activity**: Provides requirements on how vessel and rig operators should manage biofouling when operating within Australian seas to comply with the Biosecurity Act. Section 7.9 details how the requirements applicable to the activity will be met.	International Convention for the Control and Management of Ships' Ballast Water and Sediments (adopted in principle in 2004 and in force on 8 September 2017)	DAFF
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.	International Convention on Oil Pollution Preparedness, Response and Cooperation 1990	Australian Maritime Safety Authority (AMSA)

Requirements	Scope	Related International Conventions	Administering Authority
	Requirements are effected through Australian Maritime Safety Authority (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.	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	
Biosecurity Act 2015 Biosecurity Regulations 2016 Biosecurity Amendment (Biofouling Management) Regulations 2021	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. **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 and regulations regulates vessels and rigs entering Australian territory regarding ballast water and hull fouling. Section 7.9 details how the requirements applicable to the activity will be met.	International Convention for the Control and Management of Ships' Ballast Water and Sediments (adopted in principle in 2004 and in force on 8 September 2017)	DAFF
Climate Change Act 2022 Climate Change (Consequential Amendments) Act 2022	The Act sets out Australia's greenhouse gas emissions reduction targets. It outlines Australia's greenhouse gas emissions reduction targets of a 43% reduction from 2005 levels by 2030 and net zero by 2050; requires the minister to prepare and table an annual climate change statement; requires the Climate Change Authority to give the minister advice in relation to the annual statement and future greenhouse gas	The Act itself does not impose obligations directly on companies, but its passage into law sets the scene for sector-based reforms to implement the 2030 target and emissions budget, which will impact businesses.	DCCEEW

Requirements	Scope	Related International Conventions	Administering Authority
	emissions reduction targets; and provides for periodic reviews of the operation of the Act. The Act operates as 'umbrella' legislation to implement Australia's net-zero commitments and codifies Australia's net 2030 and 2050 GHG emissions reductions targets under the Paris Agreement. **Application to activity**: GHG requirements are detailed in Section 7.3.	The Safeguard Mechanism reforms, which will apply principally to the industrial and resources sectors, is one such measure.	
Environment Protection and Biodiversity Conservation Act 1999 (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 Matters of National Environmental Significance (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 • 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 6 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	DCCEEW

Requirements	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 7.10 details how the requirements applicable to the activity will be met.	-	DCCEEW
Environmental Protection (Sea Dumping) Act 1981	The Sea Dumping Act regulates the loading and dumping of waste at sea and the creation of artificial reefs in Australian waters. Australian waters stretch from the low-water mark of the Australian shoreline out to 200 nm. **Application to activity**: For P&A activities, removal of well infrastructure is planned and does not trigger requirements under the Environmental Protection (Sea Dumping) Act 1981.	Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972 (the London Convention)	DCCEEW
Marine Pest Plan 2018–2023: National Strategic Plan for Marine Pest Biosecurity	Australia's national strategic plan for marine pest biosecurity. It outlines a coordinated approach to building Australia's capabilities to manage the threat of marine pests over the next five years. It represents agreed priorities and actions of governments, marine industries, and other stakeholders to achieve a common purpose: to manage the risks posed by marine pests and minimise their potential harm to marine industries, communities and the environment. **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 7.9 details how the requirements applicable to the activity will be met.	-	DAFF
Minamata Convention on Mercury	Australia ratified the Minamata Convention on 7 December 2021. The Minamata Convention on Mercury is an international treaty that seeks to protect human health and the environment from anthropogenic (caused by humans) emissions and releases of mercury and mercury compounds.	Minamata Convention on Mercury	DCCEEW

Requirements	Scope	Related International Conventions	Administering Authority
	The Convention covers all aspects of the life cycle of mercury, controlling and reducing mercury across a range of products, processes and industries. This includes controls on: • Mercury mining. • Manufacture and trade of mercury and products containing mercury. • Disposal of mercury waste. • Emissions of mercury from industrial facilities. Countries that have ratified the Convention are bound by international law to put these controls in place. **Application to activity**: Hg may be present in drill fluid additives such as barite. . Section 7.8 details how the requirements applicable to the activity will be met.		
National Biofouling Management Guidelines for the Petroleum Production and Exploration Industry (MPSC 2018)	The guidance document provides recommendations for the management of biofouling risks by the petroleum industry. **Application to activity**: Applying the recommendations within this document and implementing effective biofouling controls can reduce the risk of the introduction of an introduced marine species. Section 7.9 details how the requirements applicable to the activity will be met.	Certain sections of International Convention for The Prevention of Pollution from Ships (MARPOL) International Convention for the Safety of Life at Sea 1974 Convention on the International Regulations for Preventing Collisions at Sea (COLREG) 1972	DAFF
National Light Pollution Guidelines for Wildlife (CoA 2023)	The Guidelines outline the process to be followed where there is the potential for artificial lighting to affect wildlife. **Application to activity**: Applying the recommendations within this document and implementing effective controls can reduce the impact of light to sensitive receptors. Section 7.2 details how the requirements applicable to the activity will be met.	-	DCCEEW
National Strategy for Reducing Vessel Strike on Cetaceans and other Marine	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.	-	DCCEEW

Requirements	Scope	Related International Conventions	Administering Authority
Megafauna (CoA 2017a)	**Application to activity**: Applying the recommendations within this document and implementing effective controls can reduce the risk of the vessel collisions with megafauna. Section 7.10 details how the requirements applicable to the activity will be met.		
Native Title Act 1993 Native Title Legislation Amendment Act 2021	The main objects of this Act are: (a) to provide for the recognition and protection of native title; and (b) to establish ways in which future dealings affecting native title may proceed and to set standards for those dealings; and (c) to establish a mechanism for determining claims to native title; and (d) to provide for, or permit, the validation of past acts, and intermediate period acts, invalidated because of the existence of native title. **Application to activity**: Native Title or Indigenous Land Use Agreements may be present within the Operational and Planning Areas as detailed in Section 6.6.	-	Attorney-General's Department
Navigation Act 2012	This Act regulates ship-related activities and invokes certain requirements of the International Convention for the Prevention of Pollution from Ships (MARPOL 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 and emergency arrangements. MO 30: Prevention of collisions. MO 31: SOLAS and non-SOLAS certification. **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 how the requirements applicable to the activity will be met.	Certain sections of MARPOL International Convention for the Safety of Life at Sea 1974 (SOLAS) Convention on the International Regulations for Preventing Collisions at Sea 1972 (COLREG)	AMSA
Offshore Petroleum and Greenhouse Gas	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.	-	NOPSEMA

Requirements	Scope	Related International Conventions	Administering Authority
Storage Act 2006 (OPGGS Act) Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (OPGGS(E)R)	Part 4 of the OPGGS(E)R specifies that an EP must be prepared for any petroleum activity and that activities are undertaken in an ecologically sustainable manner and in accordance with an accepted EP. **Application to activity**: The 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 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.		
Protection of the Sea (Prevention of Pollution from Ships) Act 1983	This Act regulates Australian regulated vessels with respect to ship-related operational activities and invokes certain requirements of the MARPOL Convention relating to discharge of noxious liquid substances, sewage, garbage, air pollution etc. **Application to activity**: All ships involved in petroleum activities in Australian waters are required to abide to the requirements under this Act. Several MOs are enacted under this Act relating to offshore petroleum activities, including: MO 91: Marine Pollution Prevention – Oil. MO 93: Marine Pollution Prevention – Noxious Liquid Substances. MO 94: Marine Pollution Prevention – Packaged Harmful Substances. MO 95: Marine Pollution Prevention – Garbage. MO 96: Marine Pollution Prevention – Sewage. MO 97: Marine Pollution Prevention – Air Pollution. Section 7 details how the requirements applicable to the activity will be met.	Various parts of MARPOL	AMSA

Requirements	Scope	Related International Conventions	Administering Authority
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 7.9 details how the requirements applicable to the activity will be met.	International Convention on the Control of Harmful Anti-fouling Systems on Ships 2001	AMSA
Threat Abatement Plan for the impacts of Marine Debris on Vertebrate Wildlife of Australia's Coasts and Ocean (CoA 2018)	The plans focus on strategic approaches to reduce the impacts of marine debris on vertebrate marine life. **Application to activity**: Section 7.11 details how the requirements applicable to the activity will be met.	-	DCCEEW
Underwater Cultural Heritage Act 2018	Protects the heritage values of shipwrecks, sunken aircraft, and relics (older than 75 years) and other types of underwater cultural heritage including Australia's Aboriginal and Torres Strait Islander Underwater Cultural Heritage 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 6.2.4.1 provides information on known shipwrecks or sunken aircraft in the Operational and Planning Areas.	Agreement between the Netherlands and Australia concerning old Dutch Shipwrecks 1972 UNESCO 2001 Convention on the Protection of the Underwater Cultural Heritage (the UNESCO 2001 Convention).	DCCEEW

Requirements	Scope	Related International Conventions	Administering Authority
	Section 6.6 provides information on First Nations cultural heritage.		
Underwater Cultural Heritage Guidance for Offshore Developments (DoEE 2019)	Provides guidance on how the Underwater Heritage Act must be considered when applying for any State, Territory or Commonwealth planning approval for actions or developments in all coastal and offshore waters. **Application to activity**: Impacts to Underwater Cultural Heritage from the activity have been identified as seabed disturbance and from an oil spill and associated oil spill response activities. The guidance document has been used to inform those sections.		

5.3 Victorian Requirements

Table 5-3: Victorian Environment Requirements Relevant to Potential Impacts and Risks to State Waters and Lands

Requirements	Scope	Application to Activity	Administering Authority
Aboriginal Heritage Act 2006 Aboriginal Heritage Regulations 2018	The Act acts primarily to provide for the protection of Aboriginal cultural heritage in Victoria. It does this through: • Establishing the Victorian Aboriginal Heritage Council. Council provides a state-wide voice for Aboriginal people and advises the Minister for Aboriginal Affairs on cultural heritage management. • Establishing Registered Aboriginal Parties. This allows Aboriginal groups with connections to country to be involved in cultural heritage decision making. • Establishing the Victorian Aboriginal Heritage Register. The register records details about Aboriginal places, objects, and knowledge. • Cultural Heritage Management Plans (CHMPs) and Cultural Heritage Permit processes, to manage activities that may impact Aboriginal cultural heritage. • Providing sanctions and penalties to prevent harm to Aboriginal cultural heritage. • Powers for Authorised Officers and Aboriginal Heritage Officers, and increased fees and charges for breaches of the Act. The Regulations) give effect to the Act. The Regulations prescribe standards, set out the circumstances in which a CHMP should be prepared and set fees and charges.	There is the potential for aboriginal heritage and Registered Aboriginal Parties within the Operational and Planning Areas. Section 6.6 identifies aboriginal heritage sites and Registered Aboriginal Parties within the Operational and Planning Areas.	First Peoples State Relations
Environment Protection Act 2017 and Environmental Protection Regulations 2021	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. Discharge of domestic ballast water from emergency response vessels	Environmental Protection Authority Victoria

Requirements	Scope	Application to Activity	Administering Authority
	The State Environment Protection Policy (Waters of Victoria) designates: • spill response responsibilities by Victorian Authorities to be undertaken in the event of spills (DoTP) with EPA enforcement consistent with the *Environment Protection Act 1970* and the *Pollution of Waters by Oil & Noxious Substances Act 1986*. • requires vessels not to discharge to surface waters sewage, oil, garbage, sediment, litter or other wastes which pose an environmental risk to surface water beneficial uses. To protect Victorian State waters from marine pests introduced via domestic ballast water, ballast water management arrangements applying to all ships in State and territorial waters must be observed as per the *Environment Protection (Ships' Ballast Water) Regulations 2006, Waste Management Policy (Ships' Ballast Water)* and the *Protocol for Environmental Management*. High risk domestic ballast water (ballast water which leachates from an Australian port or within the territorial sea of Australia (to 12 nm)), regardless of the source, must not be discharged into Victorian State waters. Ship masters must undertake a ballast water risk assessment on a voyage by voyage basis to assess risk level, provide accurate and comprehensive information to the EPA on the status and risk of ballast water contained on their ships (i.e. domestic/international), and to manage domestic ballast water discharges with EPA written approval.	into Victorian State waters must comply with these requirements. Vessel discharges during spill response are managed as detailed in Section 7.7..	
Emergency Management Act 2013	Provides for the establishment of governance arrangements for emergency management in Victoria, including the Office of the Emergency Management Commissioner and an Inspector-General for Emergency Management. Provides for integrated and comprehensive prevention, response, and recovery planning, involving preparedness, operational co-ordination and community participation, in relation to all hazards. These arrangements are outlined in the Emergency Management Manual Victoria.	Emergency response structure for managing emergency incidents within Victorian 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 Community Safety (Emergency Management Commissioner, Emergency Management Victoria)

Requirements	Scope	Application to Activity	Administering Authority
Fisheries Act 1995 (and Regulations 2019)	Provides legislative framework for the regulation, management and conservation of Victorian fisheries including aquatic habitats.	Victorian commercial and recreational fishing occur within the Operational and Planning Areas as described in Section 6.5.13. Impacts and risks to commercial and recreational fishing are assessed in Section 7.	Victorian Fishing Authority (VFA)
Flora and Fauna Guarantee Act (FFG Act) 1988 (and Regulations 2020)	The purpose of this Act is to protect rare and threatened species; and enable and promote the conservation of Victoria's native flora and fauna and to provide for a choice of procedures that can be used for the conservation, management or control of flora and fauna and the management of potentially threatening processes. Where a species has been listed as threatened an Action statement is prepared setting out the actions that have or need to be taken to conserve and manage the species and community.	Triggered if an incident results in the injury or death of a FFG Act listed species (e.g. collision with a whale). See incident reporting requirements in Section 8.3.1.	Department of Energy, Environment and Climate Action (DEECA)
Heritage Act 2017	The purpose of the Act is to provide for the protection and conservation of historic places, objects, shipwrecks and archaeological sites in state areas and waters (complementary legislation to Commonwealth legislation). Part 4 (Underwater cultural heritage) 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.	Section 6.2.5 identifies maritime heritage in Commonwealth and State waters. Act may be triggered in the event of impacts to a known or previously un-located shipwreck whilst undertaking emergency response activities. Incident reporting requirements in Section 8.3.1 details reporting to Commonwealth in first instance.	Heritage Victoria

Requirements	Scope	Application to Activity	Administering Authority
Marine Safety Act 2010 (and Regulations 2023)	Act provides for safe marine operations in Victoria, including imposing safety duties on owners, managers and designers of vessels, marine infrastructure, and marine safety equipment; marine safety workers, masters and passengers on vessels; regulation and management of vessel use and navigation in Victorian State waters; and enforcement provisions of Police Officers and the Victorian Director of Transport Safety. This Act reflects the requirements of international conventions - *Convention on the International Regulations for Preventing Collisions at Sea* and *International Convention for the Safety of Life at Sea*. The Act also defines marine incidents and the reporting of such incidents to the Victorian Director of Transport Safety.	Applies to vessel masters, owners, crew operating vessels in Victorian State waters whilst undertaking emergency response activities. Vessel safe operations during the activity and/or spill response are managed as detailed in Section 7.	Safe Transport Victoria
National Parks Act 1975	Establishes a framework for the protection and management of national parks in Australia. It provides for the conservation of natural and cultural resources, the provision of recreational opportunities, and the management of park use.	Triggered in the event of a spill impacting or potentially impacting marine or coastal park. Reporting requirements in the event of a spill impacting or potentially impacting State waters are detailed in the OPEP.	DEECA
Pollution of Waters by Oil and Noxious Substances Act 1986 (POWBONS) (and Regulations 2022)	The purpose of the *Pollution of Waters by Oils and Noxious Substances Act 1986* (POWBONS) 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.	Triggered in the event of a spill impacting or potentially impacting State waters. Reporting requirements in the event of a spill impacting or potentially impacting State waters are detailed in the OPEP.	Jointly administered by DEECA and EPA

Requirements	Scope	Application to Activity	Administering Authority
Traditional Owner Settlement Act 2010	The purposes of this Act are to advance reconciliation and promote good relations between the State and traditional owners and to recognise traditional owner groups based on their traditional and cultural associations to certain land in Victoria.	There is the potential for aboriginal heritage and Registered Aboriginal Parties within the Operational and Planning Areas. Section 6.6 identifies aboriginal heritage sites and Registered Aboriginal Parties within the Operational and Planning Areas.	Department of Justice and Community Safety
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 if vessel undertaking spill response in Victorian waters. Triggered if an incident results in the injury or death of whales, dolphins, or seals. See incident reporting requirements in Section 8.3.1.	DEECA

5.4 Tasmanian Requirements

Table 5-4: Tasmanian Environment Requirements Relevant to Potential Impacts to State Waters and Lands

Requirements	Scope	Application to Activity	Administering Authority
Aboriginal Heritage Act 1975	The Act is the primary legislation for the protection of Aboriginal cultural heritage in Tasmania.	There is the potential for aboriginal heritage and Registered Aboriginal Parties within the Planning Areas. Section 6.6 identifies aboriginal heritage sites any Registered Aboriginal Parties within the Planning Areas.	Department of Premier and Cabinet
Aboriginal Land Act 1995	An Act to promote reconciliation with the Tasmanian Aboriginal community by granting to Aboriginal people certain parcels of land of historic or cultural significance.	There is the potential for aboriginal heritage and Registered Aboriginal Parties within the Planning Areas. Section 6.6 identifies aboriginal heritage sites and Registered Aboriginal Parties within the Planning Areas.	Department of Premier and Cabinet
Emergency Management Act 2006	Provides for the protection of life, property and the environment in the event of an emergency, to establish emergency management arrangements, to provide for certain rescue and retrieval operation. Establishes that the EPA is the designated jurisdictional authority for maritime environmental emergencies in Tasmania, specifically oil pollution and noxious substance pollution events.	The Director, EPA is the Tasmanian Marine Pollution Controller and has powers relating to pollution events under Marine-related Incidents (MARPOL Implementation) Act 2020. See OPEP.	Department of Police, Fire and Emergency Management

Requirements	Scope	Application to Activity	Administering Authority
Environmental Management and Pollution Control Act 1994 (EMPCA) & Regulations	EMPCA is the primary environment protection and pollution control legislation in Tasmania. It is a performance-based style of legislation, with the fundamental basis being the prevention, reduction and remediation of environmental harm. The clear focus of the Act is on preventing environmental harm from pollution and waste. Relevant regulations under the EMPCA include: • Environmental Management and Pollution Control (General) Regulations 2017 • Environmental Management and Pollution Control (Waste Management) Regulations 2010 The EPA Division Compliance Policy provides the Director of the EPA powers of compliance.	Defines the EPA's jurisdiction during a spill event. Prescribes the fee structure to waste events and environmental protection notices. Regulates the management and control of controlled wastes. See OPEP	Environmental Protection Authority (EPA) Tasmania
Historic Cultural Heritage Act 1995	The act was developed to ensure the historic places that are of importance to the whole of Tasmania are recognised, protected, and managed effectively as part of the Resource Management and Planning System.	Section 6.2.5 identifies Martine heritage in Commonwealth and State waters. Act may be triggered in the event of impacts to a known or previously un-located historical items such as shipwrecks whilst undertaking emergency response activities. Incident reporting requirements in Section 8.3.1 details reporting to Commonwealth in first instance.	Heritage Tasmania
Living Marine Resources Management Act 1995	An Act to promote the sustainable management of living marine resources, to provide for management plans relating to fish resources, to protect marine habitats.	Tasmanian commercial fishing occur within the Operational and Planning Areas as described in Section 6.5.12. Impacts and risks to commercial and recreational fishing are assessed in Section 7.	Fishing Tasmania

Requirements	Scope	Application to Activity	Administering Authority
Marine-related Incidents (MARPOL Implementation) Act 2020	Pollution of the sea in Tasmanian State waters may be regulated by general pollution laws such as the EMPCA (see above), but the Marine-related Incidents (MARPOL Implementation) Act 2020 deals specifically with discharges of oil and other pollutants from ships. It gives effect in Tasmania to the MARPOL international convention on marine pollution.	Gives effect to MARPOL in Tasmanian waters. Vessel discharges during the activity and/or spill response are managed as detailed in Section 7.7.	EPA Tasmania
National Parks and Reserves Management Act 2002	The act provides for the management of parks and reserves based on management objectives of each class of reserve, declaration, and management of Marine Protected Areas (marine reserves).	Marine and terrestrial protected areas were identified within the Planning Areas (Section 6.2.10 and 6.2.11).	Tasmania Parks and Wildlife Service
Nature Conservation Act 2002	An Act to make provision with respect to the conservation and protection of the fauna, flora and geological diversity of the State, to provide for the declaration of national parks and other reserved land and for related purposes.	Marine and terrestrial protected areas were identified within the Planning Area (Section 6.2.10 and 6.2.11).	Tasmania Parks and Wildlife Service

5.5 New South Wales Requirements

Table 5-5: NSW Environment Requirements Relevant to Potential Impacts to State Waters and Lands

Requirements	Scope	Application to Activity	Administering Authority
Aboriginal Land Rights Act 1983	An Act to make provisions with respect to the land rights of Aboriginal persons, including provisions for or with respect to the constitution of Aboriginal Land Councils, the vesting of land in those Councils, the acquisition of land by or for those Councils and the allocations of funds to and by those Councils; to amend certain other Acts; and to make provisions for certain other purposes.	There is the potential for aboriginal heritage and Registered Aboriginal Land Councils within the Planning Areas. Section 6.6 identifies aboriginal heritage sites any Aboriginal Land Councils within the Planning Areas.	
Biosecurity Act 2015 Biosecurity Regulation 2017	Provides for the prevention, elimination, minimisation and management of biosecurity risks; and for other purposes.	Applies where oil spill response vessels may pose biosecurity risk to NSW. Section 7.9 details how the requirements applicable to the activity will be met.	NSW Department of Primary Industries
Fisheries Management Act 1994	Act is responsible for managing NSW fisheries to conserve, develop and share the fishery resources of the State for the benefit of present and future generations	NSW commercial and recreational fishing occur within the Planning Areas as described in Section 6.5. Impacts and risks to commercial and recreational fishing are assessed in Section 7.5.	NSW Department of Primary Industries

Requirements	Scope	Application to Activity	Administering Authority
Heritage Act 1977	Act provides for the identification, registration and interim protection of items of State heritage significance (including shipwrecks within state waters) in NSW.	Applies where an oil spill or oil spill response activities may pose a risk to items of State heritage significance. Section 6.2.5 identifies Martine heritage in Commonwealth and State waters. Incident reporting requirements in Section 8.3.1 details reporting to Commonwealth in first instance.	Heritage Council of NSW
Marine Estate Management Act 2014	To provide for the management of the marine estate of New South Wales consistent with the principles of ecologically sustainable development	Applies where an oil spill or oil spill response activities may pose a risk to NSW marine parks. Section 6.2.13 identifies NSW marine parks that may be affected by a spill.	NSW Department of Primary Industries
Marine Pollution Act 2012	This Act is the NSW state legislation giving effect to the requirements of MARPOL 73/78 within state waters. The Act provides the power to respond to oil and chemicals listed within MARPOL.	Applies to oil spill response in NSW waters. Vessel discharges during the activity and/or spill response are managed as detailed in Section 7.7. Provides the portfolio Minister with powers of intervention in regard to the detention or direction of commercial and trading vessels and for preventing, combating, and cleaning up of oil and chemical spills in State waters. See OPEP.	Transport for NSW

Requirements	Scope	Application to Activity	Administering Authority
National Parks and Wildlife Act 1974	This Act provides for the care, control and management of all national parks, historic sites, nature reserves, conservation reserves, Aboriginal areas and game reserves, and the protection and care of native flora and fauna, and Aboriginal places and objects.	Applies where oil spill poses a risk to NSW National parks, historic sites, nature reserves, conservation reserves, Aboriginal areas and game reserves, and the protection and care of native flora and fauna protected under the Act. Relevant NSW environmental and social receptors that maybe affected by an oil spill have been identified in Section 6 and assessed in Section 7.12.	NSW National Parks and Wildlife Service (NPWS)
Protection of the Environment Operations Act 1997	The object of the Act is to achieve the protection, restoration, and enhancement of the quality of the NSW environment. T	Applies where oil spill poses a risk to NSW waters or lands. See OPEP.	NSW Environmental Protection Authority

6 Description of the Environment

This section describes the existing environment including details of particular relevant values and sensitivities within the Planning Area. The Planning Area is used as the spatial boundary for the describing the existing environment as this is the area that may be potentially exposed to hydrocarbons at the low hydrocarbon exposure thresholds described in NOPSEMA Bulletin #1 (NOPSEMA 2019). Figure 6-1 and Table 6-1 detail the Planning Area.

Within the Planning Area there is the:

- Operational Area where the Drilling Program will be undertaken as described in Section 3. Figure 6-1 and Table 6-1 detail the Operational Area.
- The environment that may be affected (EMBA) by each impact and risk. This is detailed in the impact and risk sections and refers to this section where required.

Table 6-1: Planning and Operational Areas Description

	Areas	Description
Otway	Operational Area	The Drilling Program will be undertaken in the Otway Basin within the Otway Operational Area as described in Section 3.1. The EPBC Protected Matters Report for the Otway Operational Area is provided in E. 1 .
	Planning Area	The Otway Planning Area is based on a combination of the diesel and condensate loss of containment planning areas that has been developed based on the spill modelling to the low thresholds as detailed in Section 7.12.4. The EPBC Protected Matters Report for the Otway Planning Area is in Appendix E. 2.
Bass	Operational Area	The Drilling Program will be undertaken in the Bass Basin within the Bass Operational Area as described in Section 3.1. The EPBC Protected Matters Report for the Bass Operational Area is provided in Appendix E. 1.
	Planning Area	The Bass Planning Area is based on a combination of the diesel and condensate loss of containment planning areas that has been developed based on the spill modelling to the low thresholds as detailed in Section 7.12.4. The EPBC Protected Matters Report for the Bass Planning Area is in Appendix E. 2.

6.1 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 existing environment that may be affected by the activity, including details of the particular values and sensitivities (if any) within that environment.

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 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 the OPGGS(E)R, more detail has been provided where:

- Species listed as threatened or migratory under the EPBC Act and known or likely to occur in the Operational Areas or Planning Areas. Known and likely occurrence was determined from the PMST Report.

- Species have a biologically important area (BIA). This was determined from the National Conservation Values Atlas (NCVA).

- Species are biologically important behaviour such as breeding, foraging, resting or migration (DCCEEW 2023). This was determined from the PMST Report.

Similarly, more detail has been provided in Section 6.2.15 for Key Ecological Features (KEFs) as they are considered as conservation values of the Commonwealth marine area; and in Section 6.2.2 for Australian Marine Parks (AMPs) as they are enacted under the EPBC Act.

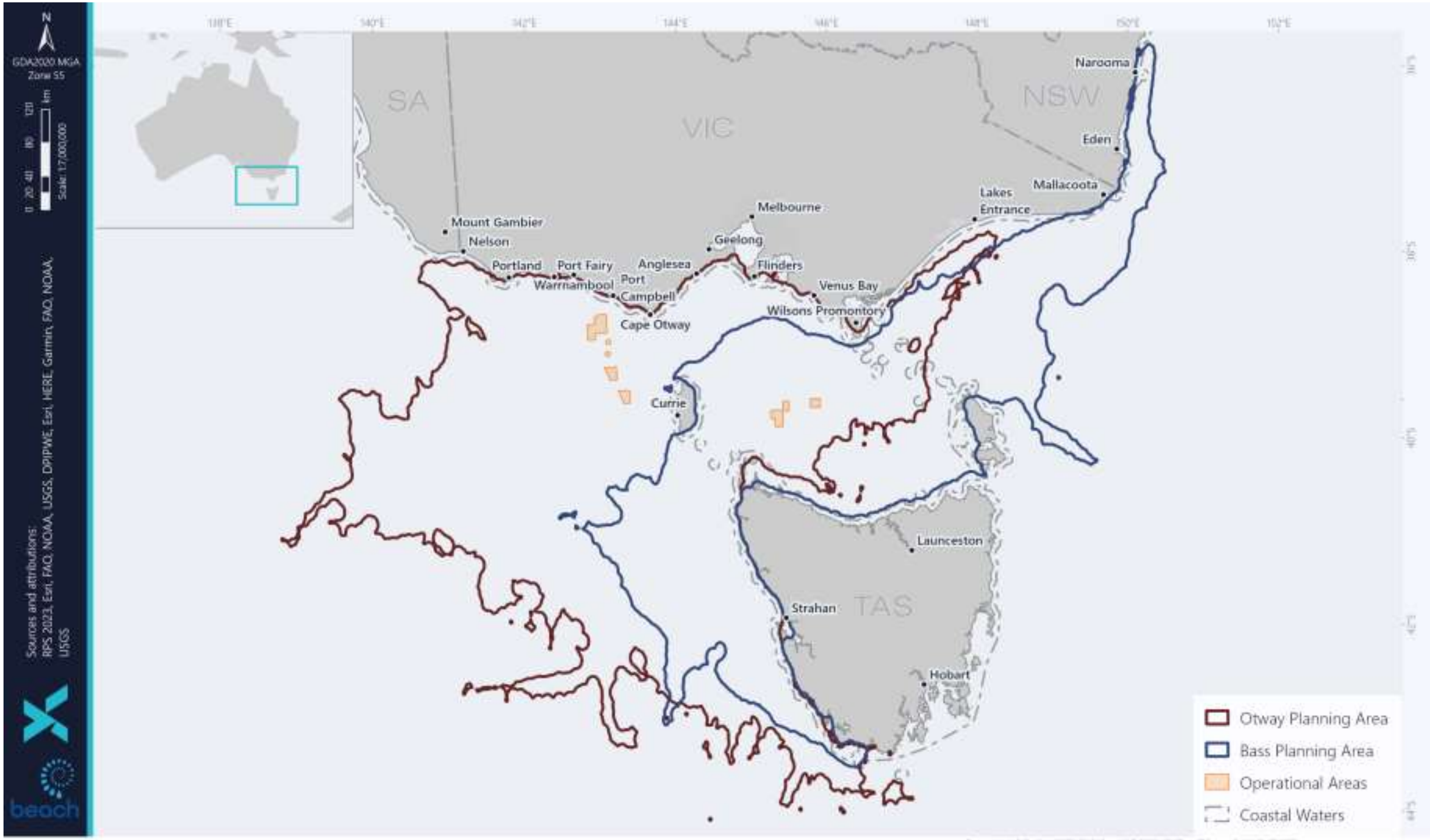


Figure 6-1: Drilling Program Planning and Operational Areas

6.2 Conservation Values and Sensitivities

The following section details the protected areas, heritage areas and key ecological features identified within the Operational and Planning Areas identified from EPBC Protected Matters Search Tool (PMST) Reports.

6.2.1 World Heritage Properties

The PMST Reports (Appendix E) identified one World Heritage Place, the Tasmanian Wilderness, within the Otway and Bass Planning Areas (Figure 6-3).

6.2.1.1 Tasmanian Wilderness

The Tasmanian Wilderness is one the world’s largest temperate wilderness areas. Listed in 1982, it is a precious cultural landscape for Tasmanian Aboriginal people, who lived there for at least 35,000 years (DCCEEW 2021a). The Tasmanian Wilderness is an outstanding example representing major stages of the earth's evolutionary history. The Tasmanian Wilderness has outstanding examples representing significant ongoing geological processes and ongoing ecological and biological processes in the evolution and development of terrestrial, fresh water and coastal ecosystems and communities.

The landscape of the Tasmanian Wilderness has exceptional natural beauty and aesthetic importance and contains superlative natural phenomena including rare fauna and flora. The ecosystems of the Tasmanian Wilderness contain important and significant natural habitats where threatened species of animals and plants of outstanding universal value from the point of view of science and conservation still survive including habitats important for endemic plant and animal taxa and taxa of conservation significance (DCCEEW 2021a).

The Tasmanian Wilderness bears a unique and exceptional testimony to an ancient, ice age society, represented by Pleistocene archaeological sites that are unique, of great antiquity and exceptional in nature, demonstrating the sequence of human occupation at high southern latitudes during the last ice age (DCCEEW 2021a).

The Tasmanian Wilderness provides outstanding examples of a type of landscape which illustrates a significant stage in human history. The world heritage values include archaeological sites which provide important examples of the hunting and gathering way of life, showing how people practised this way of life over long time periods, during often extreme climatic conditions and in contexts where it came under the impact of irreversible socio-cultural and economic change.

The Tasmanian Wilderness World Heritage Area is managed under the Tasmanian Wilderness World Heritage Area Management Plan (DPIPWE 2016a).

6.2.2 Australian Marine Parks

Australian Marine Parks (AMPs) identified in the PMST Reports (Appendix E) are presented in Table 6-2 and Figure 6-2. A total of 9 AMPs overlap the Planning Areas and are described in the following subsections.

Table 6-2 Australian Marine Parks within the Planning Areas

Australian Marine Park	Zone & IUCN Categories	Planning Area	
		Bass	Otway
Apollo	Multiple Use Zone (IUCN VI)	-	✓
Beagle	Multiple Use Zone (IUCN VI)	✓	✓
Boags	Multiple Use Zone (IUCN VI)	✓	✓
East Gippsland	Multiple Use Zone (IUCN VI)	✓	-
Flinders	Marine National Park Zone (IUCN II)	✓	-
Franklin	Multiple Use Zone (IUCN VI)	✓	✓
Huon	Multiple Use Zone (IUCN VI)	-	✓
Nelson	Special Purpose Zone (IUCN VI)	-	✓
Tasman Fracture	Marine National Park Zone (IUCN II)	✓	✓
	Multiple Use Zone (IUCN VI)	✓	✓
Zeehan	Multiple Use Zone (IUCN VI)	-	✓
	Special Purpose Zone (IUCN VI)	✓	✓

The majority of AMPs within the Planning Areas are classified as International Union for Conservation of Nature (IUCN) VI – Multiple Use Zone, 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 Nelson AMP and a section of Zeehan AMP which intersect the Planning Areas are classified as IUCN VI - Special Purpose Zone, which allows for limited mining and low-level extraction of natural resources. Permitted activities are similar to Multiple Use Zones; however, commercial fishing is not permitted.

The southern and eastern reaches of the Planning Areas overlap the Tasman Fracture AMP and Flinders AMP which are classified as IUCN II – Marine National Park Zone. This classification does not allow recreational or commercial fishing. Research and monitoring as well as structures and works are permitted with required authorisation.

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

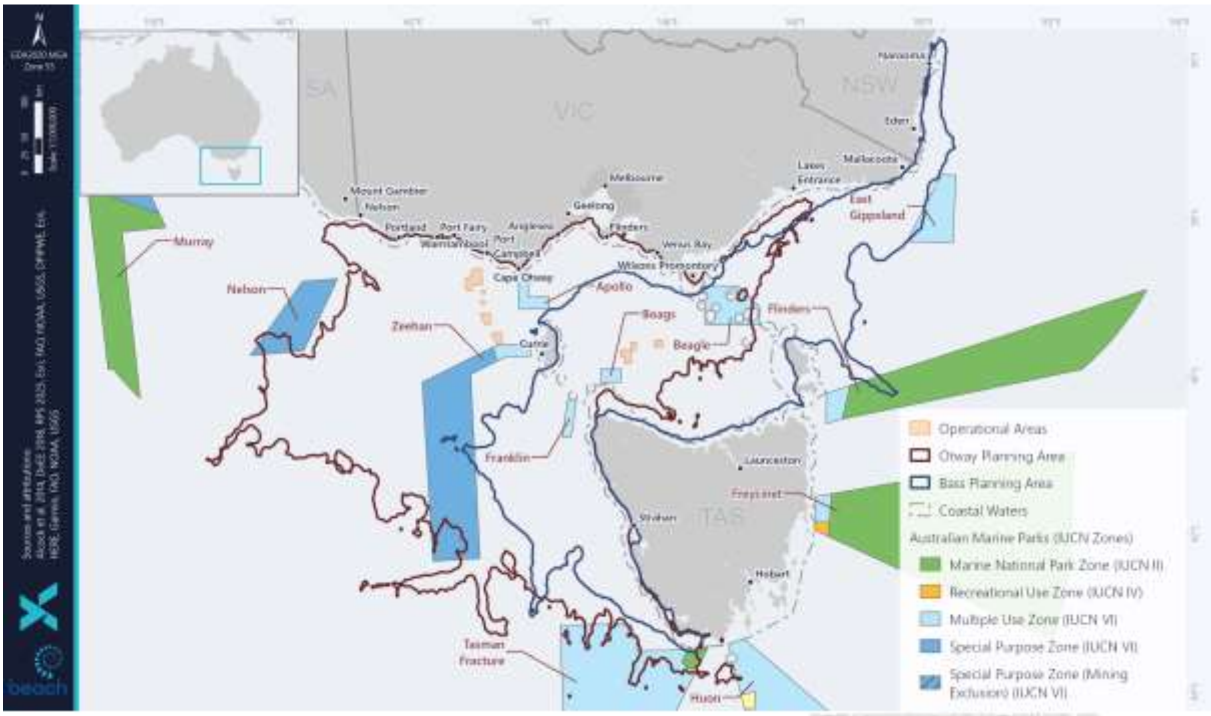


Figure 6-2: Australian Marine Parks within the Planning Areas

6.2.2.1 Apollo

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 comprises 1,184 km^2 of Commonwealth waters (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 crested tern.
- Cultural and heritage site - wreck of the MV City of Rayville.

As detailed in the Australian Marine Parks Science Atlas (AMPSA 2023) the Apollo AMP overlaps the following BIAs:

- Antipodean albatross.
- Black-browed albatross.

- Buller's albatross.
- Campbell albatross.
- Indian yellow-nosed albatross.
- Wandering albatross.
- Wedge-tailed shearwater.
- Common diving petrel.
- White-faced storm petrel.
- White shark.
- Pygmy blue whale.
- Southern right whale.

The Apollo AMP does not overlap any KEFs (AMPSA 2023).

6.2.2.2 Beagle

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 (DNP 2013) 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.

As detailed in the Australian Marine Parks Science Atlas (AMPSA 2023) the Beagle AMP overlaps the following BIAs:

- Black-browed albatross.
- Buller's albatross.
- Campbell albatross.
- Indian yellow-nosed albatross.
- Shy albatross.
- Wandering albatross.
- Little penguin.
- Short-tailed shearwater.
- Common diving petrel.
- White-faced storm petrel.
- White shark.
- Pygmy blue whale.
- Southern right whale.

The Beagle AMP does not overlap any KEFs (AMPSA 2023).

6.2.2.3 Boags

The Boags AMP is a shallow continental ecosystem ranging from 40 m to 80 m depths, covering an area of approximately 537 km^2 (DNP 2013). The marine park contains a high diversity of benthic fauna typical of the central Bass Strait including crustaceans, polychaete worms and molluscs. The pelagic zone is known to support white shark foraging behaviours. The marine park also supports seabird foraging due to the adjacent seabird breeding colonies on the Hunter group of islands.

The major conservation values of the Boags AMP (DNP 2013) are:

- Ecosystems, habitats, and communities associated with the Bass Strait Shelf Province and associated with the seafloor features: plateau and tidal sandwave/sandbank.
- It provides important foraging habitat for the shy albatross, Australasian gannet, short-tailed shearwater, fairy prion, back-faced cormorant, common diving-petrel and little penguin.

As detailed in the Australian Marine Parks Science Atlas (AMPSA 2023) the Boags AMP overlaps the following BIAs:

- Black-browed albatross.
- Buller's albatross.

- Campbell albatross.
- Indian yellow-nosed albatross.
- Shy albatross.
- Wandering albatross.
- Little penguin.
- Short-tailed shearwater.
- Common diving petrel.
- White-faced storm petrel.
- White shark.
- Pygmy blue whale.
- Southern right whale.

The Boags AMP does not overlap any KEFs (AMPSA 2023).

6.2.2.4 East Gippsland

The East Gippsland AMP contains an extensive network of canyons, continental slope and escarpment at water depths from 600 m to more than 4,000 m. The mix of both warm and temperate waters in the reserve create habitat for free-floating aquatic plants or phytoplankton. The East Australian Current combined with complex seasonality in oceanographic patterns creates large eddies of warm water with cooler, nutrient rich waters around the outside of the eddies (DNP 2013). The mixing of these patterns creates conditions for highly productive phytoplankton growth, which support a rich abundance of marine life. Pelagic birds including albatrosses, petrels and shearwaters are known to forage in these waters. Humpback whales are known to migrate through the reserve (DNP 2013).

The major conservation values of the East Gippsland AMP (DNP 2013) are:

- Ecosystems, habitats and communities associated with the Southeast Transition feature: Abyssal plain/deep ocean floor, canyon, escarpment, knoll / abyssal hill and slope.
- Important for biodiversity and productivity from the Bass Cascade and the upwelling east of Eden.
- Important foraging habitat for wandering albatross, black-browed albatross, yellow-nosed albatross, shy albatross, great-winged petrel, wedge-tailed shearwater and cape petrel.
- Important area for the migration of humpback whales.

As detailed in the Australian Marine Parks Science Atlas (AMPSA 2023) the East Gippsland AMP overlaps the following BIAs:

- Antipodean albatross.

- Black-browed albatross.
- Buller's albatross.
- Campbell albatross.
- Indian yellow-nosed albatross.
- Shy albatross.
- Wandering albatross.
- Wedge-tailed shearwater.
- White-faced storm petrel.
- White shark.
- Pygmy blue whale.

The East Gippsland AMP overlaps the Upwelling East of Eden KEF (AMPSA 2023).

6.2.2.5 Flinders

The Flinders AMP is located off the eastern coast of Tasmania. It covers a total area of 27,043 km^2. The Flinders AMP covers a depth range from 40 m to 3,000 m, encompassing the long, steep continental slope off the coast of Tasmania. Marine biodiversity is influenced by the summer incursions of the East Australian Current, and associated eddies. Additionally, a large, relatively undisturbed seamount is located within the park (DNP 2013).

The major conservation values of the Flinders AMP (DNP 2013) are:

- Ecosystems, habitats, and communities associated with sea-floor features: abyssal plain/deep ocean floor, canyons, plateaus, seamounts, the continental shelf and slope.
- Biodiversity and productivity of the East Tasmania subtropical convergence zone.
- Important foraging area for wandering, black-browed, yellow-nosed, and shy albatrosses, northern giant petrel, Gould's petrel, cape petrel, and killer whale.
- Important migration area for the humpback whale.

As detailed in the Australian Marine Parks Science Atlas (AMPSA 2023) the Flinders AMP overlaps the following BIAs:

- Antipodean albatross.
- Black-browed albatross.
- Buller's albatross.

- Campbell albatross.
- Indian yellow-nosed albatross.
- Shy albatross.
- Wandering albatross.
- Black-face cormorant.
- Short-tailed shearwater.
- Common diving petrel.
- White-faced storm petrel.
- White shark.
- Pygmy blue whale.
- Southern right whale.

The Flinders AMP overlaps the Seamounts South and East of Tasmania KEF (AMPSA 2023).

6.2.2.6 Franklin

The Franklin AMP covers an area of 671 km^2 west of the north-western corner of Tasmania and south-east of King Island (DNP 2013). At its northern end, the waters are only 40 m deep, and in much of the reserve the sea floor slopes gently and is covered by fine and coarse sediments. At the southern end of the reserve there is a valley where the water is up to 150 m deep.

The major conservation values for the Franklin AMP (DNP 2013) are:

- Examples of ecosystems, habitats and communities associated with the Tasmanian Shelf Province and the Western Bass Strait Shelf Transition and associated with sea-floor features: shelf, deep/hole/valley, escarpment, and plateau.
- Important foraging area for shy albatross, short-tailed shearwater, Australasian gannet, fairy prion, little penguin, common diving petrel, black-faced cormorant and silver gull.
- Black Pyramid Rock, 6 km north of the AMP supports the largest breeding colony of the Australasian gannet in Tasmania, and one of only eight breeding sites for this species in Australia.
- White sharks also forage in the AMP.

As detailed in the Australian Marine Parks Science Atlas (AMPSA 2023) the Franklin AMP overlaps the following BIAs:

- Antipodean albatross.
- Black-browed albatross.

- Buller's albatross.
- Campbell albatross.
- Indian yellow-nosed albatross.
- Shy albatross.
- Wandering albatross.
- Australasian gannet.
- Little penguin.
- Short-tailed shearwater.
- Common diving petrel.
- White-faced storm petrel.
- White shark.
- Pygmy blue whale.
- Southern right whale.

The Franklin AMP does not overlap any KEFs (AMPSA 2023).

6.2.2.7 Huon

The Huon AMP is located 19 km south-east of Tasmania and comprises a total area of 9,991 km^2 with water depths ranging from 70 m to 3,000 m (DNP 2013). The reserve contains the largest cluster of seamounts in Australian waters which provide a range of depths for a diversity of species. Seamounts are areas of high productivity and play an important role in the transoceanic dispersal of larvae for bottom-dwelling species. The undulating slopes of the seamounts accelerates water currents which expose rocky substrate for many species including corals and sponges and provide a rich food source for filter feeders (DNP 2013). The reserve is also an important foraging area for seabirds including black-browed, Buller's and shy albatrosses, great-winged petrel, short-tailed shearwater and fairy prion. Commercially important fish species such as the blue warehou and ocean perch are known use the reserve as a spawning and nursery area. White sharks and Australian fur seals are also known to utilise the reserve.

The major conservation values of the Huon AMP (DNP 2013) are:

- Ecosystems, habitats and communities associated with the Tasmanian Shelf Province, Tasmania Province and associated with seafloor features: canyon, seamount, pinnacle, saddle, shelf, and terrace.
- Features with high biodiversity and productivity: seamounts south and east of Tasmania.

- Important foraging area for black-browed, Buller's and shy albatrosses, great-winged petrel, short-tailed shearwater and fairy prion, Australian fur seal and killer whale.
- Important migration area for humpback whale.

As detailed in the Australian Marine Parks Science Atlas (AMPSA 2023) the Huon AMP overlaps the following BIAs:

- Antipodean albatross.
- Black-browed albatross.
- Buller's albatross.
- Campbell albatross.
- Indian yellow-nosed albatross.
- Shy albatross.
- Wandering albatross.
- Australasian gannet.
- Short-tailed shearwater.
- Sooty shearwater.
- Common diving petrel.
- Soft-plumaged petrel.
- White shark.
- Pygmy blue whale.
- Southern right whale.

The Huon AMP overlaps the Seamounts South and East of Tasmania KEF (AMPSA 2023).

6.2.2.8 Nelson

The Nelson AMP covers an area of 6,123 km^2 off the coast of South Australia, along the shared maritime border with Victoria (DNP 2013). Due to being beyond the continental shelf, water depths within the park exceed 3,000 m and contains geological features including plateaus, knolls, canyons and the abyssal plain.

The major conservation values of the Nelson AMP (DNP 2013) are:

- Examples of ecosystems, habitats and communities associated with the West Tasmanian Transition and associated with sea-floor features: abyssal plain/deep ocean floor, canyon, knoll/abyssal hill, plateau and slope.
- Important migration area for:
  - Humpback whale.
  - Blue, fin and sei whales (likely migration).

As detailed in the Australian Marine Parks Science Atlas (AMPSA 2023) the Nelson AMP overlaps the following BIAs:

- Antipodean albatross.
- Black-browed albatross.
- Buller's albatross.
- Campbell albatross.
- Indian yellow-nosed albatross.
- Shy albatross.
- Wandering albatross.
- Common diving petrel.
- White shark.

The Huon AMP does not overlap any KEFs (AMPSA 2023).

6.2.2.9 Tasman Fracture

The Tasman Fracture AMP covers an area of 42,501 km^2 in the south-west of Tasmania. (DNP 2013). The AMP extends beyond continental shelf, covering the continental slope and deepwater ecosystems as well as several geological features. Waters surrounding Mewstone, which hosts the largest colony of shy albatrosses, are also protected by the AMP. Water depths vary significantly throughout the AMP, ranging from 60 to 5,559 m. The Planning Area overlaps the Multiple Use Zone (IUCN VI) and National Park Zone (IUCN II). There is an additional Special Purpose Zone to the south of the Planning Area.

The major conservation values for the Tasman Fracture AMP (DNP 2013) are:

- Examples of ecosystems, habitats and communities with the Tasman Province, the Tasmanian Shelf Province and West Tasmania Transition and associated with sea-floor features: abyssal plain/deep ocean floor, basin, canyon, knoll/abyssal hill, pinnacle, plateau, ridge, saddle, shelf, slope, terrace, and trench/trough.
- Important whale migration for humpback whale.

- Important foraging areas for:
  - New Zealand fur-seal.
  - Wandering, black-browed and shy albatrosses; white-chinned petrel; common diving-petrel; short-tailed shearwater; and fairy prion
  - White shark.

As detailed in the Australian Marine Parks Science Atlas (AMPSA 2023) the Tasman Fracture AMP overlaps the following BIAs:

- Antipodean albatross.
- Black-browed albatross.
- Buller's albatross.
- Campbell albatross.
- Indian yellow-nosed albatross.
- Shy albatross.
- Wandering albatross.
- Short-tailed shearwater.
- Sooty shearwater.
- Black-faced cormorant.
- Common diving petrel.
- Soft-plumaged petrel.
- White shark.
- Pygmy blue whale.
- Southern right whale.

The Tasman Fracture AMP overlaps the West Tasmania Canyons and Seamounts South and East of Tasmania KEFs (AMPSA 2023).

6.2.2.10 Zeehan

The Zeehan AMP covers an area of 19,897 km^2 to the west and south-west of King Island in Commonwealth waters surrounding north-western Tasmania (DNP 2013). It covers a broad depth range from the shallow continental shelf depth of 50 m to the abyssal plain which is over 3,000 m deep. The AMP spans the continental shelf, continental slope and deeper water ecosystems of the major biological zone that extends from South Australia to the west of Tasmania. Four submarine canyons incise the continental slope, extending from the shelf edge to the abyssal plains. A rich community made up of large sponges and other permanently attached or fixed invertebrates is present on the continental shelf, including giant crab (*Pseudocarcinus gigas*). Concentrations of larval blue wahoo (*Seriolella brama*) and ocean perch (*Helicolenus* spp.) demonstrate the role of the area as a nursery ground.

Rocky limestone banks provide important seabed habitats for a variety of commercial fish and crustacean species including the giant crab. The area is also a foraging area for a variety of seabirds such as fairy prion, shy albatross, silver gull, and short-tailed shearwater (DNP 2013).

The major conservation values for the Zeehan AMP (DNP 2013) are:

- Examples of ecosystems, habitats and communities associated with the Tasmania Province, the West Tasmania Transition and the Western Bass Strait Shelf Transition and associated with the seafloor features: abyssal plain/deep ocean floor, canyon, deep/hole/valley, knoll/abyssal hill, shelf, and slope.
- Important migration area for blue and humpback whales.
- Important foraging habitat for black-browed, wandering, and shy albatrosses, and great-winged and cape petrels.

As detailed in the Australian Marine Parks Science Atlas (AMPSA 2023) the Zeehan AMP overlaps the following BIAs:

- Antipodean albatross.
- Black-browed albatross.
- Buller’s albatross.
- Campbell albatross.
- Indian yellow-nosed albatross.
- Shy albatross.
- Wandering albatross.
- Short-tailed shearwater.
- Wedge-tailed shearwater.
- Common diving petrel.
- White-face storm petrel.
- White shark.

- Pygmy blue whale.
- Southern right whale.

The Zeehan AMP overlaps the West Tasmania Canyons KEF (AMPSA 2023).

6.2.3 National Heritage Places

National Heritage Places identified within the Planning Areas identified from the PMST Report (Appendix E) are presented in Table 6-3 and Figure 6-3. Listed National Heritage Places which overlap the Planning Areas are described in the subsections below.

Two nominated places, Point Lonsdale Lighthouse Reserve and Environs and Summerland Peninsula overlap the Planning Area but are not yet listed (Table 6-3). Information on the National Heritage Places is sourced from the Australian Heritage Database.

Table 6-3 National Heritage Places within the Planning Areas

National Heritage Places	Class	Status	Coastal Component	Planning Area	
				Bass	Otway
Great Ocean Road and Scenic Environs	Historic	Listed place	✓	-	✓
Point Lonsdale Lighthouse Reserve and Environs	Historic	Nominated place	✓	-	✓
Point Nepean Defence Sites and Quarantine Station Area	Historic	Listed place	✓	-	✓
Quarantine Station and Surrounds (within Point Nepean Site)	Historic	Within listed place	✓	-	✓
Summerland Peninsula	Natural	Nominated place	✓	-	✓
Tasmanian Wilderness	Natural	Listed place	✓	✓	✓
Western Tasmania Aboriginal Cultural Landscape	Indigenous	Listed place	✓	✓	✓

6.2.3.1 Great Ocean Road and Scenic Environs

The Australian Heritage Council found the Great Ocean Road and its scenic environs road from Torquay to Allansford, a journey of 242 km, as a place of outstanding national heritage significance. Constructed by workers, including more than 3,000 returned servicemen, as a memorial to First World War servicemen, the Great Ocean Road is a significant reminder of the participation of Australian servicemen in the First World War, the Australian community's appreciation of their service, and the support provided for the welfare of servicemen and women upon returning to Australia.

The scenic environs include all views from the Great Ocean Road and Great Ocean Walk, including the Twelve Apostles, the Bay of Islands and Bay of Martyrs. The coastline from Lorne to Kennett River is among the world's most dramatic cliff and ocean scenery able to be viewed from a vehicle.

Along the length of the Great Ocean Road, the pullover points, and lookouts beside or nearby the road provide travellers with spectacular views of the coastline, hinterland, and Bass Strait seascape, framed only by cliffs, lighthouses and unencumbered by intrusive built structures. The place is also listed for its; outstanding rocky coastline, dinosaur fossil sites, geomorphological monitoring sites, its association with the pioneering landscape architect Edna Walling, and for the significance of Bells Beach to surfing.

6.2.3.2 Point Nepean Defence Sites and Quarantine Station Area including Quarantine Station and Surrounds

Point Nepean comprises approximately 520 ha at the western end of the Mornington Peninsula, along the southern coast of Port Phillip Bay. The coastline at Point Nepean is rocky with cliffs as well as Pleistocene and Holocene dunes. Ninety species of birds have been recorded at the site.

Point Nepean demonstrates the primary importance of coastal defence as well as Victorian and national quarantine processes. It contains the oldest surviving quarantine accommodation buildings in Australia which was established in 1852 after the discovery of gold which saw 100,000 migrants arriving to the region by sea.

6.2.3.3 Tasmanian Wilderness

The Tasmanian Wilderness Heritage Area comprises approximately 1,383,640 ha (nearly 20% of the land area of Tasmania), which includes 21 parks and reserves as well as privately owned land. It is considered significant for both natural and cultural values. It is one of only three temperate wilderness areas remaining in the southern hemisphere and contains rich flora and fauna biodiversity, much of which is endemic to the region. For further details see Section 6.2.1.1.

6.2.3.4 Western Tasmania Aboriginal Cultural Landscape

The Western Tasmania Aboriginal Cultural Landscape represents the best evidence of an Aboriginal economic adaptation which included the development of a semi-sedentary way of life with people moving seasonally up and down the north-west coast of Tasmania. This way of life began approximately 1,900 years ago and lasted until the 1830s.

Dotted along the wind-swept coastline of the Western Tasmania Cultural Landscape are the remains of numerous hut depressions found in Aboriginal shell middens. These huts and middens are the remnants of an unusual, specialised and more sedentary Aboriginal way of life which was based on the hunting of seals and land mammals, and the gathering of shellfish.

The Western Tasmania Cultural Landscape covers approximately 21,000 ha. Much of the area is remote and uninhabited with its remoteness being a significant factor in the area’s relatively low level of resource use since European settlement.

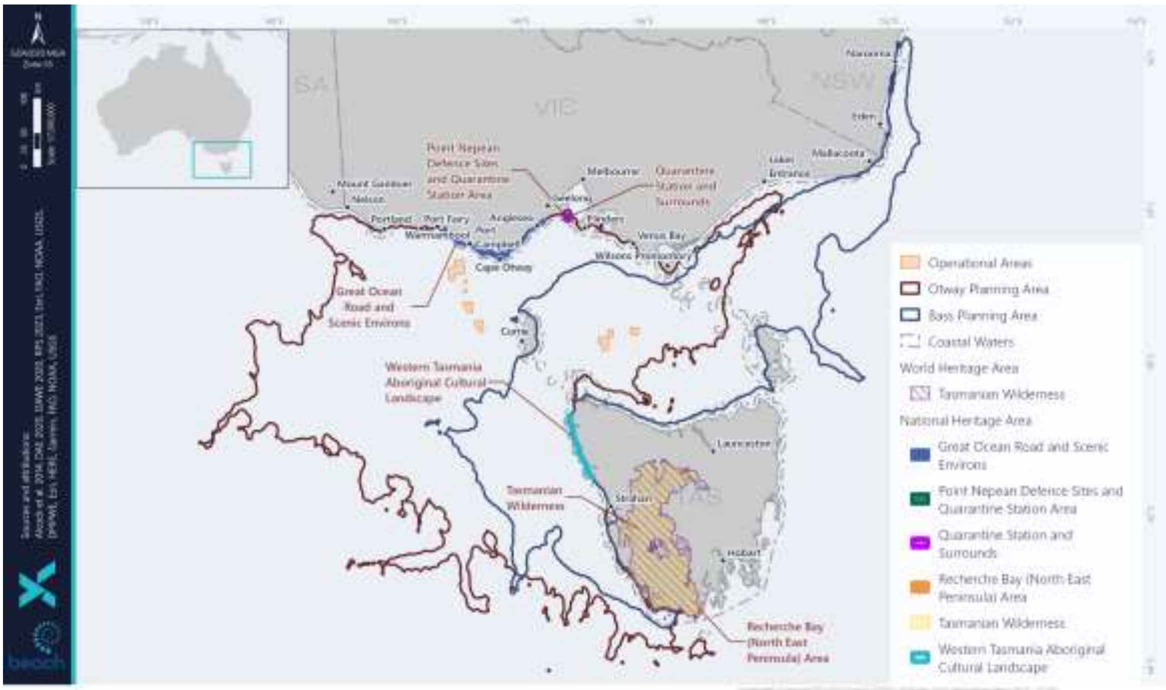


Figure 6-3: World Heritage Properties and National Heritage Places within the Planning Areas

6.2.4 Commonwealth Heritage Places

Commonwealth Heritage Places identified in the PMST Reports (Appendix E) are presented in Table 6-4 and Figure 6-4. Places identified in the PMST Report due to the size of the grids used in the PMST but not actually intersecting the Planning Area are listed in the Table 6-4 with 'X'. Commonwealth Heritage Places which intersect a Planning Area and have a coastal component which may be exposed to hydrocarbons from a spill event are discussed in the subsections below.

Table 6-4 Commonwealth Heritage Places within the Planning Areas

Commonwealth Heritage Places	Heritage Class	Coastal Component	Planning Area	
			Bass	Otway
Cape Sorell Lighthouse	Historic	-	✓	✓
Cape Wickham Lighthouse	Historic	-	X	✓
Fort Queenscliff	Historic	-	-	✓
Gabo Island Lighthouse	Historic	-	✓	-
Goose Island Lighthouse	Historic	-	✓	-
HMAS Cerberus Marine and Coastal Area	Natural	✓	-	✓
Montague Island Lighthouse	Historic	-	✓	-
Sorrento Post Office	Historic	-	-	✓
Swan Island and Naval Waters	Natural	✓	-	✓
Swan Island Defence Precinct	Historic	-	-	✓
Table Cape Lighthouse	Historic	-	X	-
Wilsons Promontory Lighthouse	Historic	-	-	✓

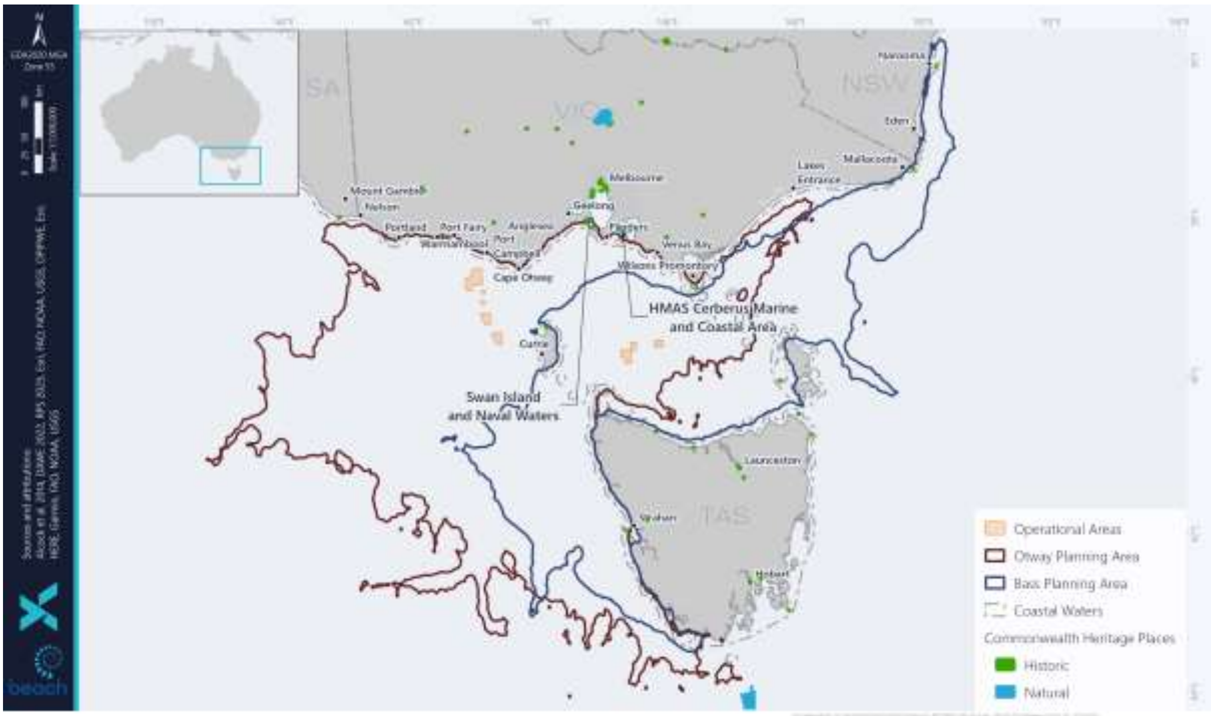


Figure 6-4: Commonwealth Heritage Places within the Planning Areas

6.2.4.1 HMAS Cerberus Marine and Coastal Area

The HMAS Cerberus Marine and Coastal Area comprises 2,400 ha at Sandy Point, one of the largest spit systems on the Victorian coast and thus one of the most dynamic shorelines. It is located along the western shore of the Western Port Ramsar site and shares its significance in providing habitat for migratory and resident waders and shorebirds, primarily on the intertidal mudflats. The site also hosts a large diversity of invertebrates in its wide range of habitats including tidal channels, tidal currents, tidal mudflats, mangroves, saltmarshes, and sand beaches. The intertidal flats are covered by seagrass *Zostera muelleri* which supports a wide range of crustaceans including amphipods, crabs, shrimps, polychaetes, and many bivalves. The mangroves are known to support crabs, polychaetes, bivalves, pulmonated gastropods, amphipods, and isopods. Marine mammals, including the Australian fur-seal and bottlenose dolphin, are also known to occur in the area. There is likely to be cultural values associated with the site which have not yet been identified or documented.

6.2.4.2 Swan Island and Naval Waters

The Swan Island and Naval Waters heritage site comprises approximately 1,000 ha including the whole of Swan Island as well as its surrounding waters. Swan Island is the largest emergent sand accumulation feature in Port Phillip Bay. The heritage site is regarded as an integral part of Swan Bay, an internationally important wetland which supports at least 46 water bird species. Swan Bay also contains extensive sheltered seagrass meadows which serve as a breeding and nursery area for a diverse array of fish species. Swan Bay is one of four major wintering sites for the orange-bellied parrot, providing abundant food sources in the saltmarshes surrounding Swan Island. There is likely to be cultural values associated with the site which have not yet been identified or documented.

6.2.5 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 2017* (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 Otway Planning Area the coast from Cape Otway to Port Fairy is 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 (DTP 2023) and well-known wrecks include Loch Ard (1878), Thistle (1837), Children (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).

There are over 450 historic wrecks (older than 75 years) within the Otway Planning Area and over 200 historic wrecks within the Bass Planning Area (Figure 6-5). The Otway Planning Area contains two historic wrecks with protected zones, the SS Alert and SS Glenelg. The Bass Planning Area contains one historic wreck with a protected zone, the SS Federal (Figure 6-5). SS Glenelg is located within 1.5 km of the Bass Planning Area (Figure 6-5). The Bass Operational Area contains one shipwreck, the SS Albert (Figure 6-5). No wrecks have been recorded within the Otway Operational Areas.

No maritime archaeological heritage was identified in the Beach seabed site assessment for the Otway Gas Development.

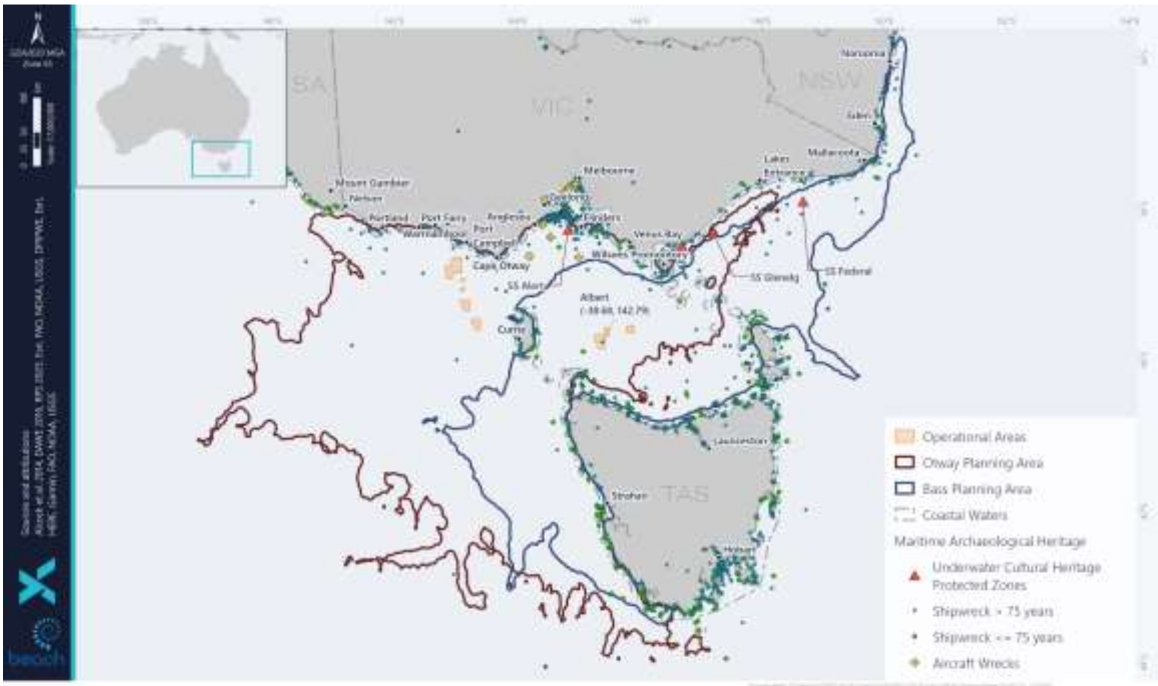


Figure 6-5: Maritime Archaeological Heritage within the Operational and Planning Areas

6.2.6 Wetlands of International Importance

Wetlands of International Importance (Ramsar-listed wetlands) identified in the PMST Reports (Appendix E) are presented in Table 6-5 and Figure 6-6. Wetlands identified in the PMST Report due to the size of the grids used in the PMST but not actually intersecting a Planning Area are listed in the Table with ‘X’. Wetlands of International Importance which intersect a Planning Area and have a coastal component which may be exposed to hydrocarbons from a spill event are discussed in the subsections below.

As defined in the OPGGS(E)R, particular relevant values and sensitivities include: the ecological character of a declared Ramsar wetland within the meaning of that Act. The ecological character and values of the overlapping Ramsar sites are described below and are from the Australian Wetlands Database (DCCEEW 2024j).

Table 6-5 Wetlands of International Importance within the Planning Areas

Wetlands of International Importance (Ramsar)	Coastal Component	Planning Area	
		Bass	Otway
Corner Inlet	✓	X	X
Gippsland Lakes	✓	-	X
Glenelg Estuary and Discovery Bay Wetlands	✓	-	✓
Lavinia	✓	✓	✓
Little Waterhouse Lake	-	X	-
Piccaninnie Ponds Karst Wetlands	✓	-	X
Port Phillip Bay (Western Shoreline) and Bellarine Peninsula	✓	-	✓

Western Port	✓	-	✓

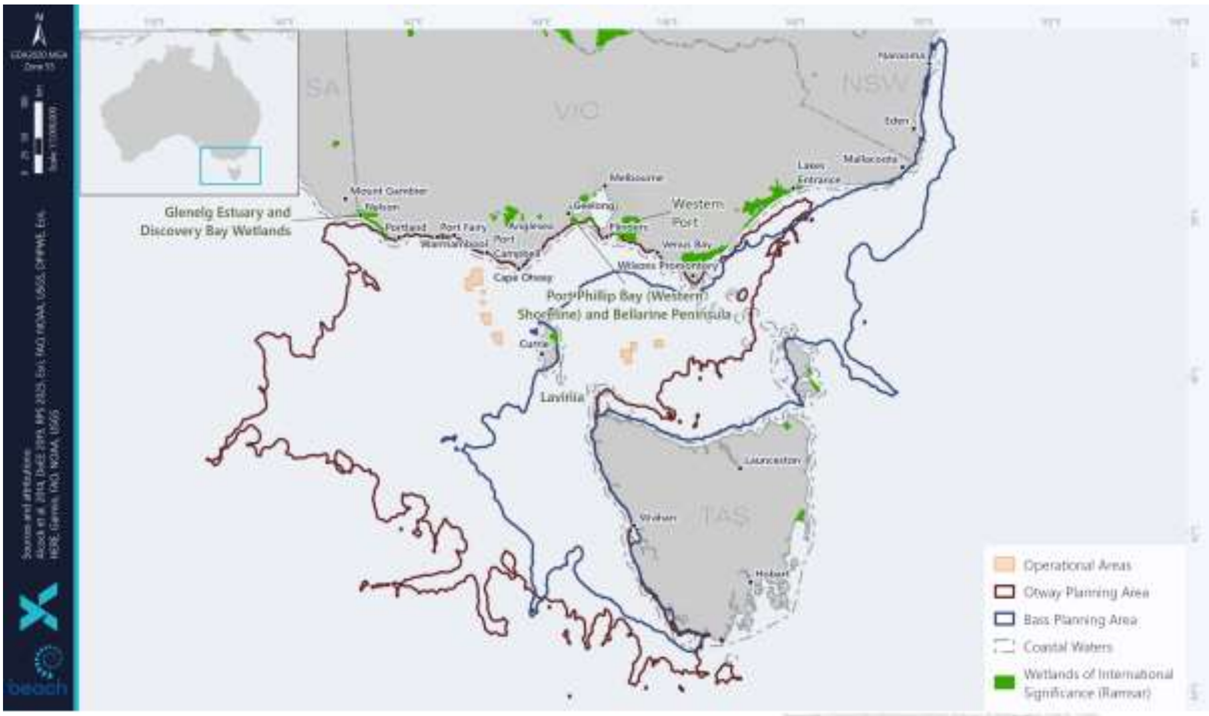


Figure 6-6: Ramsar Wetlands within the Planning Areas

6.2.6.1 Glenelg Estuary and Discovery Bay Wetlands

The Glenelg Estuary and Discovery Bay Wetlands Ramsar site is located in western Victoria, approximately 340 km west of Melbourne along the South Australian border. It is subject to the Glenelg Estuary and Discovery Bay Wetlands Management Plan (DELWP 2017a).

The site comprises approximately 22,289 ha which contain three broad systems of wetlands: freshwater wetlands, the Glenelg Estuary and beach and dune system. The site also contains regionally and internationally rare wetland types, including intact fen peatlands and a humid dune slack system. Several threatened flora and fauna species are supported by the site, including 95 waterbird species and 14 diadromous fish species.

There are 10 critical components, process and services which define the area. Components include hydrology, vegetation type and extent, as well as fish and waterbird diversity and abundance. The stratification process is considered significant in the area. Services include special features (dune slacks), supporting a diversity of wetland types, supporting threatened species, providing physical habitat for waterbirds and ecological connectivity.

The Gunditjmara Indigenous people have a living association with the Ramsar site, which has great cultural significance for them, as it is part of their *Koonang* (sea) and *Bocara Woorrowarook* (river forest) country.

Recreational and tourism activities are popular in the area including recreational fishing, camping, walking, and sightseeing.

6.2.6.2 Lavinia

The Lavinia Ramsar site is located on the north-east coast of King Island, Tasmania. The boundary of the site forms the Lavinia State Reserve, with major wetlands in the reserve including the Sea Elephant River estuary area, Lake Martha Lavinia, Penny's Lagoon, and the Nook Swamps. It is subject to the Lavinia Nature Reserve Management Plan (PWS 2000) (in draft).

The shifting sands of the Sea Elephant River's mouth have caused a large back-up of brackish water in the Ramsar site, creating the saltmarsh which extends up to 5 km inland. The present landscape is the result of several distinct periods of dune formation. The extensive Nook Swamps, which run roughly parallel to the coast, occupy a flat depression between the newer parallel dunes to the east of the site and the older dunes further inland. Water flows into the wetlands from the catchment through surface channels and groundwater and leaves mainly from the bar at the mouth of the Sea Elephant River and seepage through the young dune systems emerging as beach springs.

The Lavinia State Reserve is one of the few largely unaltered areas of the island and contains much of the remaining native vegetation on King Island. There are 10 critical components and processes identified in the Ramsar site: wetland vegetation communities, regional and national rare plant species, regionally rare bird species, Kind Island scrubtit, orange-bellied parrot, water and sea birds, migratory birds, striped marsh frog and the green and gold frog. Benefits provided by the Lavinia Ramsar site include aquaculture (oyster farming), tourism, education, and scientific value.

The vegetation communities include Succulent Saline Herbland, Coastal Grass and Herbfield, Coastal Scrub and King Island *Eucalyptus globulus* Woodland. The freshwater areas of the Nook Swamps are dominated by swamp forest. Nook Swamps and the surrounding wetlands contain extensive peatlands.

The site is an important refuge for a collection of regional and nationally threatened species, including the nationally endangered, orange-bellied parrot. This parrot is heavily dependent upon the samphire plant, which occurs in the saltmarsh, for food during migration. They also roost at night in the trees and scrub surrounding the Sea Elephant River estuary.

Several species of birds which use the reserve are rarely observed on the Tasmanian mainland, including the dusky moorhen, nankeen kestrel, rufous night heron and the golden-headed cisticola.

The Lavinia Ramsar site is also known to have significant Aboriginal sites, particularly around the lagoon system and the coastal beaches (PWS 2000).

The site is currently used for conservation and recreation, including boating, fishing, camping and off-road driving.

There has been considerable damage caused to the saltmarsh community by vehicle disturbance in the Sea Elephant Estuary and the coastal strip (PWS 2000). Vegetation clearance in parts of the catchment upstream as contributed to altered water balance due to less evapotranspiration of rainfall and build-up of the groundwater. There are threats to flora and fauna by invasive weeds and fungus. Although aquaculture plays a role in the Lavinia benefits risk from inputs of nutrients from feeding and occasional opening of the barred estuary for tidal flushing although with farm vehicles disturbance can impact the site.

6.2.6.3 Port Phillip Bay (Western Shoreline) and Bellarine Peninsula

The Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site is located on the western shore of Port Phillip Bay between Melbourne and Geelong and along the Bellarine Peninsula. It is subject to the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site Management Plan (DELWP 2018).

The site comprises 22,897 ha and 6 distinct areas including Point Cooke/Cheetham, Werribee/Avalon, Point Wilson/Limeburner's Bay, Swan Bay, Mud Islands, and the Lake Connewarre complex. These areas contain freshwater wetlands, estuaries, intertidal shorelines, sub-tidal beds, inland saline wetlands as well as a wastewater treatment facility. Coastal saltmarsh and seagrass meadows are dominant within the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site. Smaller areas of freshwater vegetation occur within the Lake Connewarre complex and mangroves at Limeburner's Bay and Barwon Estuary.

The site provides important habitat for many threatened species and is the most important area in Victoria for migratory wading birds. The orange-bellied parrot is known to winter in Port Phillip Bay following their breeding season in Tasmania. Important fish breeding habitat is also present in Swan Bay and Limeburner's Lagoon.

The site also boasts many social and cultural values, including to at least two indigenous language groups. Mud Island is part of Boonwurrung country. The remainder of the site is part of Wathaurong country. Important indigenous sites include burial sites, middens, and artefacts, some of which are at least 5,000 years old.

6.2.6.4 Western Port

The Western Port Ramsar Site is located approximately 60 km to the south-east of Melbourne, occupying a large proportion of the Western Port embayment. It is subject to the Western Port Ramsar Site Management Plan (DELWP 2017c).

Western Port comprises approximately 60,000 ha of many habitats including large shallow intertidal mudflats, seagrass meadows, fringing saltmarsh and mangroves which support a large diversity of birds, fish and invertebrates. The site contains four wetland types including marine subtidal aquatic beds (underwater vegetation), intertidal mud, sand or salt flats, intertidal marshes and intertidal forested wetlands (Hale 2016). Over 20,000 waterbirds utilise the site most years.

The site is located within the traditional lands of the Boonwurrung people, who maintain a strong connection to the waters and the land. Commercial fishing has been banned within the site and is now considered a 'Recreational Fishing Haven.' The Port of Hastings is also within the site which services approximately 200 ships per year.

6.2.7 Nationally Important Wetlands

Nationally Important Wetlands intersecting the Planning Areas are presented in Table 6-6 and Figure 6-7 (PMST Report Appendix E). Wetlands identified in the PMST Report due to the size of the grids used in the PMST but not actually intersecting a Planning Area are listed in the Table with 'X'. Nationally Important Wetlands which intersect a Planning Area and have a coastal component which may be exposed to hydrocarbons from a spill event are discussed in the subsections below.

Information provided on these wetlands is from the DCCEEW Directory of Important Wetlands in Australia.

Table 6-6 Nationally Important Wetlands within the Planning Areas

Nationally Important Wetland	State	Coastal component	Planning Area	
			Bass	Otway
Aire River	VIC	-	-	✓
Anderson Inlet	VIC	✓	-	✓
Benedore River	VIC	✓	X	-
Bungaree Lagoon	TAS	-	-	✓
Coila Creek Delta	NSW	-	X	-
Corner Inlet	VIC	✓	-	X
Jack Smith Lake State Game Reserve	VIC	-	-	X
Lake Ashwood	TAS	-	X	X
Lake Bantick	TAS	-	X	X
Lake Connewarre State Wildlife Reserve	VIC	✓	-	✓
Lake Flannigan	TAS	-	-	✓
Lake Garcia	TAS	-	X	X
Lavinia Nature Reserve	TAS	✓	✓	✓
Lower Aire River Wetlands	VIC	✓	-	✓
Lower Merri River Wetlands	VIC	✓	-	X
Mallacoota Inlet Wetlands	VIC	-	✓	-
Mud Islands	VIC	✓	-	✓
Nadgee Lake and tributary wetlands	NSW	-	✓	-
Nargal Lake	NSW	-	✓	-
Pearshape Lagoons (1-4)	TAS	-	-	✓
Powlett River Mouth	VIC	✓	-	✓
Princetown Wetlands	VIC	✓	-	✓
Rocky Cape Marine Area	TAS	✓	X	-
Swan Bay & Swan Island	VIC	✓	-	✓

Nationally Important Wetland	State	Coastal component	Planning Area	
			Bass	Otway
Tamboon Inlet Wetlands	VIC	✓	X	-
Thompsons Lagoon	TAS	-	X	-
Thurra River	VIC	✓	✓	-
Tower Hill	VIC	-	-	X
Tuross River Estuary	NSW	✓	X	-
Unnamed Wetland	TAS	✓	✓	✓
Wallaga Lake	NSW	✓	X	-
Western Port	VIC	✓	-	✓
Yambuk Wetlands	VIC	-	-	X

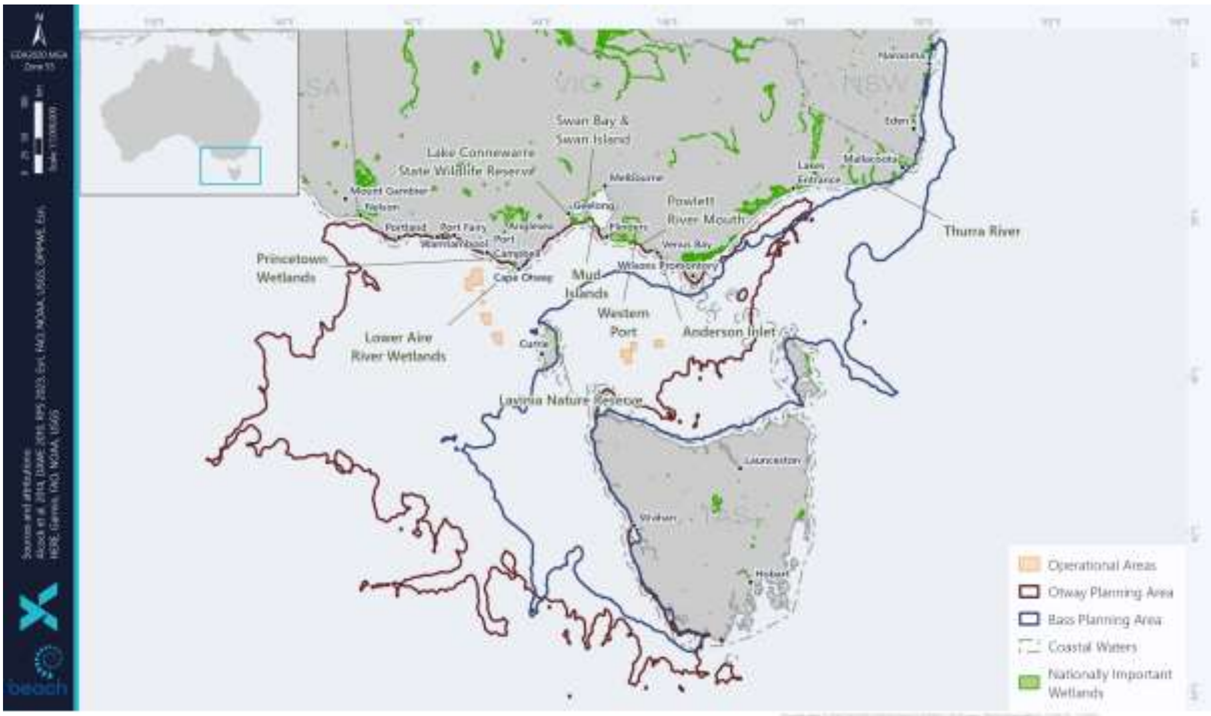


Figure 6-7: Nationally Important Wetlands within the Planning Areas

6.2.7.1 Anderson Inlet

Anderson Inlet is in the South Gippsland Basin on the south-east coast and is one of the largest estuaries in Victoria. Twenty-three species of waterbirds have been recorded at Anderson Inlet including internationally significant numbers of eastern curlew, double-banded plover, sharp-tailed sandpiper, and red-necked stint as well as nationally significant numbers of pacific golden plover and greenshank (SGCS 2003).

Camping in the area is considered a major pressure due to resulting degradation of vegetation and soil compaction. Weeds also pose a threat to the ecological integrity of the reserve as approximately 66% of the 280 flora species recorded are introduced.

6.2.7.2 Lake Connewarre State Wildlife Reserve

Lake Connewarre State Wildlife Reserve is within the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar site (see Section 6.2.6.3). The State Wildlife Reserve consists of a State Game Reserve, where duck shooting is permitted and a Nature Conservation Reserve.

6.2.7.3 Lavinia Nature Reserve

Lavinia Nature Reserve is within the Lavinia Ramsar wetland (see Section 6.2.6.2).

6.2.7.4 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 of State significance for its geomorphology.

6.2.7.5 Mud Islands

Mud Islands wetland is within the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar site (see Section 6.2.6.3).

6.2.7.6 Powlett River Mouth

Powlett River Mouth is in the South Gippsland Basin approximately 130 km to the south-east of Melbourne and supports saltmarsh vegetation. It is subject to the Powlett River Estuary Management Plan (WGCMA 2015).

Orange-bellied parrots have been recorded feeding within the site. Twenty-two fish species have been recorded in the Powlett River, including the Australian grayling (WGCMA 2015). Thirty-one significant bird species have been recorded within the estuary, wetlands, and coastal zone. The dunes near the river mouth have records of Aboriginal cultural heritage significance with a number of coastal midden sites (WGCMA 2015).

6.2.7.7 Princetown Wetlands

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

The wetlands have extensive beds of Common Reed (Phragmites australis) and meadows dominated by Beaded Glasswort (*Sarcocornia australis*) which can support large numbers of waterbirds. Significant numbers of the Swamp Greenhood (*Pterostylis tenuissima* (Nv)) occur in the Princetown Wetlands; this species is found under dense Woolly Tea-tree groves.

The wetlands are used for camping, fishing, boating, duck hunting with parts of the wetlands in the Otway National Park and the Serpentine Creek State Wildlife Reserve.

6.2.7.8 Swan Bay & Swan Island

Swan Bay & Swan Island is within the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar site (see Section 6.2.6.3) as well as the Swan Island and Naval Waters Commonwealth heritage site (see Section 6.2.4.2).

6.2.7.9 Thurra River

The Thurra River is located within the Croajingolong National Park (see Section 6.2.9.6). The site is classed as a site of state geological and geomorphological significance. Major threats to the wetlands include logging in the upper reaches of the catchment and fauna predation because of feral foxes and cats.

6.2.7.10 Western Port

Western Port is a large bay with extensive intertidal flats, mangroves, saltmarsh, seagrass beds, several small islands and two large islands. Western Port is listed as a Ramsar site as per Section 6.2.6.4.

Western Port is a high value wetland for its ecological, recreational, tourist, scientific, educational, cultural, and scenic features. It is a very good example of a saltmarsh-mangrove-seagrass wetland system.

Western Port is of high value for its avifauna and flora. The bays seagrass flats are nursery grounds for King George Whiting and other species of fish and many birds depend on these areas. Many sites in Western Port are of special significance as breeding, roosting, or feeding sites for waterbirds, including migratory wader.

6.2.8 Victorian Protected Areas – Marine

Victorian marine protected areas identified in the PMST Reports (Appendix E) are presented in Table 6-7 and Figure 6-8. Some Victorian marine protected areas are identified in the PMST Report due to the size of the grids used in the PMST but do not actually intersect a Planning Area. These are listed in Table 6-7 with 'X'. Victorian marine protected areas which intersect a Planning Area are discussed in the subsections below.

Table 6-7: Victorian Marine Protected Areas within the Planning Areas

Protected Area Name	Reserve Type	Planning Area	
		Bass	Otway
Barwon Bluff	Marine Sanctuary	-	✓
Bunurong	Marine National Park	-	✓
Bunurong Marine Park	National Parks Act Schedule 4 park or reserve	-	✓
Cape Howe	Marine National Park	✓	-
Churchill Island	Marine National Park	-	X
Discovery Bay	Marine National Park	-	✓
Eagle Rock	Marine Sanctuary	-	✓
Marengo Reefs	Marine Sanctuary	-	✓
Merri	Marine Sanctuary	-	✓

Protected Area Name	Reserve Type	Planning Area	
		Bass	Otway
Mushroom Reef	Marine Sanctuary	-	✓
Ninety Mile Beach	Marine National Park	-	X
Nooramunga Marine & Coastal Park	National Parks Act Schedule 4 park or reserve	-	X
Point Addis	Marine National Park	-	✓
Point Danger	Marine Sanctuary	-	✓
Point Hicks	Marine National Park	✓	-
Port Phillip Heads	Marine National Park	-	✓
The Arches	Marine Sanctuary	-	✓
Twelve Apostles	Marine National Park	-	✓
Wilsons Promontory	Marine National Park	X	✓
Wilsons Promontory Marine Park	National Parks Act Schedule 4 park or reserve	-	✓
Wilsons Promontory Marine Reserve	National Parks Act Schedule 4 park or reserve	X	✓

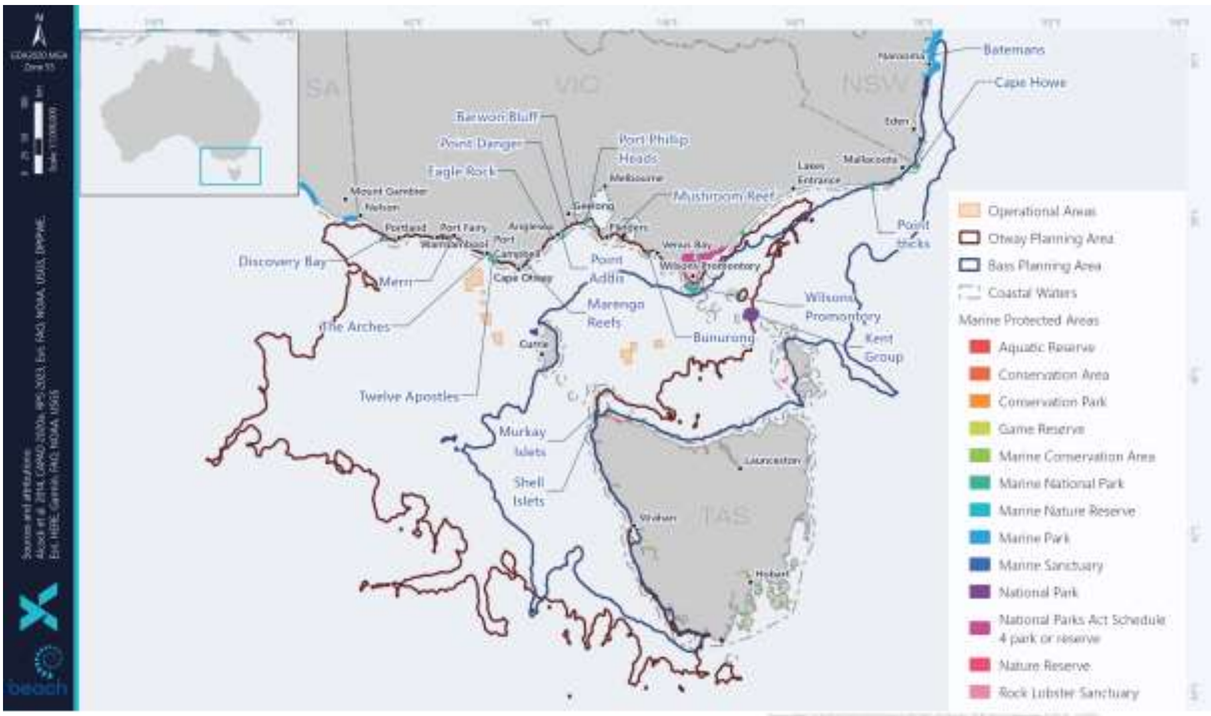


Figure 6-8: State Marine Protected Areas within the Planning Areas

6.2.8.1 Barwon Bluff Marine Sanctuary

The Barwon Bluff Marine Sanctuary are managed through the Barwon Bluff Marine Sanctuary Management Plan (Parks Victoria 2007b). The Plan identifies the key values of the park 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 fish and are also used by migratory fish and 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, shellfish and birds for the Wathaurong people.
- A strong historic and ongoing connection with marine education.
- Remnants from *the Earl of Charlemont*, a heritage-listed shipwreck.

6.2.8.2 Bunurong Marine Park/Marine National Park

The Bunurong Marine National Park is classified as IUCN II (National Parks) and the Bunurong Marine Park as IUCN IV (Habitat/species management area).

The Bunurong Marine National Park 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).
- 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.
- 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.

6.2.8.3 Cape Howe Marine National Park

The Cape Howe Marine National Park is managed under the Cape Howe Marine National Park Management Plan (Parks Victoria 2006c). The key environmental values of the park identified within the park are listed as:

- Diversity of habitats including subtidal and intertidal reefs, subtidal soft sediment, and sandy beaches.
- Co-occurrence of eastern temperate, southern cosmopolitan and temperate species, as a result of the mixing of warm eastern and cool southern waters.
- Marine mammals such as whales, dolphins, Australian fur seals and New Zealand fur seals
- Transient reptiles such as green turtles from northern waters.
- Threatened fauna including whales and birds.
- Foraging area for a significant breeding colony of little penguins from neighbouring Gabo Island.

- Outstanding active coastal landforms within and adjoining the park, such as granite and sandstone reefs.
- Outstanding landscapes, seascapes, and spectacular underwater scenery.
- Victoria's most easterly Marine National Park abutting one of only three wilderness zones on the Victorian coast.
- Opportunities for scientific investigation and learning.
- Opportunities to build knowledge of marine protected areas and their management, and to further understand marine ecological function and changes over time.
- Seascape of high cultural significance to Indigenous people.
- Places and objects of significance to Indigenous people.
- Diverse and rich maritime and post settlement history, including a shipwreck.
- Opportunities for a range of nature-based recreational activities within a pristine and extremely remote wilderness environment.
- Views of Croajingolong National Park (Cape Howe Wilderness Zone) and Gabo Island.
- Opportunities for interpretation and education about the marine environment.

6.2.8.4 Discovery Bay Marine National Park

Discovery Bay Marine National Park protects 2,770 ha within the Southern Ocean and experiences some of the highest wave energy environments in Victoria. It is managed under the Ngootyoong Gunditj Ngootyoong Mara South West Management Plan (Parks Victoria 2015). It is part of *Koonang Mirring* (Sea Country) with the coast of Discovery Bay filled with Aboriginal artefacts that are evidence of earlier ages of plenty and integral to the cultural heritage of the Gunditjmara people.

The Bonney Coast, which extends from Robe in South Australia to Discovery Bay, is a productive area because of a nutrient rich cold water upwelling, known as the Bonney Upwelling, which provides a nutrient-rich environment for fish, whales, seals, penguins, and invertebrates (Parks Victoria 2015).

Conservation Action Planning for marine protected areas across Victoria identified two key focal ecosystems in the park (Parks Victoria 2015):

- Subtidal Reefs with six key natural assets – Brown macroalgae dominated beds, large mobile fish including sharks and rays, motile macroinvertebrates, Giant Kelp Forest communities, sessile invertebrate dominated communities such as thick growths of sponges, ascidians, bryozoans and gorgonians, and mixed red algae sessile invertebrate dominated communities.
- Water Column with key assets including planktonic and other species, baleen whales and seabirds.

6.2.8.5 Eagle Rock Marine Sanctuary

The Eagle Rock Marine Sanctuary covers 17.9 ha and is located along the Victorian Surf Coast in the township of Aireys Inlet, approximately 100 km south-west of Melbourne. The sanctuary extends from the intertidal zone to 300 m offshore and protects many habitats including intertidal and subtidal soft sediment as well as intertidal and subtidal reefs.

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

- Sandy beaches, subtidal soft sediments, subtidal rocky reefs, rhodolith beds and intertidal reefs.
- Eagle Rock, a rock stack of geological significance.
- High diversity of algal, invertebrate and fish species.
- 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.

6.2.8.6 Marengo Reefs 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.

6.2.8.7 Merri Marine Sanctuary

Merri Marine Sanctuary covers 29 ha within the city of Warrnambool in south-western Victoria and protects many habitats including intertidal reef, sand, shallow reef, and rocky overhang. These habitats support many species of algae, invertebrates, fish, and shorebirds. Islands adjacent to the sanctuary provide nesting and roosting areas for many species including little penguins, little pied cormorants, short-tailed shearwaters, and pacific gulls. It is managed under the Merri Marine Sanctuary Management Plan (Parks Victoria 2007c) and is classified as IUCN III.

Indigenous tradition indicates that the sanctuary is within the Country of the Peek Wurrung, Gundidj Mara and the Kirrae Whurrong (Parks Victoria 2007c).

6.2.8.8 Mushroom Reefs Marine Sanctuary

Mushroom Reef Marine Sanctuary covers 80 ha along the southern Mornington Peninsula and protects a system of ancient basalt platforms and reefs. The sanctuary is adjacent to Mornington Peninsula National Park, extending from the high water mark to approximately 1 km offshore. The Mushroom Reef Marine Sanctuary Management Plan (Parks Victoria 2007e) identifies the following important natural values:

- Among the most diverse intertidal and rocky reef communities in Victoria.
- 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 bottom 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.
- Distinctive basalt causeway that provides habitat for numerous crab, seastar and gastropod species.

- Intertidal habitat that support resident and migratory shorebird species including threatened species.

The Burinyung-Bulluk, one of the six clans that made up the Boonwurrung people, inhabited the coastal area from Point Nepean to Hastings, which incorporates the sanctuary area. The reefs and waters of this coast provided excellent sites for gathering shellfish and hunting fish and seals and were among the most important sources of food for Boonwurrung people (Parks Victoria 2007e).

6.2.8.9 Point Addis Marine National Park

Point Addis Marine National Park lies east of Anglesea and covers 4,600 ha. 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 Marine National Park.

It is managed under the Management Plan for Point Addis Marine National Park, Point Danger Marine Sanctuary and Eagle Rock Marine Sanctuary (Parks Victoria 2005b) 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.
- High diversity of algal, invertebrate and fish species.
- 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.
- Spectacular seascape complementing well-known visitor experiences on the Great Ocean Road.

6.2.8.10 Point Danger Marine Sanctuary

Point Danger Marine Sanctuary covers 21.7 ha between the townships of Torquay and Jan Juc along Victorian Surf Coast, approximately 100 km south-west of Melbourne. It extends 600 m offshore and encompasses an offshore rock platform, protecting many habitats including intertidal and subtidal soft sediment as well as intertidal and subtidal reefs which are home to a large diversity of marine plants and invertebrates.

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

- Sandy beaches, subtidal soft sediments, subtidal rocky reefs, rhodolith beds and intertidal reefs.
- High diversity of algal, invertebrate and fish species.
- High diversity of sea slug and other invertebrate communities
- 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.

6.2.8.11 Point Hicks Marine National Park

The Point Hicks Marine National Park is managed under the Point Hicks Marine National Park Management Plan (Parks Victoria 2006e). The plan identifies the key values of the park as:

- Diversity of habitats, including subtidal and intertidal reefs, subtidal soft sediment, and sandy beaches.
- Very high diversity of fauna, including intertidal and subtidal invertebrates.
- Co-occurrence of eastern temperate, southern cosmopolitan and temperate species, as a result of the mixing of warm eastern and cool southern waters.
- Range of rocky habitats, from large boulders to smaller rocks and stones.
- Marine mammals such as dolphins, whales, Australian fur seals and New Zealand fur seals.
- Transient reptiles from northern waters, including turtles and sea snakes.
- Threatened fauna, including whales and several bird species.
- Outstanding landscapes, seascapes and spectacular underwater scenery.

- Outstanding active coastal landforms within and adjoining the park, such as granite reefs and mobile sand dunes.
- Excellent opportunities for scientific investigation and learning.
- Outstanding opportunities to build knowledge of marine protected areas and their management and to further understand marine ecological function and changes over time.
- Seascape and places of significance to Indigenous people.
- Diverse and rich maritime and posts settlement history, including shipwrecks and evidence of shipping history.
- Opportunities for a range of remote nature based recreational activities within a pristine environment.
- Spectacular views of Croajingolong National Park and the Point Hicks Lighthouse.
- Opportunities to view the park from the shore and explore the park without going underwater, by walking along the sandy beaches or investigating the rocky intertidal area.
- Opportunities for interpretation and education about the marine environment.

6.2.8.12 Port Phillip Heads Marine National Park

Port Phillip Heads Marine National Park protects 3,850 ha across six sections including Swan Bay, Mud Islands, Point Lonsdale, Point Nepean, Popes Eye and Portsea Hole. The Port Phillip Heads Marine National Park is managed under the Port Phillip Heads Marine National Park Management Plan (Parks Victoria 2006f). The plan identifies the key values of the park as:

- Incised entrance to Bay (the Rip) and the 'Heads' at Point Nepean and Point Lonsdale.
- Spectacular dive sites such as the Lonsdale and Nepean Walls and popular recreational dive locations.
- Intertidal rock platforms at Cheviot Beach and Point Lonsdale the coastal landscape of Point Nepean in Point Nepean National Park.
- Bottlenose dolphin populations sites listed under the Ramsar Convention for their importance for migratory wading birds (Swan Bay, Mud Islands).
- Distinctive bird-dominated island ecosystem of Mud Islands.
- Sheltered environments such as the seagrass meadows of Swan Bay.

Indigenous tradition indicates that the Mornington Peninsula side of the park, including Mud Islands is part of Country of the Boonwurrung and that the Bellarine Peninsula side of the park is part of Country of the Wathaurong (Parks Victoria 2006f).

6.2.8.13 The Arches Marine Sanctuary

The Arches Marine Sanctuary protects 45 ha of ocean directly south of Port Campbell. It is managed in conjunction with the Twelve Apostles Marine Park under the Management Plan for Twelve Apostles Marine National Park and The Arches Marine Sanctuary (Parks Victoria 2006b).

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.

It is also important to indigenous culture based on spiritual connection to Sea Country.

6.2.8.14 Twelve Apostles Marine National Park

The Twelve Apostles Marine National Park (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 (Parks Victoria 2006b).

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 and Parry 2007). No visible macroalgae species were present within these soft sediment areas (Plummer et al. 2003). 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 Marine National Park 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.
- 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.
- Wreck of the Loch Ard (shipwreck).
- Underwater limestone formations of arches and canyons.

- Diverse range of encrusting invertebrates.
- Spectacular dive site.

6.2.8.15 Wilsons Promontory Marine National Park

Wilsons Promontory National Park 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 (Parks Victoria 2006g) 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.

6.2.9 Victorian Protected Areas – Terrestrial

Victorian terrestrial protected areas identified in the PMST Reports (Appendix E) are presented in Table 6-8 and Figure 6-9. Some Victorian terrestrial protected areas were identified in the PMST Report due to the size of the grids used in the PMST but do not actually intersect a Planning Area. These are listed in Table 6-8 with 'X'. Victorian terrestrial protected areas which intersect a Planning Area and have a coastal component which may be exposed to hydrocarbons from a spill event are discussed in the subsections below where information is available.

Table 6-8: Victorian Terrestrial Protected Areas Intersecting the Planning Areas

Protected Area Name	Reserve Type	Coastal Component	Planning Area	
			Bass	Otway
Aire River	Heritage River	✓	-	✓
Aire River W.R.	Natural Features Reserve	✓	-	✓
Aireys Inlet B.R.	Natural Features Reserve	-	-	✓
Anglesea B.R.	Natural Features Reserve	-	-	✓
Anser Island	Reference Area	✓	-	✓
Baawang	Reference Area	-	✓	-
Bald Hills B.R.	Natural Features Reserve	-	-	X
Barham Paradise S.R.	Natural Features Reserve	-	-	X
Bats Ridge W.R	Nature Conservation Reserve	-	-	X
Bay of Islands Coastal Park	Conservation Park	✓	-	✓
Calder River	Reference Area	-	-	X
Cape Howe	Wilderness Zone	✓	✓	-
Cape Liptrap Coastal Park	Conservation Park	✓	-	✓
Cape Nelson	State Park	✓	-	✓
Cape Patterson N.C.R	Natural Features Reserve	-	-	✓
Crib Point B.R.	Natural Features Reserve	-	-	X
Crinoline Creek	Reference Area	-	-	X
Croajingolong	National Park	✓	✓	-
Curdie Vale N.C.R.	Natural Features Reserve	-	-	X
Deen Maar	Indigenous Protected Area	✓	-	X
Discovery Bay Coastal Park	Conservation Park	✓	-	✓
East Gippsland Coastal streams	Natural Catchment Area	✓	✓	-
Edna Bowman N.C.R.	Natural Features Reserve	-	-	✓
Fingal B.R	Natural Features Reserve	-	-	X
Flinders B.R./N.F.R.	Natural Features Reserve	-	-	X
French Island	National Park	✓	-	✓
Goose Lagoon W.R	Natural Features Reserve	-	-	X
Great Otway	National Park	✓	-	✓
Hedditch Hill S.R.	Natural Features Reserve	-	-	X
Jack Smith Lake W.R	Natural Features Reserve	-	-	X

Protected Area Name	Reserve Type	Coastal Component	Planning Area	
			Bass	Otway
Johanna Falls S.R.	Natural Features Reserve	-	-	✓
Kilcunda N.C.R.	Natural Features Reserve	-	-	✓
Lady Julia Percy Island W.R.	Nature Conservation Reserve	✓	-	✓
Lake Aringa W.R	Nature Conservation Reserve	-	-	X
Lake Connewarre W.R	Natural Features Reserve	✓	-	✓
Lake Denison W.R	Natural Features Reserve	-	-	X
Lake Gillear W.R	Natural Features Reserve	-	-	✓
Latrobe B.R.	Natural Features Reserve	-	-	X
Lawrence Rocks W.R.	Nature Conservation Reserve	✓	-	✓
Lonsdale Lakes W.R	Nature Conservation Reserve	-	-	✓
Lower Glenelg	National Park	-	-	X
Main Ridge N.C.R.	Natural Features Reserve	-	-	X
Marengo N.C.R.	Nature Conservation Reserve	-	-	✓
Mornington Peninsula	National Park	✓	-	✓
Mount Richmond	National Park	-	-	X
Mount Vereker Creek	Natural Catchment Area	✓	-	X
Parker River	Reference Area	-	-	✓
Phillip Island Nature Park	Other	✓	-	✓
Point Nepean	National Park	✓	-	✓
Port Campbell	National Park	✓	-	✓
Portland B.R.	Natural Features Reserve	-	-	X
Princetown W.R	Natural Features Reserve	-	-	✓
Queenscliff N.F.R	Natural Features Reserve	-	-	✓
Rame Head	Remote and Natural Area - Schedule 6, National Parks Act	✓	✓	-
Reef Island and Bass River Mouth N.C.R	Natural Features Reserve	✓	-	X
Salt Lagoon, St Leonards W.R	Nature Conservation Reserve	-	-	X
Sandpatch	Wilderness Zone	✓	✓	-
Seal Creek	Reference Area	-	X	-

Protected Area Name	Reserve Type	Coastal Component	Planning Area	
			Bass	Otway
Seal Islands W.R.	Nature Conservation Reserve	✓	-	✓
Southern Wilsons Promontory	Remote and Natural Area - Schedule 6, National Parks Act	✓	X	✓
Stony Creek (Otways)	Reference Area	✓	-	✓
Swan Bay - Edwards Point W.R.	Nature Conservation Reserve	✓	-	✓
Tower Hill W.R	Natural Features Reserve	✓	-	X
Trewalla B.R.	Natural Features Reserve	-	-	X
Unnamed P0176	Private Nature Reserve	-	-	✓
Ventnor B.R.	Natural Features Reserve	-	-	✓
Vereker Creek	Reference Area	✓	-	X
Waratah B.R	Natural Features Reserve	-	-	X
Wild Dog B.R.	Natural Features Reserve	-	-	X
Wild Dog Creek SS.R.	Natural Features Reserve	-	-	✓
Wilsons Promontory	National Park	✓	X	✓
	Wilderness Zone	✓	-	X
Wilsons Promontory Islands	Remote and Natural Area - Schedule 6, National Parks Act	✓	-	✓
Wongarra B.R.	Natural Features Reserve	-	-	X
Wonthaggi B.R.	Natural Features Reserve	-	-	X
Wonthaggi Heathlands N.C.R.	Natural Features Reserve	-	-	✓
Yambuk F.F.R.	Nature Conservation Reserve	✓	-	X

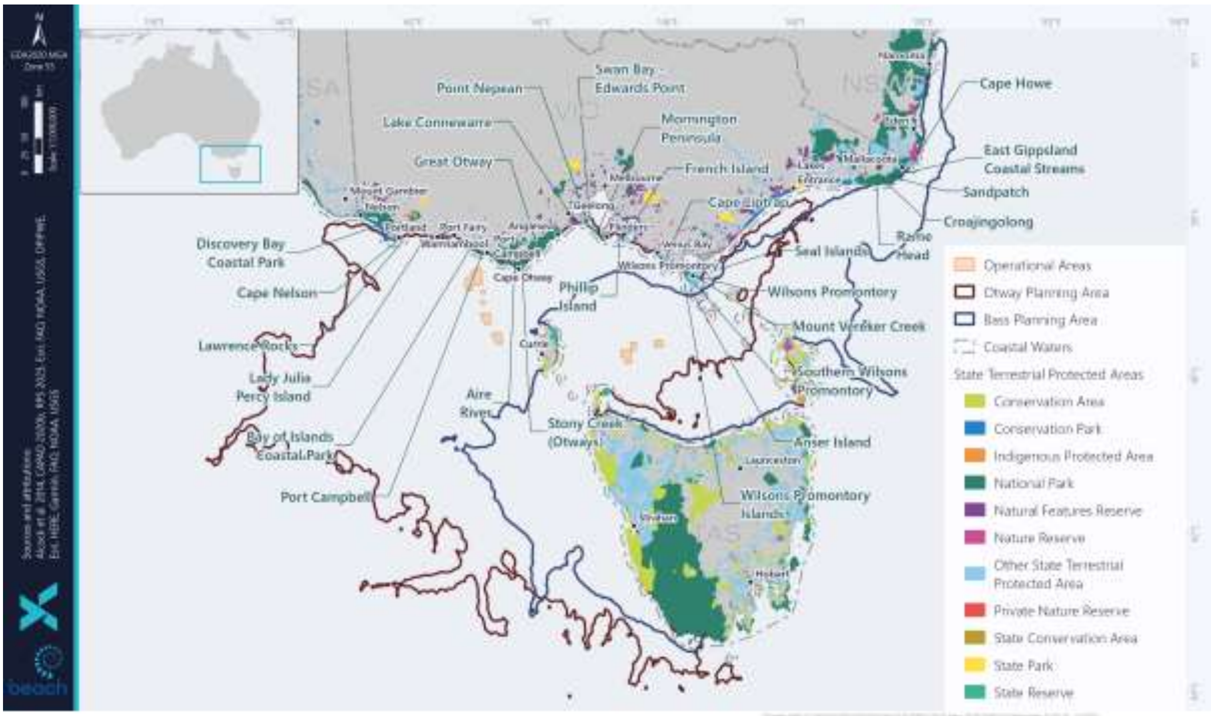


Figure 6-9: State Terrestrial Protected Areas within the Planning Areas - Victoria

6.2.9.1 Aire River Heritage River

The Aire River is a perennial river of the Corangamite catchment, located in the Otway region. The river generally flows west by south then south through the Great Otway National Park (see Section 6.2.9.9), joined by three minor tributaries, before reaching its mouth and emptying into Bass Strait west of Cape Otway. It is a popular fishing and camping area. It is managed under the Aire River Estuary Management Plan 2015-2023 (Corangamite CMA 2015).

6.2.9.2 Anser Island

Anser Island is the largest island of the Anser Group, spanning 80 ha and located 1.5 km south-west of Wilsons Promontory. Anser Island is within the Wilsons Promontory National Park (see Section 6.2.9.17) and managed under its management plan. The general management aim of reference areas is to protect viable samples of one or more land types that are relatively undisturbed for comparative study with similar land types elsewhere, by keeping all human interference to the essential minimum and ensuring as far as practicable that the only long-term change results from natural processes (Parks Victoria 2002).

6.2.9.3 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).

6.2.9.4 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.
- Occurrence of about 270 species of flowering plants, including 27 orchid species.
- 30 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.

6.2.9.5 Cape Nelson State Park

Cape Nelson State Park is located in south-western Victoria and is managed under the under the Ngootyoong Gunditj Ngootyoong Mara South West Management Plan (Parks Victoria 2015). Key features of this state park include:

- Presence of numerous walks, including a portion of the 250 km Great South West Walk.
- Diverse and representative vegetation of coastal Victoria, including heath, wet heath, and soap mallee communities.
- Habitat for restricted fauna species, including black wallabies, bandicoots, and firetail finches.

6.2.9.6 Croajingolong National Park (Including Cape Howe Wilderness Zone, East Gippsland Coastal Streams, Rame Head Remote and Natural Area, Sandpatch Wilderness Zone)

Croajingolong National Park is located in south-western Victoria and is managed under the Croajingolong National Park Management Plan (Parks Victoria 1996). The plan identifies the following environmental values within the park:

- Wide variety of coastal landforms including tidal inlets, estuaries and lagoons, dune-blocked lake and swamp systems, freshwater interdune lakes, extensive sand dunes and sand sheets, and prominent rocky cliffs.
- Many sites recognised for their geological and geomorphological significance.
- Habitats supporting over 1,000 recorded native plant species, 87 of which are listed as threatened in Victoria and have primary habitat within the Park.
- 90 species of orchids, including all five of Australia's lithophytic and epiphytic orchids.
- Significant and well developed sites of Warm Temperate Rainforest in the lower reaches of a number of rivers, notably Wau Wauka Creek, Harrisons Creek and Dowell Creek.
- Coastal Heathland, a community considered to be extremely species rich, and covering up to 10% of the Park.
- Habitats supporting 43 species of threatened fauna, including the little tern, ground parrot, eastern bristle-bird, eastern broad-nosed bat, and Australian fur-seal.
- The Skerries, one of only four Australian fur-seal colonies in the State and an important breeding site for penguins and other seabirds.
- Records for the Park include one third of Victoria's and one quarter of Australia's bird species.
- Some of the richest amphibian habitats in Victoria.
- Coastal streams and catchments which are relatively undisturbed, with an absence of introduced fish species and good populations of native fish species.
- Localities with among the highest wilderness quality in the State, outside the mallee, and two of the three coastal wilderness areas in Victoria
- An area of major significance and importance in Victoria for the conservation and protection of Aboriginal sites.
- Sites giving an insight into the European history of the State, with evidence of maritime history, settlement, utilisation and the reservation of parks.
- The site of the first European sighting of eastern mainland Australia by Lieutenant Hicks aboard the *Endeavour* in 1770.

6.2.9.7 Discovery Bay Coastal Park

Discovery Bay Coastal Park comprises 10,460 ha and extends along the coast of Discovery Bay from Cape Nelson north-westwards for 50 km to the border with South Australia. The park is managed under the Ngootyoong Gunditj Ngootyoong Mara South West Management Plan (Parks Victoria 2015).

- Part of the Great South West Walk, a long distance 250 km semi-remote hiking trail.
- The Cape Bridgewater fur seal colony is located within the park.

- The beaches are part of the stronghold for hooded plovers in Victoria.
- Glenelg River Heritage River.
- Remote and natural setting for experienced surfers.

6.2.9.8 French Island National Park

French Island National Park protects 11,100 ha of wetlands of international significance and is the only national park in Victoria totally contained on an island. It is the largest island along the Victorian coastline, located off the Mornington Peninsula in Western Port (see Section 6.2.6.4) and characterised by a range of coastal habitats including rocky shorelines, sandy beaches, mangroves, saltmarshes and wetlands. More than 230 bird species have been recorded on French Island, including the orange-bellied parrot, white-bellied sea eagle and 33 species of waders.

The park is protected under the French Island National Park Management Plan (Parks Victoria 1998a) which identifies the following natural values:

- The only substantial representation of the land systems of the coastal sand plains and clayey-sand plains of Western Port within the State's nature conservation reserve system.
- Extensive mangrove and saltmarsh areas along the north coast which are of State geomorphological importance.
- Part of the Western Port site listed under the Convention on Wetlands of International Importance especially as Waterfowl Habitat (the Ramsar Convention) see Section 6.2.6.4.
- Habitat for a vast number of migratory birds which are listed under the JAMBA and CAMBA.
- The sand spit along the west coast is an important research site for sediment movement and coastal dynamics.
- Rich flora with more than 580 species, including about 100 orchids and 12 threatened species.
- Vegetation of at least State botanical significance, with high quality representative samples of sand heathland, shrubby foothill forest, coastal heathland, coastal saltmarsh, and swamp sedgeland and grassland.

Fauna of international and national significance, including more than 260 species, whose conservation is enhanced by the island's isolation from the mainland preventing colonisation by foxes and limiting the degree of habitat disturbance.

6.2.9.9 Great Otway National Park (including Stony Creek Reference Area)

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:

- Large area of essentially unmodified coastline, linking the land to marine ecosystems and marine national parks.
- 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.

6.2.9.10 Deen Maar (Lady Julia Percy) Island Wilderness Reserve

Deen Maar (Lady Julia Percy) Island is located 21 km south-west of Port Fairy and is one of four Australian fur-seal breeding colonies in Victoria and the largest known breeding colony in Australia.

6.2.9.11 Lake Connewarre Wilderness Reserve

Lake Connewarre Wilderness Reserve is within the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar site (see Section 6.2.6.3).

6.2.9.12 Lawrence Rocks Wildlife Reserve

Lawrence Rocks are two rocky islets and an associated reef 2.4 km south-east of Point Danger and is classified an Important Bird Area due to supporting a breeding colony of over 10% of the world's known population of Australasian gannets (BirdLife 2024a). Lawrence Rocks are the remnant peaks of a submerged volcano (Parks Victoria 2015).

Lawrence Rocks comes under the Ngootyoong Gunditj Ngootyoong Mara South West Management Plan (Parks Victoria 2015).

6.2.9.13 Mornington Peninsula National Park

Mornington Peninsula National Park protects 2,686 ha of land along the coast approximately 70 km south of Melbourne, often described as 'Melbourne's Playground' due to its popularity for recreation. Mornington Peninsula National Park is the most visited park in Victoria.

The park is managed under the Mornington Peninsula National Park and Arthurs Seat State Park Management Plan (Parks Victoria 1998c) which identifies the following values:

- 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 particular land systems formed within the Southern Victorian Coastal Plains and the Southern Victorian Uplands.
- Many significant native plants and vegetation communities.
- Highly scenic landscape values along the ocean coast and at Port Phillip heads and prominent feature of Arthurs Seat.
- One of the highest recorded densities of Aboriginal archaeological sites along the Victorian Coast.
- 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.

6.2.9.14 Phillip Island Nature Park

Phillip Island is east of Melbourne and forms a natural breakwater for the shallow waters of Western Port. It is known by its Traditional Owners, the Bunurong, as Millowl and forms part of the Kulin nation with a history dating back tens of thousands of years (SoV 2021). Today the Island is a popular tourist destination, due to a range of nature-based experiences and attractions along with boating, fishing, sporting opportunities and national and international motor racing events.

Phillip Island is Biologically Important Area (BIA) for the little penguin, with breeding and foraging sites present (DCCEEW 2023h). The successful eradication of foxes has contributed to the strong recovery of several species including little penguins and short-tailed shearwaters (SoV 2021).

6.2.9.15 Point Nepean National Park

Point Nepean National Park protects 560 ha of land at the tip of Mornington Peninsula and is managed under the Point Nepean National Park Master Plan (Parks Victoria 2017). The park is surrounded by Port Phillip Heads Marine National Park (see Section 6.2.8.12). The park is of great cultural significance as a sacred place to Traditional Owners for over 35,000 years, a landmark and natural resource to European settlers, as well as a line of defence for Victoria and Australia (Parks Victoria 2017). Restricted access has allowed the park to maintain the largest and most intact area of remnant coastal vegetation on the Port Phillip coast and Victoria's largest remnant area of coastal alkaline scrub. Intertidal rock platforms support a diverse marine ecosystem while dune habitats provide roosting and feeding opportunities for resident and migratory seabirds.

6.2.9.16 Port Campbell National Park

Port Campbell National Park and Bay of Islands Coastal Park combine to form a linear reserve along 65 km of Victoria's southern ocean coastline and contain a number of major tourist attractions, including the 'Twelve Apostles'. The park is managed under the Port Campbell National Park and Bay of Islands Coastal Park Management Plan (Parks Victoria 1998).

The park natural values include various fauna such as the little penguin, short-tailed shearwater and various whale species (Parks Victoria 2019b).

Within the park is evidence of Aboriginal activities, including shell middens, stone artefacts, and staircases cut into the coastal cliffs (Parks Victoria 2019b).

6.2.9.17 Seal Islands Wildlife Reserve

Seal Islands Wildlife Reserve is located approximately 14 km east of Wilsons Promontory and is part of the Wilsons Promontory Islands Important Bird Area (BirdLife International 2024b).

6.2.9.18 Swan Bay - Edwards Point Wildlife Reserve

Edwards Point Wildlife Reserve protects a 4 km sand spit within Swan Bay. See Sections 6.2.6.3 and 6.2.8.12 for further details about ecological significance.

6.2.9.19 Wilsons Promontory National Park including South Wilsons Promontory and Wilsons Promontory Islands

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.
- 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.
- 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.

6.2.10 Tasmanian Protected Areas - Marine

Tasmanian marine protected areas identified in the PMST Reports (Appendix E) are presented in Table 6-9 and Figure 6-9. Some Tasmanian marine protected areas were identified in the PMST Report due to the size of the grids used in the PMST but do not actually intersect a Planning Area. These are listed in Table 6-9 with 'X'. Tasmanian marine protected areas which intersect a Planning Area are discussed in the subsections below where information is available.

Table 6-9: Tasmanian Marine Protected Areas within the Planning Areas

Protected Area Name	Reserve Type	Planning Area	
		Bass	Otway
Arthur Bay	Conservation Area	✓	-
Chappell Islands	Nature Reserve	✓	-
Kent Group	National Park	✓	✓
Marriott Reef	Conservation Area	✓	-
Murkay Islets	Conservation Area	✓	✓
Pardoe Northdown	Conservation Area	X	-
Reef Island	Conservation Area	✓	-
Shell Islets	Conservation Area	✓	✓
Unnamed (Duck Bay)	Conservation Area	X	-
West Inlet	Conservation Area	X	-

6.2.10.1 Kent Group National Park

Kent Group National Park is made up of islands and islets, situated halfway between Wilsons Promontory in Victoria and Flinders Island off Tasmania's north-eastern tip. Kent Group National Park is in the middle of Bass Strait where it is subject to a constant barrage of wild seas and currents that with it brings richness in nutrients that supports a unique diversity of marine life. The islands are an important refuge for seabirds along with providing a sanctuary for the Australian fur-seals who make their home on the rocky outcrops (DPIPWE 2021).

Several sites of Aboriginal occupation are known in the park (PWS 2005).

6.2.10.2 Murkay Islets Conservation Area

The Murkay Islets are part of the Trefoil Island Group near Cape Grim off the north-western coast of Tasmania, comprising a combined area of approximately 0.5 ha. They are also included in the Hunter Island Group Important Bird Area, recognised by BirdLife Australia for providing important breeding habitat for significant bird species including the short-tailed shearwater, black-faced cormorant, Pacific gull and orange-bellied parrot (BirdLife International 2023a).

6.2.10.3 Shell Islets Conservation Area

The Shell Islets are a group of small islands within the Trefoil Island Group near Cape Grim off the north-western coast of Tasmania, comprising a combined area of approximately 0.08 ha (Brothers et al. 2001). The islets provide important breeding and foraging habitat for several seabird, shorebird and wader species including the Caspian tern, red-necked stints and sanderlings.

6.2.11 Tasmanian Protected Areas – Terrestrial

Tasmanian terrestrial protected areas identified in the PMST Reports (Appendix E) are presented in Table 6-10 and Figure 6-10. Areas identified in the PMST Report due to the size of the grids used in the PMST but not actually intersecting a Planning Area are listed in the Table with 'X'. Tasmanian terrestrial protected areas which intersect a Planning Area and have a coastal component which may be exposed to hydrocarbons from a spill event are discussed in the subsections below, where information is available. Indigenous Protected Areas are described in Section 6.6.2.5.

Table 6-10 Tasmanian Terrestrial Protected Areas within the Planning Areas

Protected Area Name	Reserve Type	Coastal Component	Planning Area	
			Bass	Otway
Albatross Island	Nature Reserve	✓	✓	✓
Anderson Islands	Conservation Area	✓	X	-
Arthur River Rd Marrawah	Conservation Covenant	-	X	X
Arthur-Pieman	Conservation Area	✓	✓	✓
Badger Box Creek	Nature Reserve	-	-	✓
Badger Island	Indigenous Protected Area	✓	✓	-
Badger River	Regional Reserve	-	X	X
Bass Pyramid	Nature Reserve	✓	✓	✓
Bernafai Ridge	Conservation Area	-	-	X
Big Green Island	Nature Reserve	✓	✓	
Bird Island	Game Reserve	✓	✓	✓
Black Pyramid Rock	Nature Reserve	✓	✓	✓
Blyth Point	Conservation Area	✓	✓	-
Boat Harbour Road Killiecrankie	Conservation Covenant	-	✓	-
Bond Tier	Regional Reserve	-	-	X

Protected Area Name	Reserve Type	Coastal Component	Planning Area	
			Bass	Otway
Boxen Island	Conservation Area	✓	✓	-
Brick Islands	Conservation Area	✓	X	-
Brougham Sugarloaf	Conservation Area	-	X	-
Bull Rock	Conservation Area	✓	✓	-
Bun Beetons Point	Conservation Area	✓	✓	-
Calm Bay	State Reserve	✓	✓	✓
Cape Sorell	Historic Site	✓	✓	✓
Cape Wickham	Conservation Area	✓	X	✓
	State Reserve	-	X	✓
Cataraqui Point	Conservation Area	✓	X	✓
Chalky Island	Conservation Area	✓	✓	-
Christmas Island	Nature Reserve	✓	-	✓
City of Melbourne Bay	Conservation Area	✓	✓	✓
Colliers Forest Reserve	Conservation Covenant	-	X	✓
Colliers Swamp	Conservation Area	-	✓	✓
Comeback Rd Marrawah	Conservation Covenant	-	-	X
Cone Islet	Conservation Area	✓	✓	✓
Councillor Island	Nature Reserve	✓	✓	✓
Counsel Hill	Conservation Area	-	X	✓
Craggy Island	Conservation Area	✓	✓	-
Crayfish Creek	Regional Reserve	-	X	-
Currie Lightkeepers Residence	Historic Site	-	-	✓
Curtis Island	Nature Reserve	✓	✓	✓
Darling Range	Conservation Area	-	X	-
Deep Lagoons	Conservation Area	-	-	✓
Devils Tower	Nature Reserve	✓	✓	✓
Disappointment Bay	State Reserve	✓	X	✓
Doughboy Island	Conservation Area	✓	✓	-
East Kangaroo Island	Nature Reserve	✓	✓	-
East Moncoeur Island	Conservation Area	✓	✓	✓
Edgcumbe Beach	Conservation Area	✓	X	-
Egg Beach	Conservation Area	✓	✓	-
Eldorado	Conservation Area	-	X	✓

Protected Area Name	Reserve Type	Coastal Component	Planning Area	
			Bass	Otway
Emita	Nature Recreation Area	✓	✓	-
Foochow	Conservation Area	✓	X	-
Forwards Beach	Conservation Area	✓	X	-
Fotheringate Bay	Conservation Area	✓	✓	-
Four Mile Beach	Regional Reserve	✓	✓	✓
Gentle Annie	Conservation Area	-	X	✓
Goose Island	Conservation Area	✓	✓	-
Harbour Islets	Conservation Area	✓	✓	✓
Harcus Island	Conservation Area	✓	X	X
Harcus River Rd West Montagu	Conservation Covenant	-	X	X
Harcus River Road	NRS Addition - Gazettal in Progress	-	X	X
Harcus River Road #4	Conservation Covenant	-	X	X
Harcus River Road Marrawah	Conservation Covenant	-	X	X
Henderson Islets	Conservation Area	✓	✓	✓
Highfield	Historic Site	-	✓	-
Hogan Group	Conservation Area	✓	✓	✓
Holts Point	Conservation Area	✓	✓	-
Hunter Island	Conservation Area	✓	✓	✓
Isabella Island	Nature Reserve	✓	✓	-
Jacksons Cove	Conservation Area	✓	✓	-
Kangaroo Island	Conservation Area	✓	✓	-
Kentford Forest	Conservation Area	-	-	✓
	Nature Reserve	-	-	✓
Kentford Rd Nugara	Conservation Covenant	-	-	✓
Killiecrankie	Nature Recreation Area	✓	✓	-
Kings Run	Private Nature Reserve	-	✓	✓
Kings Run #2	Conservation Covenant	-	✓	✓
Kuhns Rd Memana	Conservation Covenant	-	X	-
Lavinia	State Reserve	✓	✓	✓
Lily Lagoon	Nature Reserve	-	-	✓
Little Chalky Island	Conservation Area	✓	✓	-
Little Island	Conservation Area	✓	✓	-

Protected Area Name	Reserve Type	Coastal Component	Planning Area	
			Bass	Otway
Little Peggs Beach	State Reserve	✓	X	-
Little Trefoil	Conservation Area	✓	✓	✓
Long Island	Conservation Area	✓	✓	-
Low Point	Conservation Area	✓	✓	-
lungatalanana	Indigenous Protected Area	✓	✓	-
Lymwood	Conservation Covenant	-	-	✓
Lyons Cottage	Historic Site	-	✓	-
Macquarie Harbour	Historic Site	-	✓	-
Marshall Beach	Conservation Area	✓	✓	-
Mile Island	Conservation Area	✓	✓	-
Millwood Road	Conservation Covenant	-	X	✓
Mount Chappell Island	Indigenous Protected Area	✓	✓	-
Mount Dundas	Regional Reserve	-	X	X
Mount Heemskirk	Regional Reserve	✓	✓	✓
Mount Tanner	Nature Recreation Area	✓	✓	-
Muddy Lagoon	Nature Reserve	-	-	✓
Mulligans Hill	Conservation Area	-	✓	-
	Conservation Covenant	-	X	-
Nares Rocks	Conservation Area	✓	✓	✓
Neds Reef	Conservation Area	✓	X	-
New Year Island	Game Reserve	✓	X	✓
Night Island	Conservation Area	✓	✓	-
Ninth Island	Conservation Area	✓	✓	-
North East Islet	Nature Reserve	✓	✓	✓
North East River	Game Reserve	✓	✓	-
Ocean Beach	Conservation Area	✓	✓	✓
Oyster Rocks	Conservation Area	✓	✓	-
Palana Beach	Nature Recreation Area	✓	✓	-
Pasco Group	Conservation Area	✓	✓	-
Pegarah	Private Nature Reserve	-	X	✓
Pegarah Forest	Conservation Covenant	-	X	✓
Pegarah Rd King Island	Conservation Covenant	-	X	✓
Penguin Islet	Nature Reserve	✓	✓	-

Protected Area Name	Reserve Type	Coastal Component	Planning Area	
			Bass	Otway
Perkins Island	Conservation Area	✓	X	-
Petrel Islands	Game Reserve	✓	✓	-
Pieman River	State Reserve	✓	✓	✓
Porky Beach	Conservation Area	✓	-	✓
Preminghana	Indigenous Protected Area	✓	✓	✓
Prime Seal Island	Conservation Area	✓	✓	-
Rebecca Creek	Conservation Area	-	-	X
Red Hut Point	Conservation Area	✓	✓	✓
Red Hut Road #1	Conservation Covenant	-	✓	✓
Red Hut Road #2	Conservation Covenant	-	✓	✓
Reedy Lagoon	Private Nature Reserve	-	✓	-
Reekara Road #1	Conservation Covenant	-	-	✓
Reekara Road #2	Conservation Covenant	-	-	✓
Reid Rocks	Nature Reserve	✓	✓	✓
Rocky Cape	National Park	✓	X	-
Rodondo Island	Nature Reserve	✓	✓	✓
Roydon Island	Conservation Area	✓	✓	-
Sartoris Rd Nugara	Conservation Covenant	-	-	✓
Sea Elephant	Conservation Area	✓	✓	✓
Sea Elephant Bootlace	Conservation Covenant	-	X	✓
Sea Elephant River	Conservation Covenant	-	X	✓
Seacrow Islet	Conservation Area	✓	✓	✓
Seal Rocks	Conservation Area	-	X	✓
	State Reserve	✓	X	✓
Sentinel Island	Conservation Area	✓	✓	-
Settlement Point	Conservation Area	✓	✓	-
Sister Islands	Conservation Area	✓	✓	-
Slaves Bay	Conservation Area	✓	✓	✓
South Pats River	Conservation Area	-	X	-
South Rd Nugara	Conservation Covenant	-	-	✓
Southwest	Conservation Area	✓	✓	✓
	National Park	✓	✓	✓
Spike Island	Conservation Area	✓	✓	-

Protected Area Name	Reserve Type	Coastal Component	Planning Area	
			Bass	Otway
Stack Island	Game Reserve	✓	✓	X
Stanley	Conservation Area	✓	✓	-
Stokes Point	Conservation Area	✓	✓	✓
Strahan Customs House	Historic Site	-	X	X
Strzelecki	National Park	✓	✓	-
Sugarloaf Rock	Conservation Area	✓	✓	✓
Sundown Point	State Reserve	✓	✓	✓
Sydney Cove	Historic Site	✓	✓	-
Table Cape	Conservation Area	✓	X	-
	State Reserve	✓	X	-
Tambar	Conservation Covenant	-	-	✓
Tathams Lagoon	Conservation Area	-	-	✓
Tatlows Beach	Conservation Area	✓	✓	-
Teepookana	Regional Reserve	-	✓	X
Temma	Conservation Covenant	-	-	X
Tenth Island	Nature Reserve	✓	X	-
The Dock	Conservation Covenant	-	✓	-
The Doughboys	Nature Reserve	✓	✓	✓
The Nut	State Reserve	✓	✓	-
Three Hummock Island	State Reserve	✓	✓	✓
Three Sisters-Goat Island	Nature Reserve	✓	X	-
Tikkawoppa Plateau	Regional Reserve	-	X	✓
Tin Mine Rd Loorana	Conservation Covenant	-	-	✓
Trial Harbour	State Reserve	✓	✓	✓
Trousers Point Beach	Conservation Area	✓	✓	-
Tully River	Conservation Area	-	X	X
Wallaby Islands	Conservation Area	✓	✓	-
Warra Creek	Regional Reserve	-	X	X
Welcome River	State Reserve	✓	✓	X
Welcome Swamp	Conservation Covenant	-	-	X
West Coast Range	Regional Reserve	-	✓	-
West Moncoeur Island	Nature Reserve	✓	✓	✓
West Point	State Reserve	✓	✓	✓

Protected Area Name	Reserve Type	Coastal Component	Planning Area	
			Bass	Otway
Wicks Road Nugara	Conservation Covenant	-	-	✓
Wingaroo	Nature Reserve	-	✓	-
Wright Rock	Nature Reserve	✓	✓	-
Wybalenna Island	Conservation Area	✓	✓	-
Yambacoona	Conservation Covenant	-	X	✓

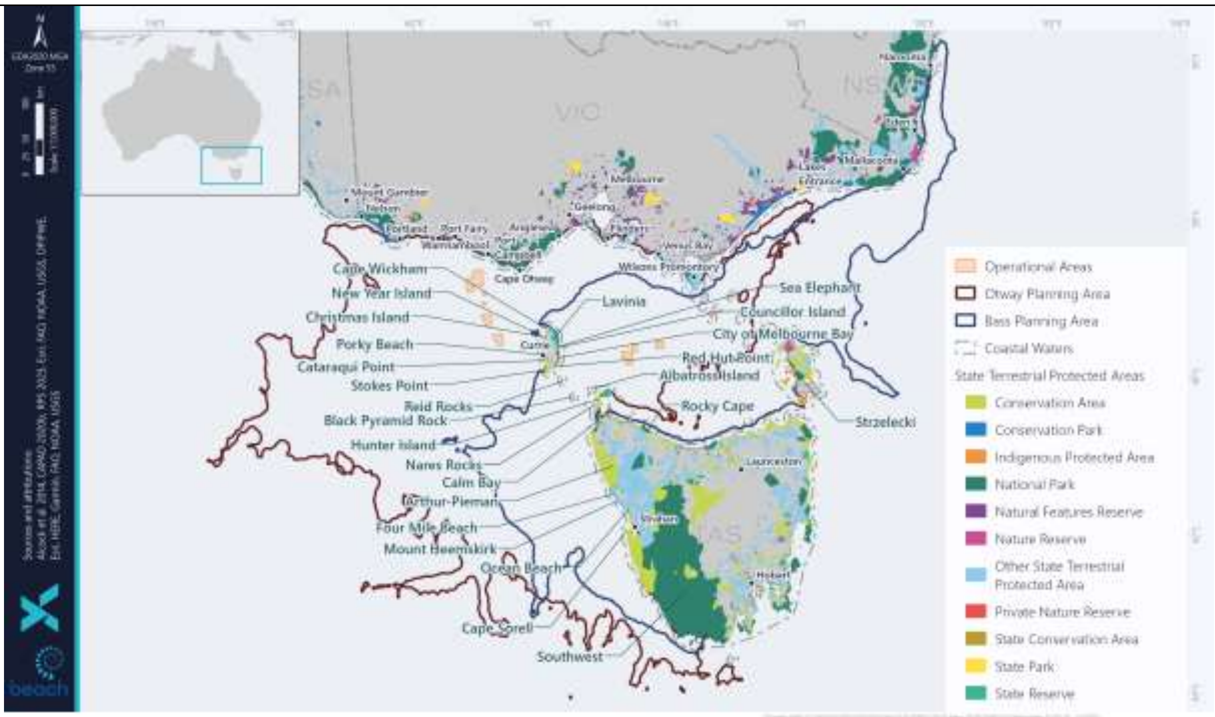


Figure 6-10: State Terrestrial Protected Areas within the Planning Areas - Tasmania

6.2.11.1 Albatross Island Nature Reserve

Albatross Island Nature Reserve covers 33 ha off the north-west coast of Tasmania (BirdLife International 2023). The island is habitat critical to the survival of the shy albatross. Albatross Island and the adjacent Black Pyramid Rock support approximately 40% of the global population of shy albatross and approximately 20% of the global population of Australasian gannet, as well as significant numbers of fairy prion and common diving-petrel (BirdLife International 2023).

6.2.11.2 Arthur-Pieman Conservation Area

The Arthur-Pieman Conservation Area covers 102,982 ha along the north-west coast of Tasmania at the mouth of the Arthur River, containing extensive peatlands and large dune fields. The Arthur-Pieman Conservation Area is managed under the Arthur-Pieman Conservation Area Management Plan (PWS 2002).

The area provides important habitat for many bird species including the orange-bellied parrot, hooded plovers, white-bellied sea eagles, fairy terns and pacific gulls.

The Arthur–Pieman Conservation Area has been described as '...one of the world's great archaeological regions' by the Australian Heritage Commission (PWS 2002). In recent years there has been concerns in relation to impacts from 4wd tracks on indigenous places and heritage objects within the conservation area (DPIPWE 2021a).

6.2.11.3 Black Pyramid Rock Nature Reserve

Black Pyramid Rock Nature Reserve covers 14.47 ha on the basaltic rock island. The island is part of the Hunter Island Group between King Island and north-west Tasmania. The reserve is also part of the Albatross Island and Black Pyramid Rock Important Bird Area recognised by BirdLife Australia (BirdLife International 2023). The Important Bird Area provides habitat for many species including Little penguins, short-tailed shearwaters, Pacific and silver gulls. Black Pyramid Rock Nature Reserve is the only documented breeding site for the Australasian gannet in the Bass Strait and one of only eight breeding sites within Australia (PWS 2000).

6.2.11.4 Calm Bay State Reserve

Calm Bay State Reserve covers 321.19 ha within Circular Head at the north-west of Tasmania. There is no management plan for the Calm Bay State Reserve.

6.2.11.5 Cape Sorell Historic Site

Cape Sorell Historic Site covers 69.63 ha of headland along the West Coast of Tasmania. The heritage-listed Cape Sorell Lighthouse is located within the site. No management plan is available for the Cape Sorell Historic Site.

6.2.11.6 Cape Wickham Conservation Area/State Reserve

The Cape Wickham Conservation Area and State Reserve protect 85.04 and 2.56 ha, respectively, on the northern tip of King Island and contains Cape Wickham lighthouse and the gravesites of the crew of Loch Leven, a ship that was wrecked nearby. These features are outside of the Planning Area. It is designated as IUCN Category V which is a protected landscape/seascape. There is no management plan in place.

6.2.11.7 Cataraqui Point Conservation Area

Cataraqui Point Conservation Area is located on the west coast of King Island covering an area of 275.8 ha and extending from the coast to 100-200 m inland. The conservation area is designated as IUCN Category V and there is no management plan in place.

6.2.11.8 Christmas Island Nature Reserve

Christmas Island Nature Reserve covers 84.24 ha surrounding the granite island to the north-west of King Island. The reserve is part of the King Island Important Bird Area recognised by BirdLife Australia for providing important habitat for the orange-bellied parrot during its migration as well as significant numbers of short-tailed shearwater, black-faced cormorant, fairy tern, hooded plover, and Pacific gull (BirdLife Australia 2023b).

6.2.11.9 City of Melbourne Bay Conservation Area

City of Melbourne Bay Conservation Area covers 201.03 ha on King Island. The conservation area is designated as IUCN Category V and there is no management plan in place.

6.2.11.10 Councillor Island Nature Reserve

Councillor Island Nature Reserve covers 17.58 ha of the granite island within the New Year Group. The reserve is part of the King Island Important Bird Area recognised by BirdLife Australia for providing important habitat for the orange-bellied parrot during its migration as well as significant numbers of short-tailed shearwater, black-faced cormorant, fairy tern, hooded plover and Pacific gull (BirdLife International 2023c). The conservation area is designated as IUCN Category I and there is no management plan in place.

6.2.11.11 Four Mile Beach Regional Reserve

Four Mile Beach Regional Reserve covers 3,280.45 ha along the west coast of Tasmania. The reserve is designated as IUCN Category VI and there is no management plan in place.

6.2.11.12 Hunter Island Conservation Area

Hunter Island Conservation Area covers 7,330.41 ha between King Island and north-west Tasmania. Hunter Island is the main island of the Hunter Island Group which is also an Important Bird Area recognised by BirdLife Australia as supporting the orange-bellied parrot, short-tailed shearwater, black-faced cormorant, and pacific gull (BirdLife International 2023a).

6.2.11.13 Lavinia State Reserve

Lavinia State Reserve covers 7,860.4 ha on King Island at the Lavinia Ramsar Site. See Section 6.2.6.2.

6.2.11.14 Mount Heemskirk Regional Reserve

Mount Heemskirk Regional Reserve covers 16,737.11 ha along the west coast of Tasmania. The reserve is designated as IUCN Category VI and there is no management plan in place.

6.2.11.15 Nares Rocks Conservation Area

Nares Rocks Conservation Area covers 3.06 ha in the Hunter Island Group between King Island and north-west Tasmania. Breeding activity has been recorded in the area for significant species including the common diving-petrel, pacific gull, silver gull and black-faced cormorant (Brothers et al. 2001).

6.2.11.16 New Year Island Game Reserve

New Year Island Game Reserve covers 118.22 ha to the north-west of King Island. The reserve is part of the King Island Important Bird Area recognised by BirdLife Australia for providing important habitat for the orange-bellied parrot during its migration as well as significant numbers of short-tailed shearwater, black-faced cormorant, fairy tern, hooded plover and pacific gull (BirdLife Australia 2023c).

6.2.11.17 Ocean Beach Conservation Area

Ocean Beach Conservation Area covers 6,192.8 ha along the west coast of Tasmania. The conservation area is an IUCN category V and there is no management plan in place.

6.2.11.18 Porky Beach Conservation Area

Porky Beach Conservation Area is located on the west coast of King Island covering an area of 339.8 ha and extending from the coast to 100-200 m inland. The conservation area is designated as IUCN Category V and there is no management plan in place.

6.2.11.19 Red Hut Point Conservation Area

Red Hut Point Conservation Area covers an area of 159.84 ha on King Island. The conservation area is designated as IUCN Category V and there is no management plan in place.

6.2.11.20 Reid Rocks Nature Reserve

Reid Rocks Nature Reserve covers 6.62 ha in the New Year Island Group. It is the only breeding site in Tasmania for Australian fur-seals (PWS 2000).

6.2.11.21 Rocky Cape National Park

The Rocky Cape National Park protects 3,096 ha along the north coast of Tasmania. The national park protects a range of habitat from coastline to rolling hills of heathland. Conservation significant flora species, such as *Xanthorrhoea arenaria* are present throughout the park. The vegetation and landforms throughout the park support a range of conservation significant fauna, like the Tasmanian devil and spotted quoll. Recreational values within the park include swimming, snorkelling, fishing, and bushwalking. Evidence of First Nations occupation is present throughout the park, including vast cave middens (TASPAWS 2023).

6.2.11.22 Sea Elephant Conservation Area

Sea Elephant Conservation Area covers 722.06 ha on King Island, approximately 25 km north-east of Currie. The conservation area is designated as IUCN Category VI and there is no management plan in place.

6.2.11.23 Seal Rocks Conservation Area/State Reserve

Seal Rocks Conservation Area and State Reserve protects 458.07 and 583.54 ha, respectively, on the southwestern coast of King Island. The state reserve is an IUCN category III and there is no management plan in place.

6.2.11.24 Southwest Conservation Area and National Park

The Southwest Conservation Area and National Park protect approximately 789,000 ha of land in the southwest corner of Tasmania. Southwest National Park is Tasmania’s largest National Park. The parks are part of the Tasmanian Wilderness World Heritage Area discussed in Section 6.2.1.1. Habitats that are found within the parks include mountain ranges, rocky coastlines, deep harbours, extensive plains, and undisturbed forests. The settlement of Melaleuca is located within the national park and is one of few places where the orange-bellied parrot breeds. Further species of conservation significance that are supported within the area include the short-tailed shearwater, the hooded plover and the Port Davey skate who can be found in the Bathurst Channel. Visitors can participate in a variety of nature-based activities including fishing, caving, camping, boating, snorkelling, and swimming. Further the South Coast Track is located within the national park and is a multi-day hike along the southern Tasmanian coast. There is a rich First Nations heritage within the national park. Midden sites, artefact scatters, hut depressions and rock shelters all provide links to the people that have lived on the land of the national park for over 35,000 years (TASPAWS 2022)

6.2.11.25 Stokes Point Conservation Area

Stokes Conservation Area is a 233.1 ha area on the south-western coast of King Island. The state reserve is an IUCN category V and there is no management plan in place.

6.2.11.26 Strzlecki National Park

The Strzlecki National Park protects 4,216 ha and is in the south-western corner of Flinders Island in the Bass Strait. It is managed under the Strzlecki National Park Management Plan (PWS 2000a). The park protects a range of ecosystems from coastline to mountain landscapes. It is of biogeographic significance as it contains elements of both Tasmanian and mainland Australian flora and fauna. Further there is considerable scientific interest due to the high number of endemic species, rare flora and fauna, and significant vegetation communities. The national park is a major attraction for visitors to Flinders Island and contributes significantly to the island's tourism sector. Visitors can participate in recreational activities like camping, bushwalking, nature studies, and scenic diving. There is considerable evidence of First Nations occupation of Flinders Island and several sites have been recorded within the national park. Sites recorded include sell middens, cove deposit and artefact scatters (PWS 2000a)

6.2.11.27 Sundown Point State Reserve

Sundown Point State Reserve covers 149.4 ha and is within the Arthur-Pieman Conservation Area (see Section 6.2.11.2).

6.2.11.28 Sydney Cove Historic Site

Sydney Cove is the eight oldest shipwreck in Australian waters and the historic site protects 61.08 ha.

6.2.11.29 The Doughboys Nature Reserve

The Doughboys Nature Reserve covers 19.98 ha at the Doughboy Islands (Koindrim) as part of the Trefoil Island Group off the north-west of Tasmania. The Doughboys are part of the Hunter Island Group Important Bird Area, recognised by BirdLife Australia as supporting the orange-bellied parrot, short-tailed shearwater, black-faced cormorant, and pacific gull (BirdLife International 2023a).

6.2.11.30 The Nut State Reserve

The Nut State Reserve protects 67.68 ha and is managed under the Nut State Reserve Management Plan 2003 (PWS 2003). The Nut rises to 143 m and is almost completely ringed by sheer cliffs falling to the sea. It is a tourism icon for the north-west region and one of the most well known landforms in Tasmania (PWS 2003).

The reserve is a significant breeding site for short-tailed shearwaters, Australian kestrels, and little penguins. Significant Aboriginal and historic heritage sites exist within the reserve (PWS 2003).

6.2.11.31 Trial Harbour State Reserve

Trial Harbour State Reserve covers 0.71 ha along the west coast of Tasmania. The state reserve is an IUCN category III, aimed to protect a natural monument or feature.

6.2.11.32 West Point State Reserve

West Point State Reserve is a 557.08 ha area on the northwest coast of Tasmania. The state reserve is an IUCN category V and there is no management plan in place.

6.2.12 South Australian Protected Areas – Marine

Lower South East Marine Park was identified in the PMST Reports (Appendix E) as being intersected by the Planning Area due to the size of the grids used in the PMST. As shown in Figure 6-8 no South Australian marine parks are within the Planning Area.

6.2.13 New South Wales Protected Areas – Marine

New South Wales marine protected areas intersecting the planning areas are presented in Table 6-11 and Figure 6-9 (PMST Report Appendix E).

Table 6-11: New South Wales Marine Protected Areas Intersecting the Planning Areas

Protected Area Name	Reserve Type	Planning Area	
		Bass	Otway
Batemans	Marine Park	✓	-

6.2.13.1 Batemans Marine Park

Batemans Marine Park covers approximately 850 ha. The marine park extends from Murramarang Beach to Wallage Lake and includes the Tollgate and Montague Islands. A key natural feature of Batemans Marine Park are large expanses of rocky reef, which support a variety of marine fauna. The Montague Island Nature Reserve is located within the Batemans Marine Park. This Nature reserve supports a breeding place for over 40,000 seabirds, a haul-out site for Australian and New Zealand fur seals, a nesting place for three shearwaters, crested terns and silver gulls, and is a nesting place for the little penguin (DPI NSW 2023). The Batemans Marine Park is managed under the Batemans Marine Park Operational Plan (Marine Parks Authority 2010). The plan identifies the key natural, cultural, and economic values of the park as:

- Contains 24 estuaries and frequent nutrient rich upwelling events.
- Shallow rocky reefs dominated by lush kelp forests which support hundreds of invertebrate species and a diverse array of fish species.
- Deeper rocky reefs host sponges, ascidians and sea whips as well as over 78 species of fish.
- Abundant seagrass beds which enhance primary production and biodiversity, stabilize sediment, and provide a nursery habitat for crustaceans and fish.
- Unconsolidated habitats support infauna species including crustaceans, gastropods, and polychaete worms.
- Resident and migratory species of particular conservation importance within the park include grey nurse and white sharks, eastern blue devil fish, black cod, weedy sea dragons, Australian and New Zealand fur-seals, as well as humpback, southern right and killer whales.
- A number of seabird and shorebirds have been recorded nesting or foraging within the park.
- Many sites and objects of significance to the Yuin (*Dharumba, Djirringanj*, *Brinja* and Walbanga).

- More than 10 shipwrecks including the John Penn and the Lady Darling.
- Commercial and recreational tourism including swimming, fishing, surfing, snorkelling, diving, sailing, kayaking and whale watching.

6.2.14 New South Wales Protected Areas – Terrestrial

New South Wales terrestrial protected areas identified in the PMST Reports (Appendix E) are presented in Table 6-12 and Figure 6-11. Areas identified in the PMST Report due to the size of the grids used in the PMST but not actually intersecting a Planning Area are listed in the Table with 'X'. New South Wales terrestrial protected areas which intersect a Planning Area and have a coastal component which may be exposed to hydrocarbons by a spill event are discussed in the subsections below, where information is available.

Table 6-12: New South Wales Terrestrial Protected Areas Intersecting the Planning Areas

Protected Area Name	Reserve Type	Coastal Component	Planning Area	
			Bass	Otway
Ben Boyd	National Park	✓	✓	-
Bermaguee	Nature Reserve	-	X	-
Bermagui	Flora Reserve	-	X	-
Biamanga	National Park	✓	✓	-
Eurobodalla	National Park	✓	✓	-
Gulaga	National Park	-	X	-
Mimosa Rocks	National Park	✓	✓	-
Montague Island	Nature Reserve	✓	✓	-
Mumbulla	Flora Reserve	-	X	-
Murrah	Flora Reserve	-	X	-
Nadgee	Nature Reserve	✓	✓	-

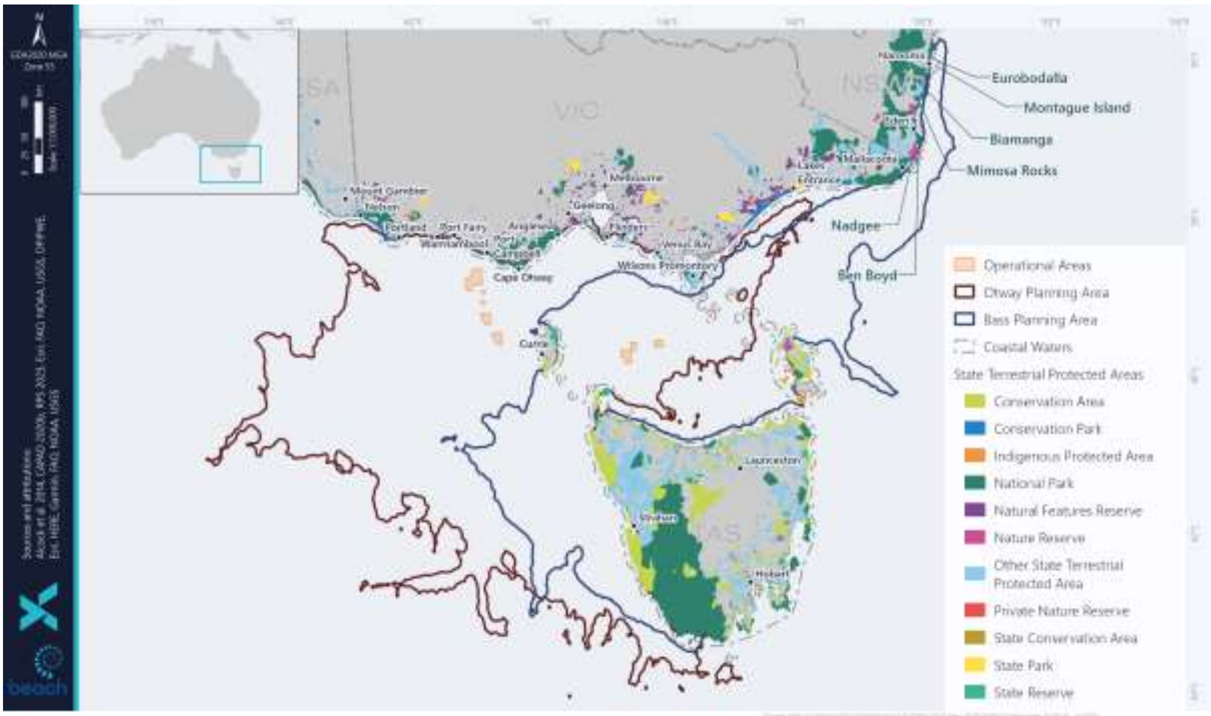


Figure 6-11: State Terrestrial Protected Areas within the Planning Areas – New South Wales

6.2.14.1 Ben Boyd National Park

The Ben Boyd National Park (Beowa National Park) protects around 10,500 ha and is managed under the Ben Boyd National Park and Bell Bird Creek Nature Reserve Plan of Management (NPWS 2021). It spans 47 km of rocky coastline and sheltered inlets. Unique features of the park include the contrast between the folded red rock platforms and ocean water. Species of significance known to visit the water surrounding the National Park include the humpback whale and the southern right whale. Recreation activities undertaken at the park include bush walking, swimming, the Green Cape light station, and whale watching. More than 50 First Nations sites have been recorded within the national park, including middens, rock shelters, campsites, and long-distance travel routes (NPWS 2021)

6.2.14.2 Biamanga National Park

The Biamanga National Park covers approximately 13,750 ha and is managed under the Plan of Management Yuin Bangguri (Mountain) Parks (NPWS 2014). Much of the national park is situated above the high-water mark, however a segment of shoreline at Baragoot Beach is included. The national park contains many unique flora and vegetation associations and provides vital habitat for numerous fauna species. The land within the national park is traditionally associated with the Yuin people of NSW. There are many significant First Nations sites found within the national park that hold spiritual significance for the Yuin people (NPWS 2014).

6.2.14.3 Eurobodalla National Park

The Eurobodalla National Park covers approximately 2,200 ha and is managed under the Eurobodalla National Park Plan of Management (NPWS 2000). The national park contains a 30 km long section of coastline. A total of 12 different vegetation associations are present throughout the national park. These associations support an estimated 194 different fauna species including conservation significant mammals. Several migratory bird species use Eurobodalla as important north-south linking habitat including the large sand plover and the black-tailed godwit. Recreational values of the park include camping, fishing, swimming, and hiking. The national park is located on the traditional lands of the Yuin People of NSW. 85 registered Aboriginal sites are known from the national park and its surrounds including middens, camp sites, quarried, artefact scatters, burial sites, and fish traps (NPWS 2000).

6.2.14.4 Mimosa Rocks National Park

Mimosa Rocks National Park covers 5,700 ha on the far south NSW coast and is managed under the Mimosa Rocks National Park Plan of Management (NPWS 2011). The dunes and cliffs within the national park support specialised vegetation associations capable of withstanding high salinity and coastal winds, including coastal banksia, coastal wattle and drooping she-oak. Conservation significant fauna supported by this unique vegetation include the hooded plover, bar-tailed godwit, and a variety of migratory seabirds. The name of the national park stems from the paddle steamer *Mimosa* which wrecked on the rocks in 1863. Recreational activities within the park include swimming, camping, and hiking. The land within the national park is traditionally associated with the Yuin people of NSW (NPWS 2023).

6.2.14.5 Montague Island Nature Reserve

Montague Island Nature reserve is included within the Batemans Marine Park, described further in Section 6.2.13.1, and is subject to the Barunguba Montague Island Nature Reserve Draft Plan of Management (DPE 2023). The reserve provides important habitat for nesting seabirds including little penguins, short-tailed shearwaters, wedge-tailed shearwaters, greater crested terns, Gould’s petrels and silver gulls. The reserve is also the largest aggregation of fur-seals on the NSW coast and the most northerly breeding site on the east coast of Australia (DPE 2023). Australian and long-nosed fur-seals utilise the area for haul-out and breeding. The island is recognised as a significant ceremonial area and resource gathering place to Aboriginal peoples, namely the Yuin People. Public visitation is limited to commercial tours.

6.2.14.6 Nadgee Nature Reserve

The Nadgee Nature Reserve protects 20,671 ha from the south coast of NSW to East Gippsland in Victoria and is subject to the Nadgee Nature Reserve Plan of Management (NPWS 2003). The main habitats protected include the coastal range, coastal plain, estuaries, beaches, cliffs, dunes and other coastal landforms. The reserve has been relatively undisturbed since European settlement, has a large number of rare and threatened plant and animal species and has the only coastal wilderness area in NSW. Recreation values include bushwalking, birdwatching, and swimming. The land within the nature reserve is traditionally associated with the Bidamal people of NSW and has been shared with the Dtharwa and Monaroo peoples. Evidence of traditional use has been identified by the presence of middens along the shoreline (NPWS 2003).

6.2.15 Key Ecological Features

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

KEFs identified in the PMST Reports (Appendix E) are presented in Table 6-13 and Figure 6-12 and described in the subsections below.

Table 6-13 Key Ecological Features within the Planning Areas

Key Ecological Feature	Operational Area		Planning Area	
	Bass	Otway	Bass	Otway
Big Horseshoe Canyon	-	-	✓	-
Bonney Coast Upwelling	-	-	-	✓
Seamounts South and East of Tasmania	-	-	-	✓
Shelf Rocky Reefs	-	-	✓	-
Upwelling East of Eden	-	-	✓	✓
West Tasmania Canyons	-	✓	✓	✓

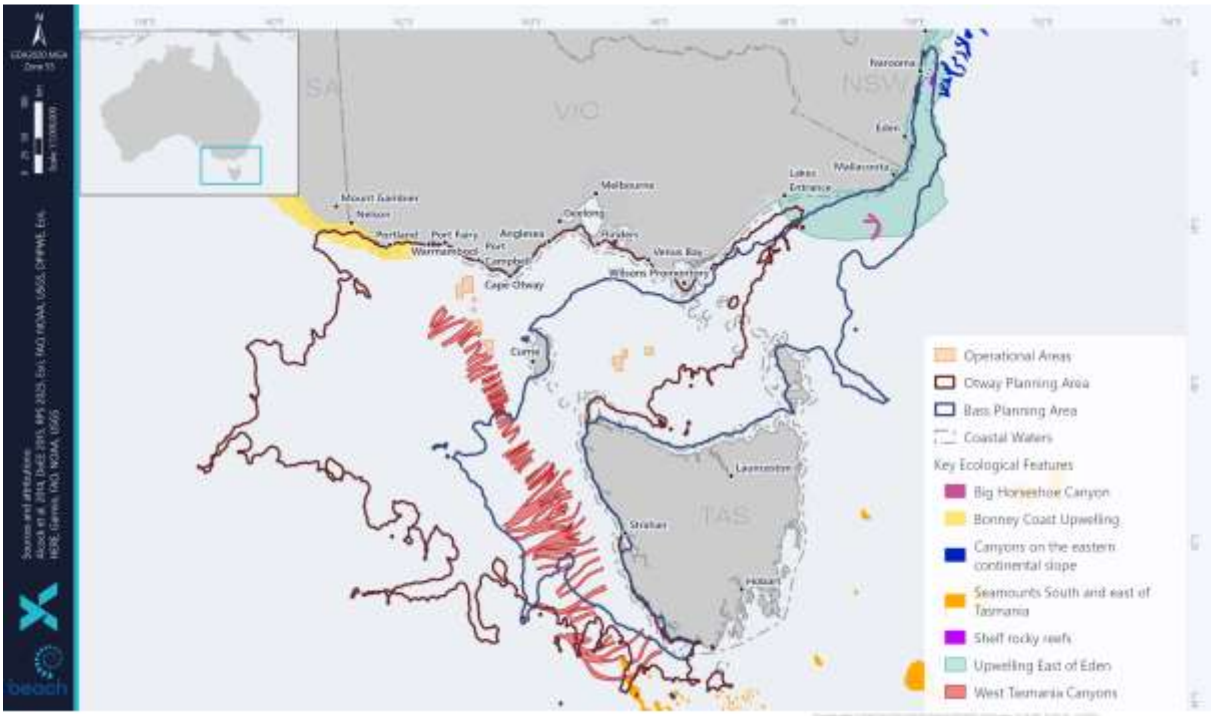


Figure 6-12: Key Ecological Features within the Operational and Planning Areas

6.2.15.1 Big Horseshoe Canyon

Big Horseshoe Canyon lies south of the coast of eastern Victoria and is the easternmost arm of the Bass canyon system. The steep, rocky slopes provide hard substrate habitat for attached large megafauna. Big Horseshoe Canyon is defined as a KEF as it is an area of high productivity and aggregations of marine life (DCCEEW 2023d). Canyons have a marked influence on diversity and abundance of species through their combined effects of topography, geology, and localised currents, all of which act to funnel nutrients and sediments into the canyon. Sponges and other habitat forming species provide structural refuges for benthic fish, including the commercially important pink ling (*Genypterus blacodes*) and the only known temperate location of the stalked crinoid (*Metacrinus cyaneu*), which occurs in water depths between 200 m and 300 m (DCCEEW 2023d).

6.2.15.2 Bonney Coast Upwelling

The Bonney Coast upwelling is a predictable, seasonal upwelling bringing cold nutrient rich water to the sea surface and supporting regionally high productivity and high species diversity in an area where such sites are relatively rare and mostly of smaller scale (DCCEEW 2023g). The Bonney Coast upwelling is defined as a key ecological feature as it is an area of enhanced pelagic productivity and has high aggregations of marine life (DCCEEW 2023g). In addition to whales, many endangered and listed species frequent the area, possibly also relying on the abundance of krill that provide a food source to many seabirds and fish. The high productivity of the Bonney coast upwelling is also capitalised on by other higher predator species such as little penguins and Australian fur seals feeding on baitfish (CoA 2015c). Further detail about the Bonney Coast upwelling is provided in Section 6.3.6.

The Bonney Coast Upwelling KEF lies on the continental shelf situated ~120 km northwest of Cape Jaffa, South Australia to Portland, Victoria (Figure 6-12). The location of the Bonney Coast Upwelling KEF was originally derived through a review of enhanced chlorophyll occurrence for summer seasonal data between the years of 1998 and 2010 (Research Data Australia 2013).

The Bonney Coast Upwelling KEF is situated ~67 km to the west of the Otway Operational Area (Figure 6-12).

6.2.15.3 Seamounts South and East of Tasmania

The Seamounts South and East of Tasmania are defined as a KEF as they are considered an area of high productivity which results in increased aggregations of marine life and increasing biodiversity. They are clusters of seamounts rising from the abyssal plain, continental rise or plateau situated 200 km or more from the Tasmanian coast (DCCEEW 2023f). As geological features, seamounts provide variable habitat for many species. Some summits and slopes will have hard substrate which can provide attachment points for sessile invertebrates, while soft sediment supports burrowing species (DCCEEW 2023f). Further, seamounts can sometimes influence and intensify currents, creating localised upwelling and turbulent mixing. Accelerated water flows are thought to create upwellings of nutrient rich waters from the seafloor (DCCEEW 2023f).

6.2.15.4 Shelf Rocky Reefs

Rocky reefs and hard grounds are located in all areas of the South-east Marine Region continental shelf including the Bass Strait, from the sub-tidal zone 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 key ecological feature as they are an area of high productivity and aggregations of marine life. This KEF has not yet been spatially defined (CoA 2015a).

6.2.15.5 Upwelling East of Eden

The Upwelling East of Eden is defined as a KEF due to its high productivity and aggregations of marine life. The upwelling is influenced by dynamic eddies of the east Australian current which cause episodic productivity events when they interact with the continental shelf and headlands. The episodic mixing of nutrient enrichment events drive phytoplankton blooms that are the basis of productive food chains including zooplankton, copepods, krill and small pelagic fish (DCCEEW 2023e). The upwelling of this region on the eastern Victorian coast and southern NSW coast occurs more of less continuously from austral spring to autumn (Huang and Wand 2019). However, there is strong temporal (i.e., month to month, seasonal and inter-annual) variability of the upwelling characteristics and area of influence (Huang and Wang 2019).

The upwelling supports regionally high primary productivity which in turn support fisheries and biodiversity, including top order predators, marine mammals, and seabirds. This area is one of two feeding areas for blue whales and humpback whales, known to arrive when significant krill aggregations form. The area is also important for other cetaceans, seals, sharks, and seabirds (DCCEEW 2023e)

6.2.15.6 West Tasmania Canyons

The West Tasmania 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 (Williams 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 (CoA 2015a).

6.3 Physical Environment

6.3.1 Metocean Conditions

6.3.1.1 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.

6.3.1.2 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.

Wind data for the Otway Basin from RPS (2022) demonstrated average monthly wind speeds ranging from 14.2 knots (January) to 20.1 knots (July) with maximums ranging between 58.9 knots (February) and 65.8 knots (December. The dominant wind direction throughout the year was from the west, whilst maximum wind speeds were typically associated with westerly winds during all months of the year.

Wind data from the Bass basin from RPS (2023) demonstrated average monthly wind speeds ranging from 15.5 knots (January) to 19.6 knots (July) with maximums oscillating between 39.1 knots (January) and 50.2 knots (July). The wind direction between November to March was generally southwest and northeast, while the winds were mostly blowing from the west during May to October.

6.3.1.3 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).

6.3.1.4 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 6-13). 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.

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.

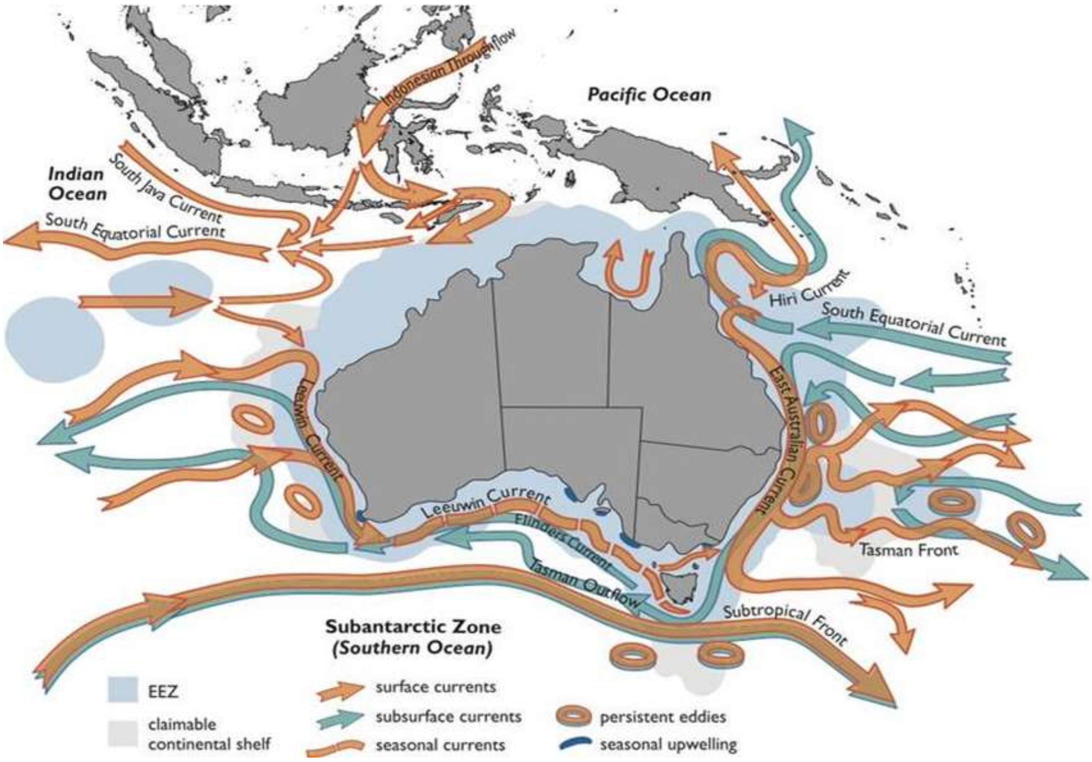


Figure 6-13: Australian Ocean Currents

6.3.1.5 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.
- 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.

6.3.1.6 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 coast 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.

6.3.2 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.

In terms of monitoring work with the Otway and Bass Strait regions, between 2009 and 2016 the Integrated Marine Observing System (IMOS) recorded 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), and biological sound sources including dolphin vocalisations were also recorded.

No acoustic monitoring has been undertaken within the Bass Operational Area.

Otway Gas Development Acoustic Monitoring

To gain an understanding of the existing marine acoustic environment to inform the impact assessment for the Otway Gas Development acoustic monitoring was undertaken by Woodside (2003). During April-May 2001 two underwater noise loggers were placed (5.1 km and 2.9 km south-west of an exploration petroleum drilling vessel at the Thylacine site to measure underwater noise before, during and after drilling activity. Only one of the loggers (5.9 km) was able to be recovered. A further logger was placed in the shipping lane approximately 60 km due south of Port Fairy to measure ambient noise produced by physical, man-made and biological sources between late November 2001 and early March 2002.

The following features were noted with respect to underwater noise environment at the Thylacine location:

- Thylacine site was relatively quiet with only the passage of several boats (about ten) evident.
- Horizontal banding characteristic of persistent calling by pygmy blue whales was not evident, rather these call types occurred infrequently and at low levels indicating the respective sources were at long range.
- Evidence of low-level, distant evening fish choruses only.

The following features were noted with respect to underwater noise environment at the shipping lane location:

- Regular passages of boats evident.
- Regular evening fish choruses, there were also dawn choruses and persistent low level calling by these sources over daytime.
- Blue whale calling persisted over many hours, an example is the first close passage for the season just before midday on 4 January 2002 followed by several more animals a day later.
- Evidence of calling from at least three other whale species.
- Baseline broadband underwater noise for the period was in the order of 93 to 97 dB re 1 µPa with shipping raising the averaged noise level above 105 dB re 1 µPa for 6% of the deployment time.

An acoustic monitoring program was also undertaken during exploratory drilling of the Casino-3 well. 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).

More recently, JASCO Applied Sciences (Australia), JASCO, completed a monitoring study for Beach in relation to exploration drilling activities at the Artisan-1 well with the aim of completing an acoustic characterisation of the drilling and associated vessel activity within the Otway Basin. McPherson et al. (2021) details the monitoring program and results. Four recorders were deployed in February and retrieved in early April 2021 with Stations 1 through 4 deployed at distances of 0.336, 1.13, 5.11, and 25 km from the Ocean Onyx drill rig.

The results for Station 4, the furthest from the drill rig, were a median broadband ambient noise of 104.5 dB re 1 µPa, a mean of 118.3 dB re 1 µPa, a minimum of 86.6 dB re 1 µPa, and a maximum of 153.6 dB re 1 µPa. This is a larger range than was recorded for Casino 3. The mean levels at Station 4 are 8.3 dB higher than those recorded 5 km offshore of Warrnambool, while the maximum recorded at Station 4 is lower by 7.4 dB. For Station 4 contributors to the soundscape were weather, shipping, and marine mammals. Local variations in ambient noise and received levels can depend upon water depth and the proximity to contributors. In this case, the shipping lanes and the frequency and proximity of vessel passes are strong drivers of the ambient noise at Station 4. The quieter levels reported at Thylacine in Lattice Energy (2017) are likely due to the placement of the monitoring station at a distance from the shipping lanes, which limited their contributions to the data set and thus resulted in a lower reported range of received sound levels.

6.3.3 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 (DO), 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 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), but coastal communities appear generally well adapted to deal with these extrinsic stresses.

6.3.3.1 Bass

The nutrient concentrations in Central Bass Strait are low compared to that of what is seen at its extremities (Gibbs et al. 1986, Gibbs 1992). It is hypothesised that this could be due to the biological demands of the Bass Strait waters consuming much of the nutrients before moving into Central Bass Strait (Gibbs 1992). In the nearshore areas of the Planning Area, water quality may be negatively affected through the discharge of polluted waters from rivers, which drain catchments dominated by stock grazing and small coastal settlements (Parks Victoria 2006b).

6.3.3.2 Otway

The Otway Basin is characterised by high wave energy and cold temperature waters subject to upwelling events (Bonney coast 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).

An environmental survey was undertaken from November 2019 to January 2020 for the Otway Gas Development (Ramboll 2020). Water samples were collected at two of the gas fields, Artisan and Thylacine. Sample locations are shown in Figure 6-16. The Artisan field is representative of the water quality closer to shore, while the Thylacine field is representative of water quality within the offshore areas.

In situ measurements were taken for dissolved oxygen (DO), pH and oxidation-reduction potential (ORP), and DO and pH were assessed against the default trigger values for physical and chemical stressors for south-east Australia for slightly disturbed ecosystems set out in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC 2000). Trigger values are used to assess risk of adverse effects due to nutrients, biodegradable organic matter and pH in various ecosystem types.

DO was between the lower and upper limits of 90 and 110% saturation for marine waters in all samples. Likewise, pH was between the lower and upper limits of 8.0 and 8.4 for all samples. The range of ORP measurements indicated a well oxygenated, ecologically healthy environment.

Laboratory analyses for a suite of analytes were undertaken and compared to the ANZECC (2000) default trigger values for physical and chemical stressors for nutrient analytes and the trigger values for toxicants at alternative levels of protection for all other analytes.

The concentration of ammonia, nitrite and reactive phosphorus was at or below the level of reporting (LOR) for all samples. Only one sample contained a concentration of nitrate-nitrite, NO_3, Total kjeldahl nitrogen (TKN) and total nitrogen (TN) above the LOR, however, none of the measurements exceeded ANZECC trigger values. Concentrations of total phosphorus (TP) were recorded in all samples, but all measurements were well below ANZECC trigger values. Total suspended solids (TSS) was typically within the range expected for unmodified marine waters.

The concentrations of Cd, Cr, Co, Pb, Hg, and Ni were at or below LOR in all samples. The concentration of Cu was below, at or very close to the limit of reporting (LOR) for all samples. The concentration of Zn against ANZECC protection level (or trigger values) were below the 90% protection level but concentrations variously exceeded 95 or 99% protection levels. This result is consistent with a slightly disturbed marine system which is described in (ANZECC 2000) as an ecosystem in which biodiversity may have been affected to small degree by human activity.

Benzene, toluene, ethylbenzene and xylene (BTEX) and poly aromatic hydrocarbon (PAH) were below the detection limit in all water samples. Very low traces of total recoverable hydrocarbon (TRHs) were detected in the Thylacine_1_2 water sample but were at levels of no concern. TRHs were below detection limits in all other samples. The level of chlorophyll a in filtered samples was below the detection level.

In summary, the water quality at the Thylacine and Artisan survey areas indicated an undisturbed mid-depth environment.

It is expected that water quality within the Otway Operational and Planning Areas 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.

6.3.4 Sediment Quality

6.3.4.1 Bass

Sediment sampling has not been undertaken within the Bass Operational Area and will be done as part planned OGV seabed survey.

Origin Energy, as the previous operator of the BassGas Development, undertook several geotechnical surveys in and around the Yolla-A platform. These surveys indicate that the seabed is flat and featureless, with surveys prior to construction indicating the seabed has very soft to soft alternating layers of silty carbonate clay and silty sands containing fragile white shell fragments (Thales Geosolutions 2001).

6.3.4.2 Otway

It is expected that sediment quality within the Otway Operational and Planning Areas will be typical of the offshore marine environment of the Otway Basin.

An environmental survey was undertaken from November 2019 to January 2020 for the Otway Gas Development (Ramboll 2020). Sediment samples were collected at two of the gas fields, Artisan and Thylacine using a Double Van Veen grab sampler (refer to Figure 6-16 for sample locations). Due to poor weather conditions sampling had to be reduced. It was decided that the Artisan field would be representative of the sediments closer to shore, while the Thylacine field which is further offshore would be representative of the Geographe field. Three replicate sediment samples were to be collected at each of the fields, however, this was not always possible because of the compacted substrate. The resulting samples included four replicate samples from Thylacine and two replicate samples from Artisan.

The sediment within all samples and, therefore at both fields, was predominantly sand with a range of 95-97% as a proportion of each sample. There was very little silt and a maximum of 4.7% for the clay fraction. There were no discernible trends based on the location of sample collection.

The ORP or oxidation reduction potential of sediments within the samples was measured and the anoxic layer with low ORP was not detected in any of the sediments analysed and the range of measurements indicated that these sediments maintain a well oxygenated, unmodified environment.

There was a notable degree of variability in the nutrient samples collected in the Thylacine field, however the small number of samples means that a trend or pattern is not discernible. Nitrate-nitrite was not detected in any samples. Total organic content and detectable nitrogen concentrations were slightly higher in the Artisan samples compared to the Thylacine samples. Generally, the concentrations of nutrients in the marine sediments were to be expected for this environment and type of sediment.

Of the inorganic compounds tested, Cd, Cu, Pb, Hg, Ni and Sn were below the limit of reporting in all sediment samples. The concentration of Cr in sediments was low, and well below the Interim Sediment Quality Guidelines low trigger value of 80 mg/kg from the recommended sediment quality guidelines set out in ANZECC (2000). The concentration of Cr was slightly higher in the samples from Artisan than those from Thylacine. Zn was detected in two of the six samples (one sample from each field) and was well below the ISQC-Low trigger value.

BTEXs, PAHs, PCBs and TRHs were either below the LOR or at levels of no concern.

In summary, sediments had a high ORP and low or undetectable levels of toxicants indicating an unmodified seabed environment. It is expected that sediment quality within the Otway Operational and Planning Areas will be typical of the offshore marine environment of the Otway Basin.

6.3.5 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.

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), sulphur dioxide (SO_2), lead (Pb), particles less than 10 micrometres in diameter (PM10) and particles less than 2.5 micrometres in diameter (PM2.5). The most recent annual air monitoring report shows Victoria's air quality in 2015 was generally good with AAQ NEPM (Ambient Air Quality National Environmental Protection Measure) goals and standards being met for carbon monoxide (CO), nitrogen dioxide (NO_2), Ozone (O_3) and sulphur dioxide (SO_2). There were some exceedances for particles.

The Geelong monitoring station is the closest to the Operational Areas; however, it is situated in an urban environment and is not representative of the clean air environment over the majority of the Planning Area. The Cape Grim Baseline Air Pollution Station data is likely a more reliable point of reference for air quality in the Operational and Planning Areas 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 (GHGs), including carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O) and synthetic GHGs such as hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6).

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).

6.3.6 Bonney Coast Upwelling

The Bonney coast upwelling is mainly driven by the frequent south-easterly winds during the austral summer (Lewis 1981, Middleton and Bye 2007, Nieblas et al. 2009, Schahinger 1987). The frequent south-easterly winds are the result of southern migration of the subtropical ridge (Nieblas et al. 2009; Schahinger 1987). 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 which brings cold, nutrient rich water to the sea surface.

Huang and Wang (2019) developed an image processing technique to map upwelling areas along the south-eastern coast of Australia. This study used monthly Moderate Resolution Imaging Spectroradiometer sea surface temperature (SST) composites between July 2002 and December 2016, which were generated from daily SST images with a spatial resolution of ~1 km. As upwelling in winter is unlikely to occur images during this period were not analysed. Upwelling reaching the surface often displays a colder SST signature than the adjacent area (e.g., Dabuleviciene et al. 2018, Gill et al. 2011, Kampf et al. 2004, McClatchie et al. 2006, Oke and Griffin 2011, Oke and Middleton 2001, Roughan and Middleton 2004, Willis and Hobday 2007). This negative SST anomaly is the foundation of upwelling mapping using SST data (Huang and Wang 2019).

The spatial patterns of the mapped Bonney coast upwelling have been shown to follow a clear temporal pattern. When the upwelling season starts during late spring and early summer (November and December), the influence of the Bonney coast upwelling was found to be often restricted to the coast. During the mid-summer and early autumn (January to March) when the upwelling is the strongest, the upwelling influence often extended to the shelf break before retreating in April (Huang and Wang 2019).

Gill et al. (2011) states that the Bonney coast upwelling generally starts in the eastern part of the Great Australian Bight and spreads eastwards to the Otway Basin. At the height of the Bonney coast upwelling during February and March, the upwelling's area of influence often exceeds 12,000 km^2, its SST anomaly often exceeds 1°C, and its chlorophyll-a concentrations are often >1.5 times of its adjacent areas (Huang and Wang 2019).

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, not all favourable upwelling winds lead to an upwelling event. Huang and Wang (2019) state that each year for the period of 14 years (Sept 2002 to May 2016) of their study there was large variability in the distribution of the upwelling influence areas, month to month, season to season and year to year.

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.

Huang and Wang (2019) results indicate that the ENSO events are likely to have a low-to-moderate impact on the upwelling intensity although the El Nino events tend to strengthen upwelling intensity along the south-east coast of Australia with La Nina events tending to weaken upwelling intensity. Previous studies (Middleton and Bye, 2007; Middleton et al. 2007) indicated that the El Nino events would raise the thermocline (along the Australian margin) which effectively forms a colder and nutrient-rich pool at shallower depths. This is likely to enhance upwelling intensity, with higher SST and chlorophyll-a anomalies and a larger area of influence.

Ecological importance

The primary ecological importance of the Bonney coast 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 of 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 coast 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.

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 coast 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. Huang and Wang (2019) found a generally weak and unclear correlation between chlorophyll-a and SST. This weak correlation may be due to chlorophyll-a concentrations (a remote measure of plankton population) are also influenced by other complex oceanographic and biological mechanisms such as grazing, seasonality and transportation.

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 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 Bureau of Meteorology 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.

Operational Setting

Mapping of the Bonney coast upwelling frequency by Huang and Wang (2019) identified that the occurrence of an upwelling event between 2002 and 2016 (measured by remote sensing of a combination of SST anomaly and chlorophyll-a) within the Operational Areas was unlikely with an upwelling frequency for this area of <10% (Figure 6-14). The closest areas of increased frequency of upwelling events to the Operational Areas (10-30% occasional/semi-seasonal) were small, isolated areas situated in coastal areas (Figure 6-14) >13 km from the Otway Operational Area. Areas of further increased frequencies of Bonney coast upwellings (30-50% seasonal) were found to the west >200 km of the Otway Operational Area.

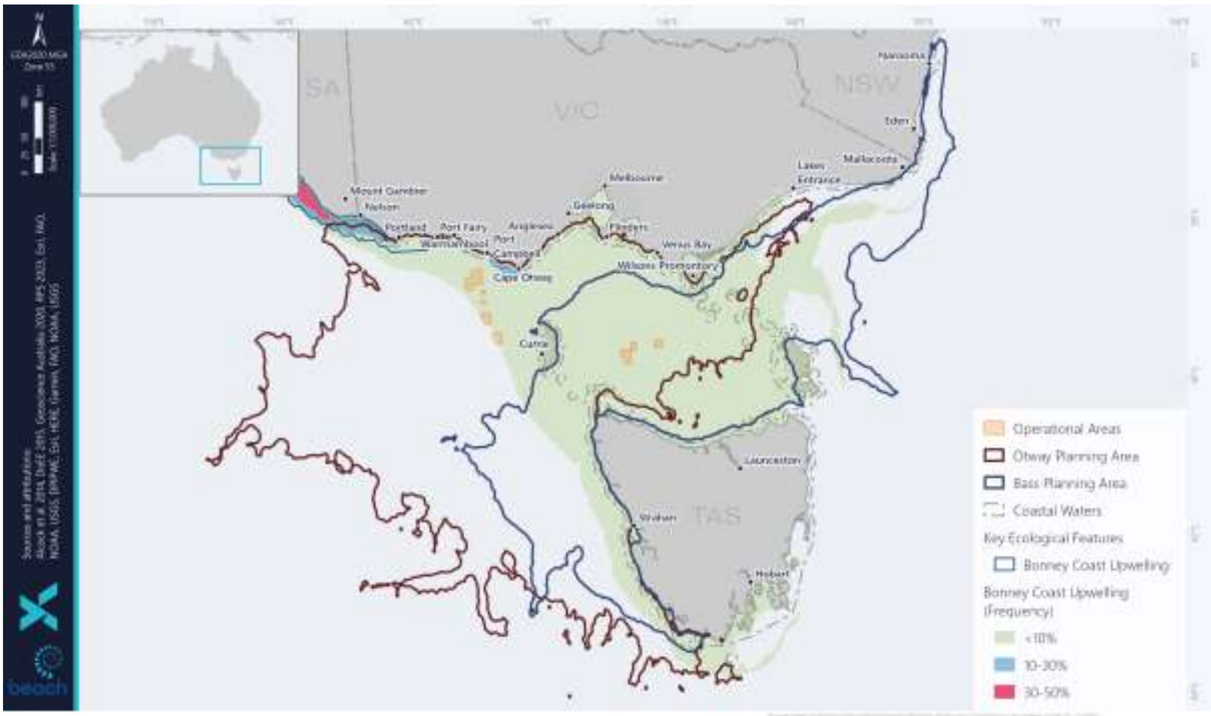


Figure 6-14: Bonney Coast Upwelling Frequency within the Operational and Planning Areas (*Source: Huang and Wang 2019; Geoscience Australia 2020*).

6.4 Ecological Environment

To characterise the ecological environment, a literature search and online resources and databases were reviewed to identify and assess flora and fauna species known to be present or potentially present in the Operational and Planning Areas. 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 Species Profile and Threats (SPRAT) database.
- Protected Matters Search Tool (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).
- Beach Energy's Environment Plans for previous activities in the region.
- National Conservation Values Atlas (NCVA).
- Relevant listings under the Victorian FFG Act 1988 (DEECA 2023)
- Relevant listings under the Tasmanian Threatened Species Conservation Act (1995) (TSC Act)
- Relevant environmental guidelines and publicly available scientific literature on individual species.

6.4.1 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.

6.4.1.1 Bass

Surveys undertaken within the Bass Operational Area recorded a flat and featureless seabed with soft to soft alternating layers of silty carbonate clay and silty sands containing fragile white shell fragments (Thales Geosolutions 2001).

Marine invertebrate diversity in South Australian waters is considered to be high with the Bass Strait containing porifera, cnidarians, bryozoans, arthropods, crustaceans, molluscs, echinoderms, and annelids. Distribution of these species is understood to be irregular with little evidence of distinct biogeographic regions (Poore et al. 1985, Wilson and Poore 1987).

One of the objectives of this seabed survey is to obtain further information on the benthic habitat and species in the Bass Operational Area.

6.4.1.2 Otway

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):

1. Shallow shelf: consisting of exhumed limestone substrates that host encrusting mollusc, sponge, bryozoan, and red algae assemblages.
2. Middle shelf: a zone of swell wave shoaling and production of mega-rippled bryozoan sands.
3. Deep shelf: accumulations of intensely bioturbated, fine bioclastic sands.
4. Shelf edge/top of Slope: nutrient-rich upwelling currents support extensive, aphotic bryozoan/sponge/coral communities.

The dominant benthic habitat throughout the shelf area, as indicated by the seabed and benthic habitat studies, is medium to coarse carbonate sands with areas of low relief exposed limestone (Boreen et al. 1993, BBG 2003, Ramboll 2020). The benthic species assemblages known or likely to be associated with these habitats are described in the following sections.

A video survey of the seabed at selected sites along proposed offshore pipeline routes for the Otway Gas Development (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. 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.

Beach commissioned a seabed site assessment for the Otway Gas Development in 2019 (Ramboll 2020). The seabed site assessment was undertaken from November 2019 to January 2020 and ranged in water depths from 70 to 104 m. The survey extent included the potential subsea development areas and associated flowline / control umbilical routes, and is shown in Figure 6-15. The information from these surveys are relevant for the Otway Operational Areas with the exemption of the T/30P Operational Areas. The T/30P areas are part of a future seabed survey to obtain further information on the benthic habitat and species on the shelf edge and slope.

The Otway survey comprised of multibeam bathymetry, side scan sonar, magnetometer, and sub-bottom profiling, cone penetration tests and seabed samples. In addition, sediment samples for infauna were collected and the composition and percent coverage of epifauna was assessed from photographs of the seafloor taken with a drop camera. The drop camera locations within the Otway

Operational Area are shown in Figure 6-16. Drop camera images are shown in Figure 6-17 to Figure 6-24 and a summary is provided in Table 6-14.

The composition and percent coverage of epifauna was assessed from photographs of the seafloor. Percentage cover was typically no more than 37%. The seabed at Hot Tap X had the greatest average coverage of epibiota whilst the lowest coverage was recorded along the route between Artisan and Hot Tap Y. Of the gas field sites, Artisan and Hercules had a slightly greater coverage of epifauna. Of the individual epibenthic organisms, Gastropoda sp. 2 (a cone shell) and crionids (featherstars) were the most abundant.

No benthic species or ecological communities listed as threatened under the Environmental Protection and Biodiversity Conservation Act 1999 (the EPBC Act) were identified.

In summary, the seabed is similar across the Otway Operational Area, consisting of carbonate rich coarse to medium sands with areas of exposed limestone substrate (Ramboll 2020, CEE Consultants Pty Ltd 2003, BBG 2003 and Boreen et al. 1993). This type of seabed is highly mobile making it difficult for filter feeders and soft body invertebrates to survive and establish in significant populations. Epifauna is dominated by low density, patchy assemblages of branching bryozoans, gorgonian cnidarians, and sponges.

Table 6-14: Summary of the Seabed Survey Benthic Habitats

Survey Location	Summary
Artisan (Figure 6-17)	Very little bathymetric variation across the survey area with water depths ranging from 68 to 74 m. Seabed topography dominated by exposed rock on the seabed. Small patches of very thin transgressive coarse sand are present across the survey area. Megaripples were seen in some areas, with a wavelength of 1.5 to 2 m and a height of 0.3 to 0.5 m. Survey area characterised by low to moderate reflectivity characteristic of rock outcrop. A series of elevated mounds were noted in the north-west of the Artisan survey area 0.5 -1.0 m above ambient seabed. Seabed showed a scattered sessile biota on a sandy seafloor.
Geographe (Figure 6-18)	Very little bathymetric variation across the survey area with water depths ranging from 80 to 91 m. Rocky outcrops of the Port Campbell Limestone show some variable relief up to 2 m. Sand is clean washed and well sorted and comprising predominantly of angular broken shells and bryozoans. Percentage cover from the four drop camera sites ranged from zero to 55% with an average percentage cover of 13%. Predominantly hard seabed with coarse sand substrates that supports a patchy complex of branching epibiota (i.e., bryozoans, gorgonian cnidarians, and sponges).
Thylacine (Figure 6-19)	Seabed depths vary ranging from 92 to 115 m, with an overall southwestern slope. Seabed topography compromises of rocky outcrops of the regionally dipping Port Campbell limestones. Sands are coarse (siliceous) calcareous medium sand. 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.

Survey Location	Summary
	Percentage epifauna cover from the eight drop camera sites ranged from zero to 65% with an average percentage cover of 14%. Predominantly hard seabed with coarse sand substrates that supports a patchy complex of branching epibiota (i.e., bryozoans, gorgonian cnidarians and sponges). Epibiota on the seabed in the vicinity of the Thylacine gas fields is representative of what is expected at depths around 70 – 100 m. Infauna was of relatively low abundance and diversity as expected for coarse sand substrates.
La Bella (Figure 6-20)	Water depth varies from 89 to 104 m, with an overall southwestern slope. Seabed characterised by rocky outcrops interspersed with low-lying areas of shallow uncemented sediment. Seabed topography is typical of an eroded platform, with inferred calcarenite lithology. Side scan sonar results also provide flat seabed and megarippled sands and rock outcrop features. At rock exposures, seabed photographs appear to show biogenic growth.
Hercules (Figure 6-21)	Very little bathymetric variation across the survey area with water depths ranging from 71 to 77 m. Seabed characterised by rocky outcrops interspersed with low-lying areas of shallow uncemented sediment. Port Campbell limestone cap rock is covered in places by mobile sediments of 1 m thickness. Hercules site is a southern extension of the Artisan site, and therefore the seabed features bear strong similarities to those seen at Artisan site. Seabed features are typical of an eroded platform, including parallel asymmetric ridges with intermittent depressions.
Proposed Pipeline and Umbilical Routes (Figure 6-22 Figure 6-23 Figure 6-24)	Seabed terrain is largely comprised of outcropping calcarenites, incised with erosional features and interspersed with (relatively) low-lying areas where shallow uncemented sands occur. Sands are generally less than 1 m thick. Side scan sonar results also provide flat seabed and megarippled sands and rock outcrop features. At rock exposures, seabed photographs appear to show biogenic growth.

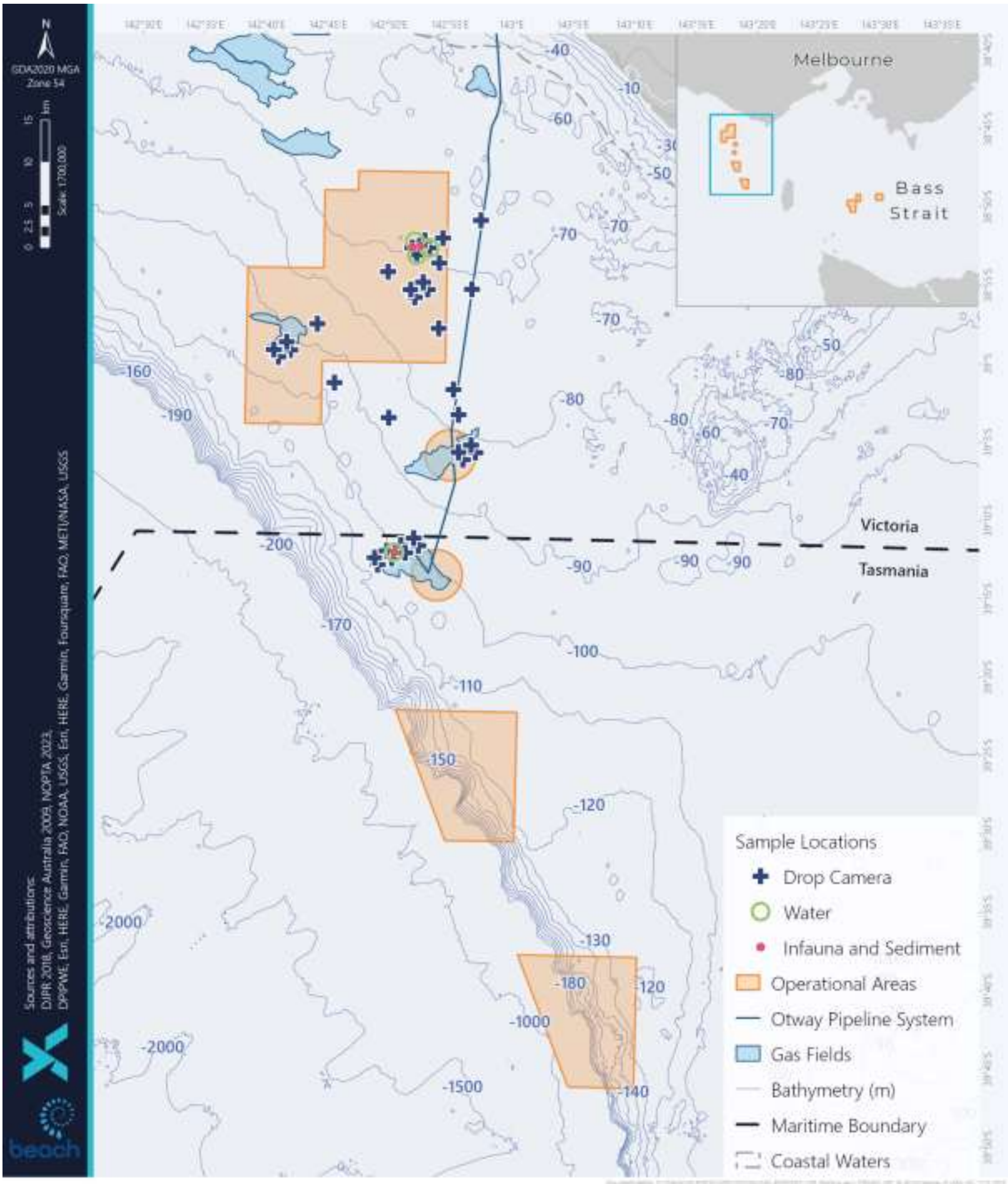


Figure 6-15: Location of the Otway Gas Development Seabed Site Assessment and the Operational Areas

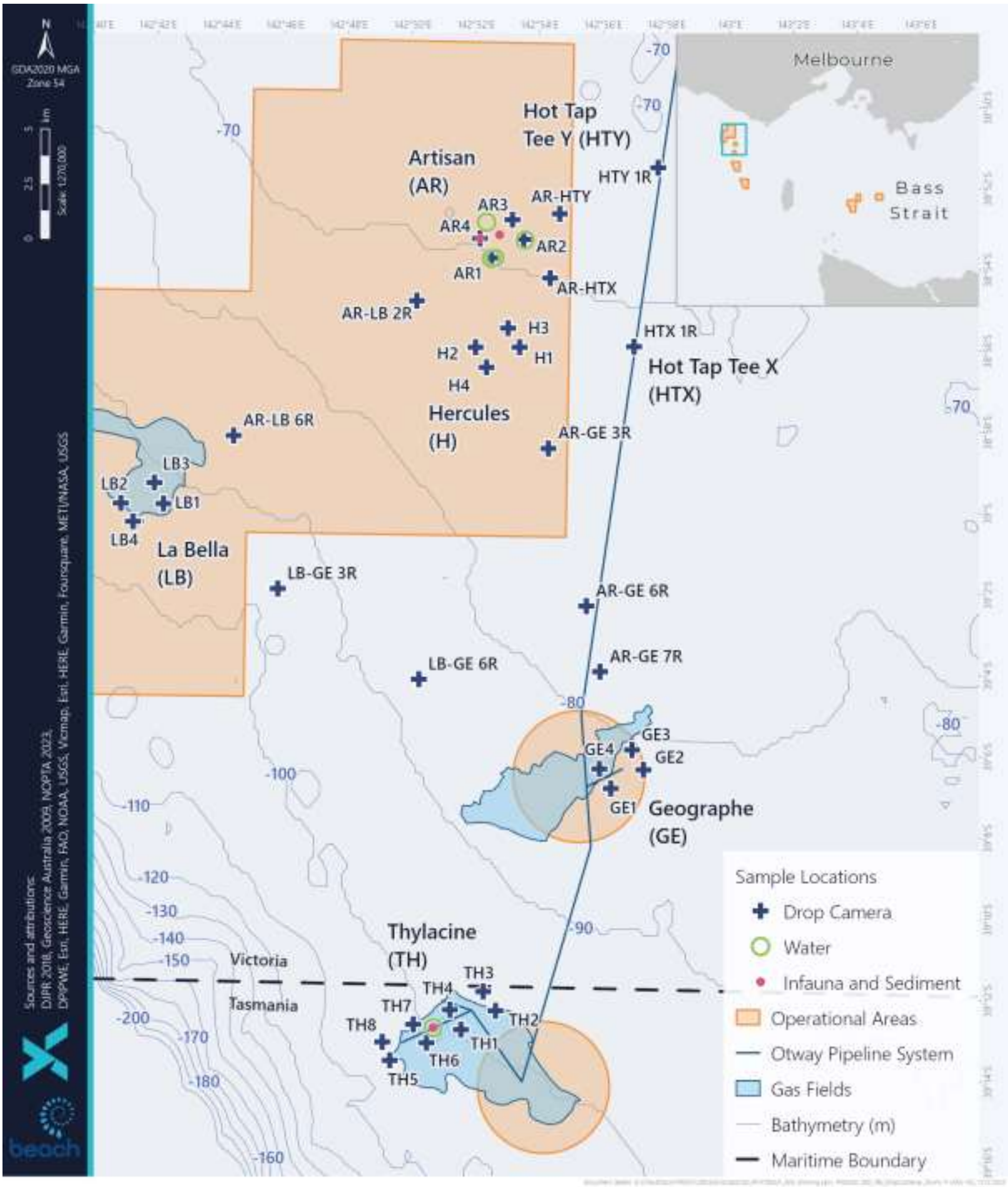


Figure 6-16: Drop Camera and Sample Locations for the Otway Gas Development Seabed Site Assessment with the Operational Areas

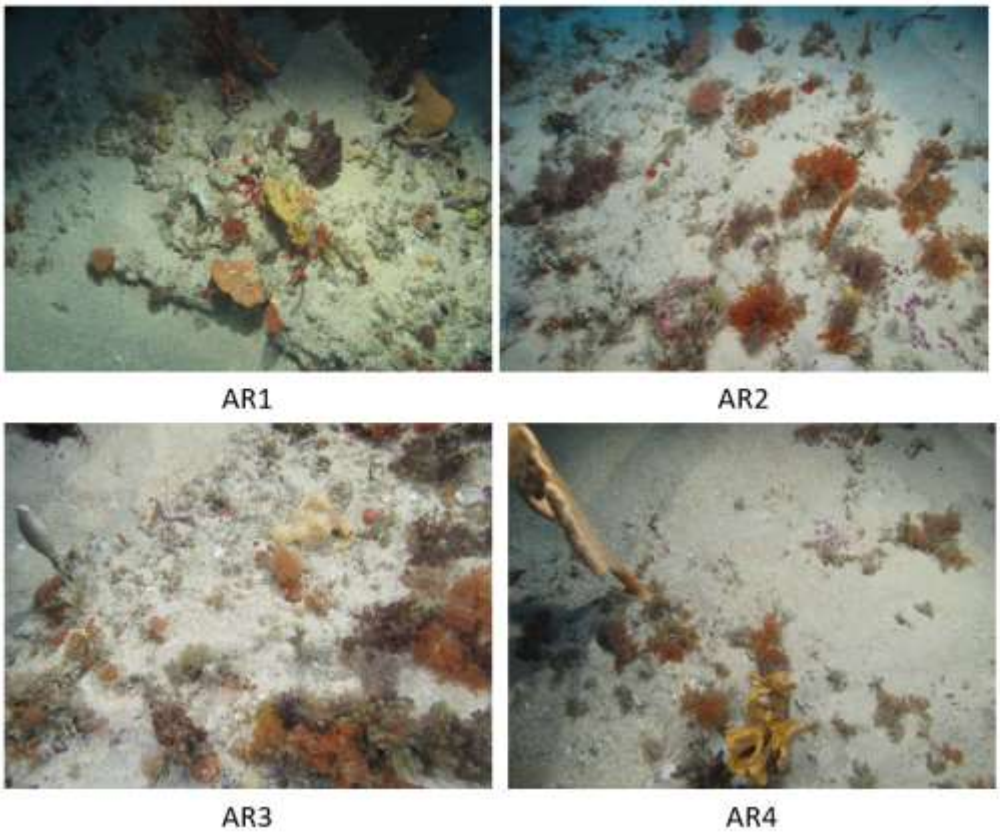


Figure 6-17: Drop Camera Images at Artisan

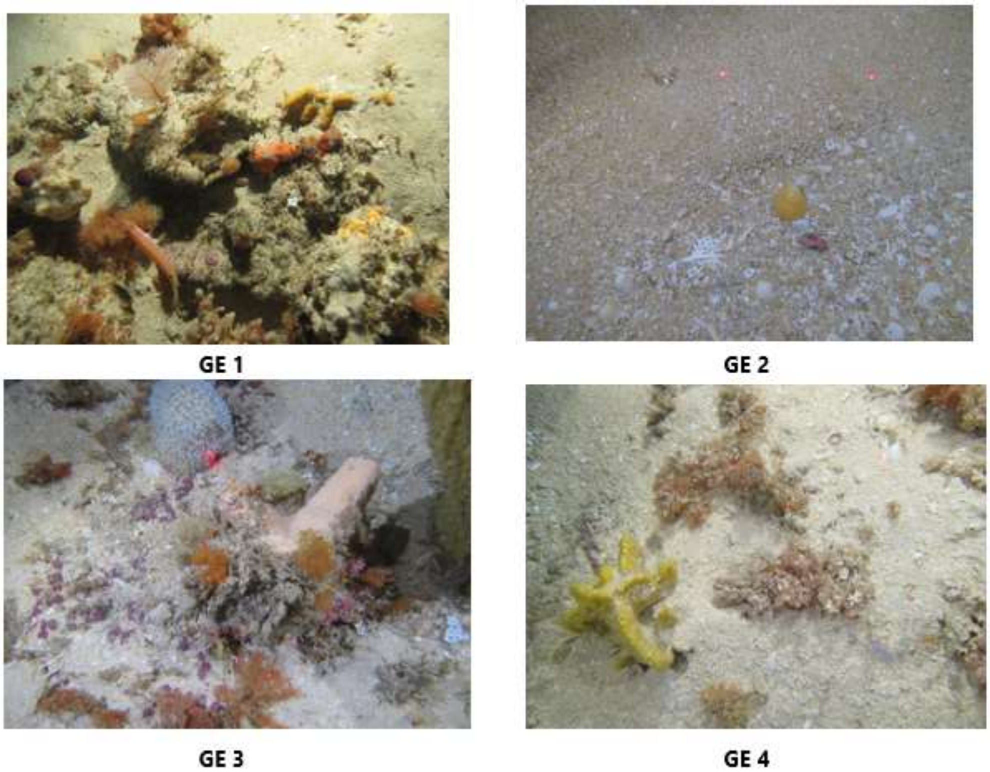


Figure 6-18: Drop Camera Images at Geographe

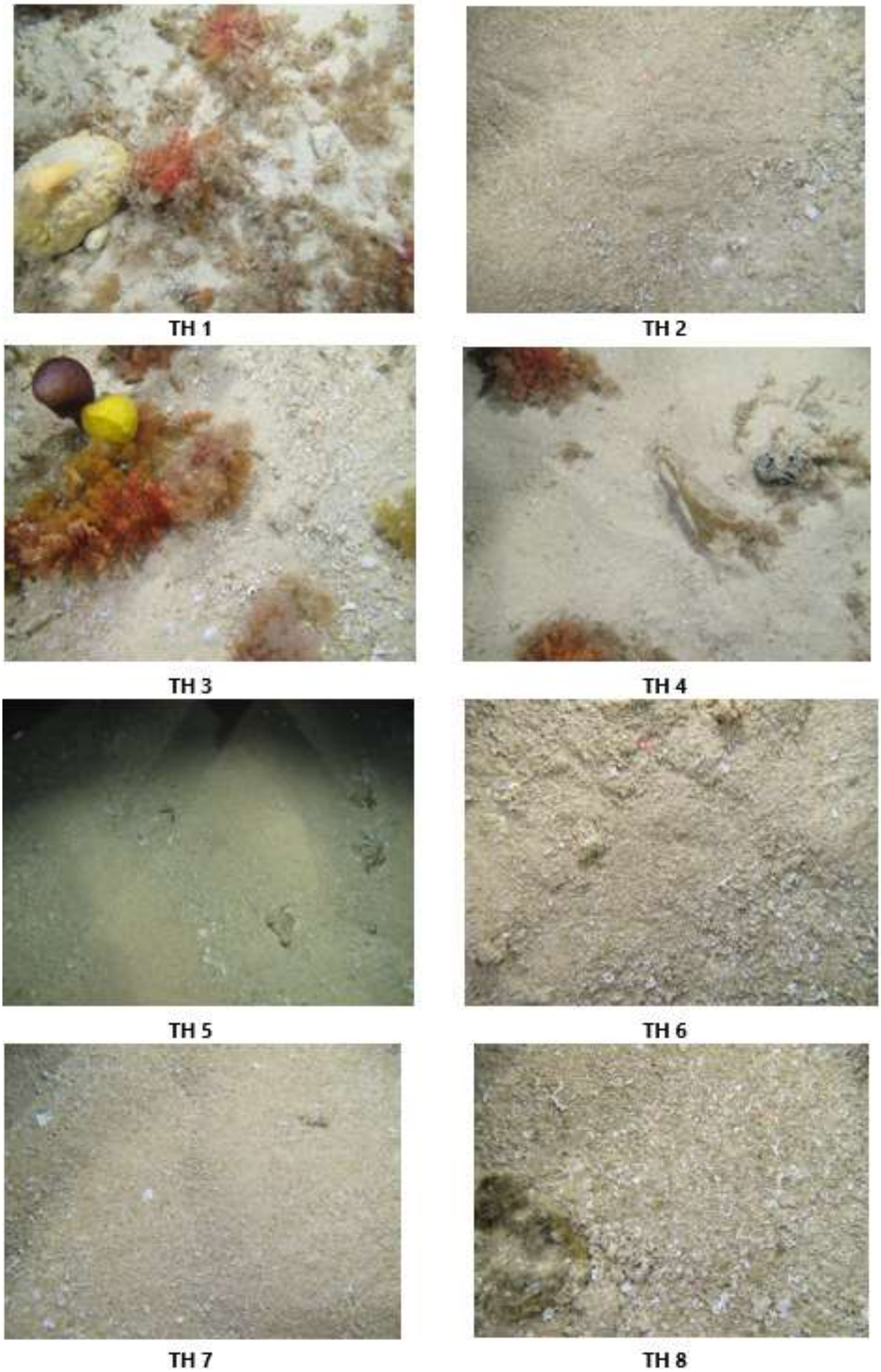


Figure 6-19: Drop Camera Images at Thylacine

Figure 6-20: Drop Camera Images at LaBella

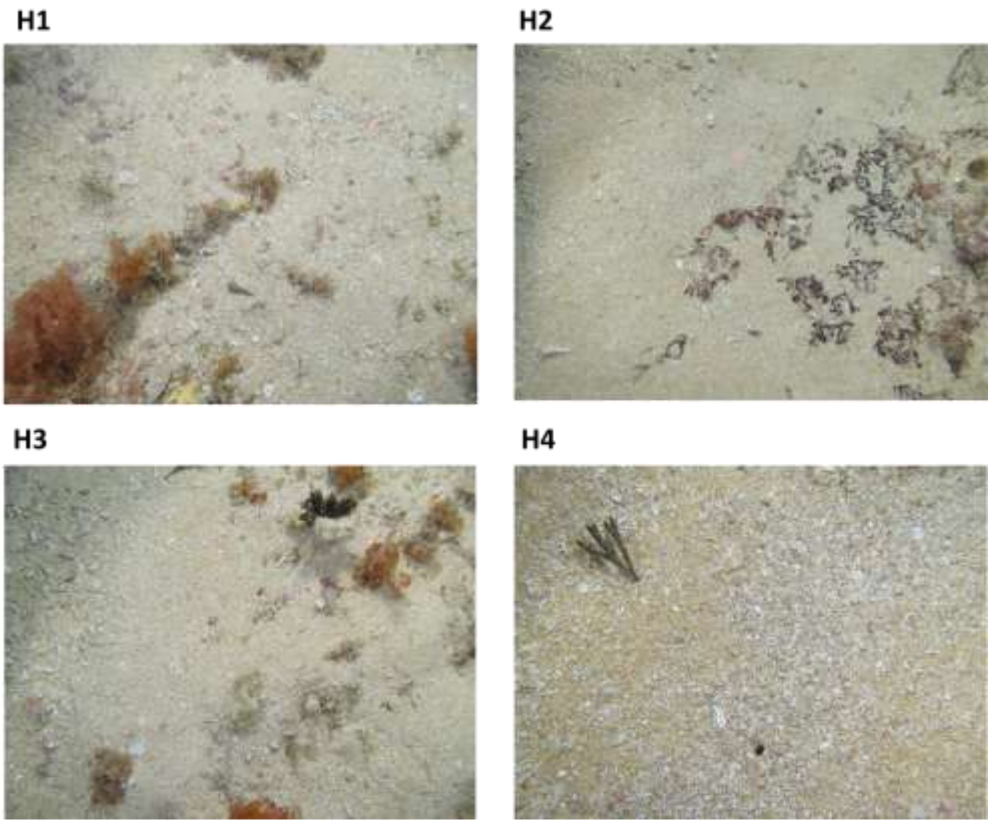


Figure 6-21: Drop Camera Images at Hercules

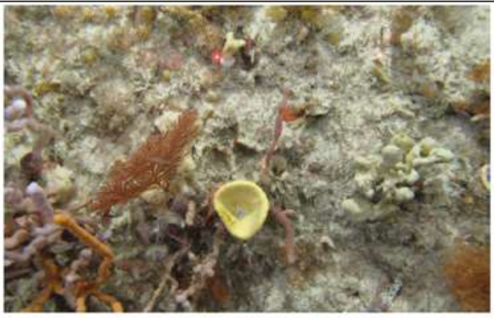
	
Hot Tap Tee X	**Hot Tap Tee X**
	
Hot Tap Tee Y	**Hot Tap Tee Y**

Figure 6-22: Drop Camera Images at Hot Taps

Artisan to Hot Tap Tee Y Route

Artisan to Hot Tap Tee Y Route

Artisan to Hot Tap Tee X Route

Artisan to Hot Tap Tee X Route

Figure 6-23: Drop Camera Images at Proposed Flowline Routes

Figure 6-24: Drop Camera Images at Proposed Flowline Route and Umbilical Routes

6.4.1.3 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 resedimentation 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).

6.4.1.4 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). Within the Planning Areas, seagrass meadows have been primarily recorded along the Victorian and New South Wales coastline, as well as a small overlapping meadow on the northern coast of Tasmania (Figure 6-25). 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).

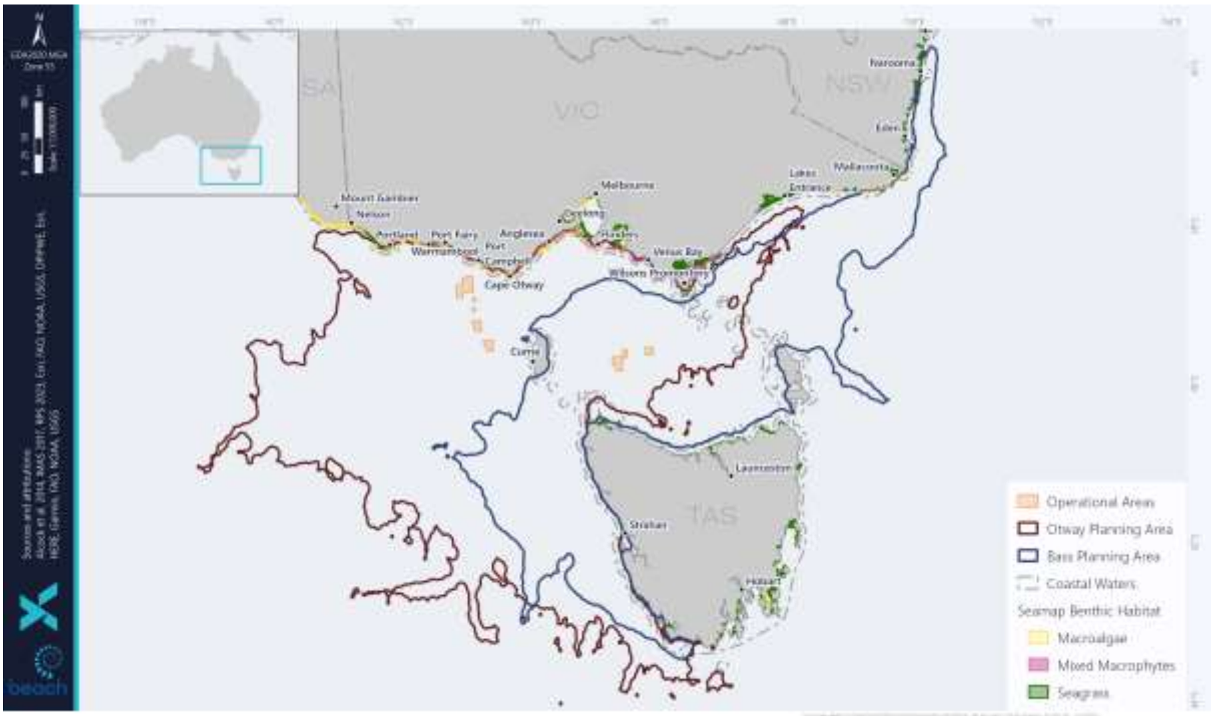


Figure 6-25: Presence of Benthic Habitat (Seagrass, Macroalgae and Mixed Macrophytes) within the Planning Areas

6.4.1.5 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 gastropods 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 Planning Areas, macroalgae have primarily been recorded along the Victorian coastline (Figure 6-25).

Kelp are a special group of large brown algae that attach themselves to solid structures to form forests. They extend their leaf-like fronds into the waters above them reaching towards the sunlight. These larger algae in turn create a habitat for smaller algae, invertebrates, and fish (VFA 2023). On Victoria's coast kelp forests grow on most rocky reefs in waters to a depth of around 30 m, although most are found in shallower waters (VFA 2023).

Bull kelp or southern bull kelp (*Durvillaea potatorum*) is a fast-growing brown macroalgae (seaweed) with large dark brown and leathery strap-like blades. It consists of a body, called the thallus, with a stipe connecting the blades to the holdfast (a structure adhering the bull kelp to the seafloor.

Offshore Victoria and Tasmania there are two main species of *Durvillaea*, these are *D. potatorum* and *D. amatheiae*. The approximate distribution of the species is shown in Figure 6-26.

Durvillaea spp. are a significant habitat. The holdfast can be inhabited by a diverse array of epifauna and infauna invertebrates. These burrow into the holdfast creating holes that can be used by a wide variety of animals. In addition, *Durvillaea* spp. grow in large groups or forests that can become important nursery areas and sanctuary areas for fish, crustaceans, and other fauna.

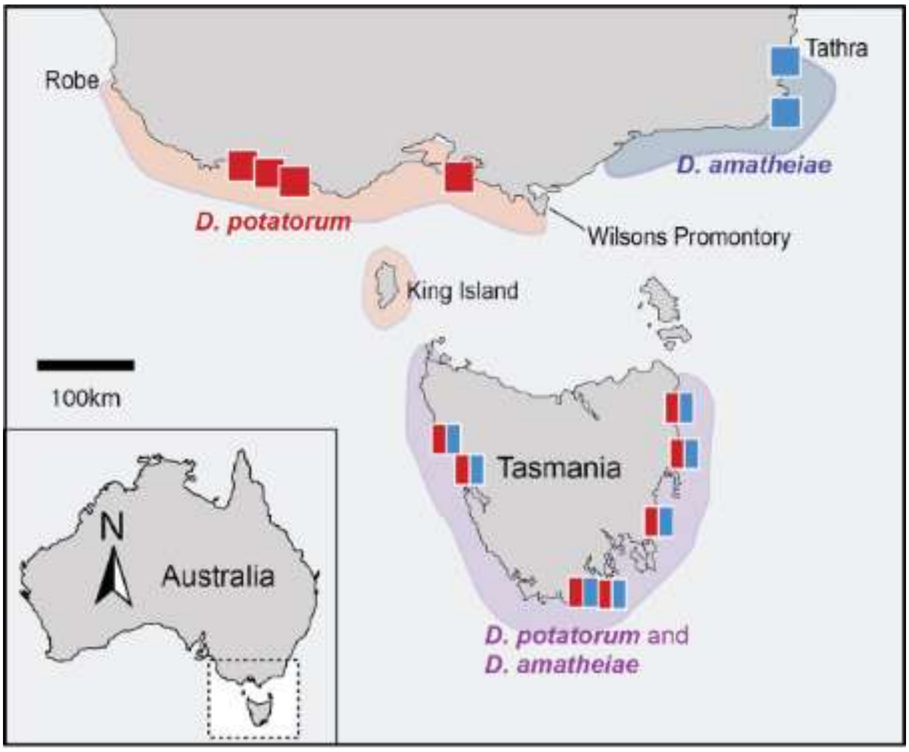


Figure 6-26: Distribution of Bull Kelp off Victoria and Tasmania (Velasquez et al. 2020)

Thurstan et al. (2017) gathered historical data on the use of bull kelp by First Nations. Bull kelp has a long history of use by First Nations in Australia, New Zealand, and Chile. In Australia this reportedly dates back 65,000 years (Thurstan et al. 2017). First Nation people in Tasmania used dried bull kelp to transport water and food. The species name came from this use: *potatorum* means 'to drink' in Latin (Government of SA 2023).

Thurstan et al. (2017) details a number of First Nations historical references for bull kelp including:

- Cultural activities and cultural history –mythology and sacred songs.
- Ceremonial activities –being burned or being used during smoking ceremonies.
- Medicinal use –bandages and medicinal poultice.
- Clothing – cloaks and shoes.

- Diet – raw, jelly, dried and roasted (preserving for several months).
- Fishing – ropes and fishing nets / traps, traps for shortfinned eels, also used to assist during diving for crayfish.
- Shelter – waterproofing, wind proofing and carpeting.

Bull kelp is also collected by the seaweed industry as described in Section 6.5.14.

6.4.1.6 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 Operational Areas and Planning Areas, 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).

6.4.1.7 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 bernardi*), *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, 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*).

6.4.1.8 Basalt Rises

No basalt rises were identified within the Operational or Planning Areas.

6.4.2 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 or grey mangrove (*Avicennia marina*), which is known to occur at Western Port, which overlaps the Otway Planning Area. (Figure 6-27). Mangroves have also been recorded within the Bass Planning Area in New South Wales, including at Bermagui River, Meringo Creek and Wagonga Inlet (Figure 6-27).

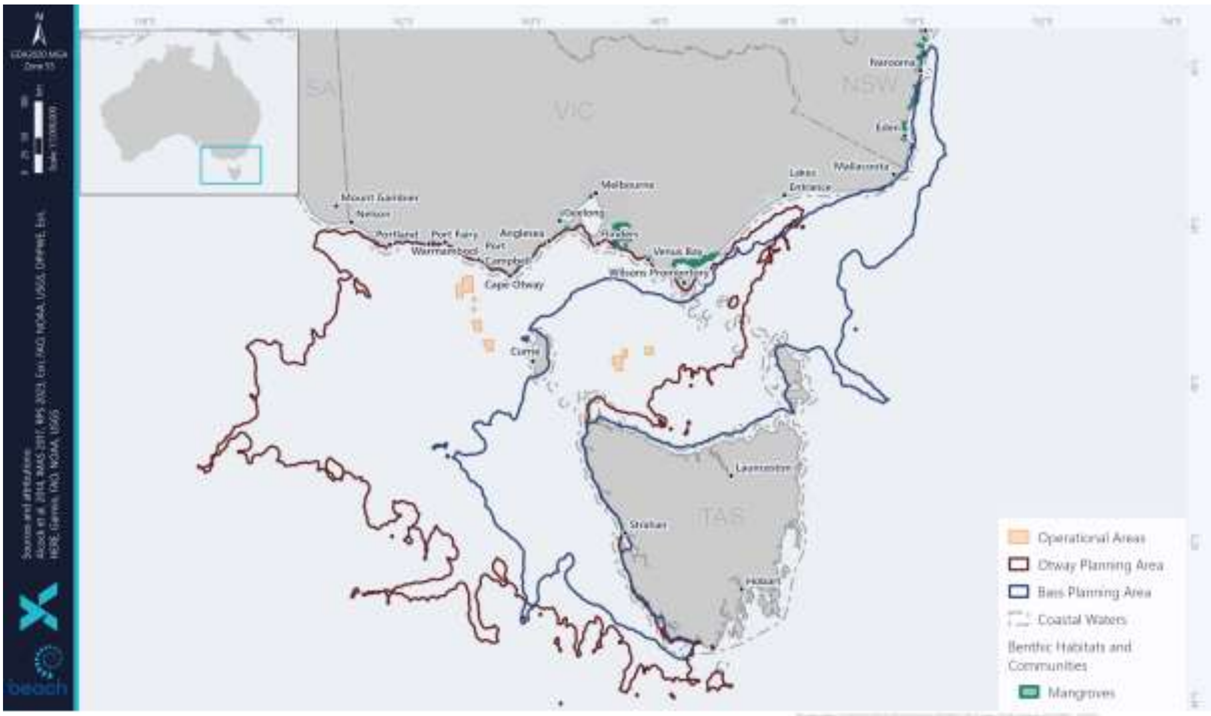


Figure 6-27: Presence of Mangrove Habitat within the Planning Areas

6.4.3 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 6-28Figure 6-28, Boon et al. 2011).

Within the Otway Planning Area, saltmarsh habitat has been mapped along the Victorian coastline including at 12 Apostles, Curdies Inlet, Port Phillip Bay and Thompson Creek (Figure 6-28). The Bass Planning Area overlaps several areas of recorded saltmarsh habitat along Flinders Island in Tasmania, eastern Victoria at the Gippsland Lakes and New South Wales including Baragoot Lake, Coila Lake and Nangudga Lake (Figure 6-28). Along the Tasmanian coastline, saltmarsh habitat has been mapped within the Planning Areas at King Island at Seal River and Yellow Rock River as well as the northern and western coasts of Tasmania including Arthur River, Henty River and Robbins Passage (Figure 6-28).

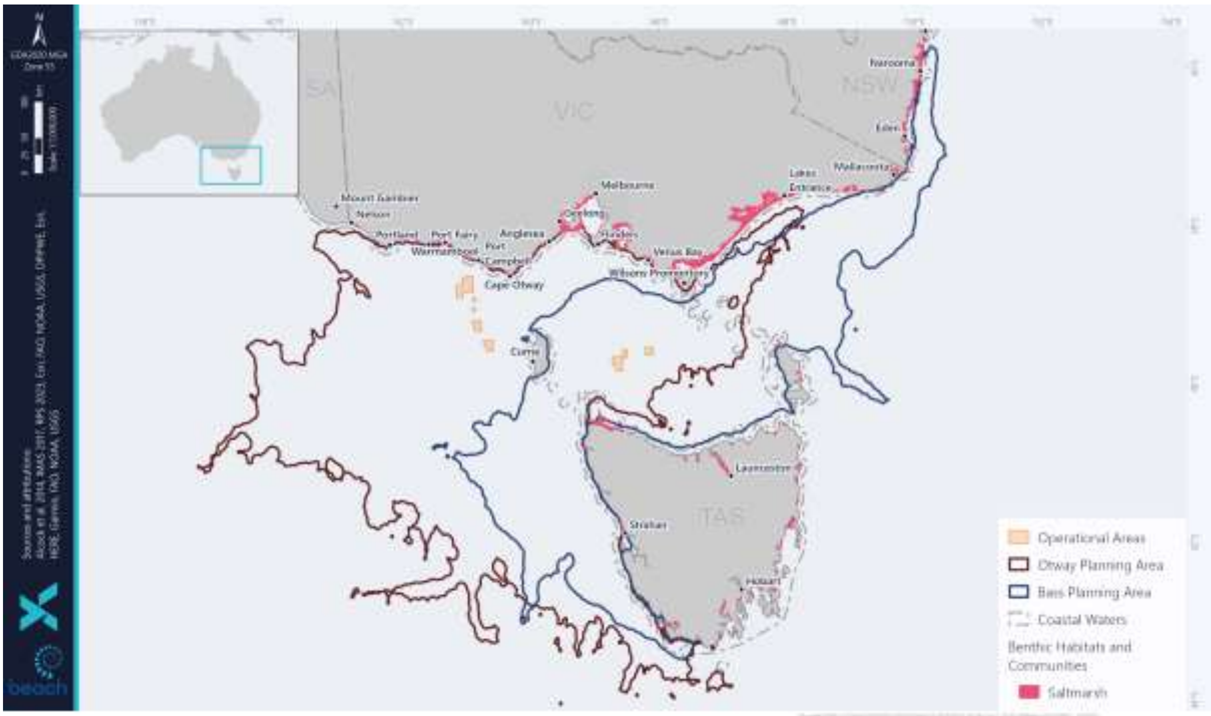


Figure 6-28: Presence of Saltmarsh Habitat within the Planning Areas

6.4.4 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 Planning Areas, the seasonal Bonney coast upwelling is a productivity hotspot, with high densities of zooplankton and are important for fish and whales. Of importance in the region is krill, *Nyctiphanes australis*, which swarms throughout the water column reaching its highest abundance in shallow waters of the continental shelf during nightly vertical migrations, primarily in the summer months (Hosie 1983). During winter months, *N. australis* abundance decreases and becomes relatively scarce in the upper water column. *N. australis* feeds on microalgae and provides an important link in the food chain, particularly for the blue whale. 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, illustrating 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 Planning Areas 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.

6.4.5 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 (DNP 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 (*Macroctopus maorum*) 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).

Sponge gardens are most commonly found in low light environments on reefs more than 20 m deep, and on rubble in areas where currents aren't very strong. These habitats flourish in deeper waters or shaded areas because they do not require much light, unlike algae and seagrass. The Bass Strait sponge beds area was identified as one of the 11 unique areas based on reports of large sponge catches in southern Bass Strait, taken on Museum Victoria research cruises conducted between 1979-

1983 to assess the marine biodiversity of Bass Strait. Limited further research has been done into the sponge beds in the Bass Strait, but it is assumed that the area has high biodiversity value based on surveys of other sponge beds elsewhere. (Butler et al. 2002).

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.

6.4.6 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).

TECs identified in the PMST Reports are presented in Figure 6-29 and Table 6-15 (Appendix E). TECs identified in the PMST Report due to the size of the grids used in the PMST but not actually intersecting a Planning Area are listed in the Table with 'X'. TECs which intersect a Planning Area and have a coastal component which may be exposed to hydrocarbons from a spill event are discussed in the subsections below.

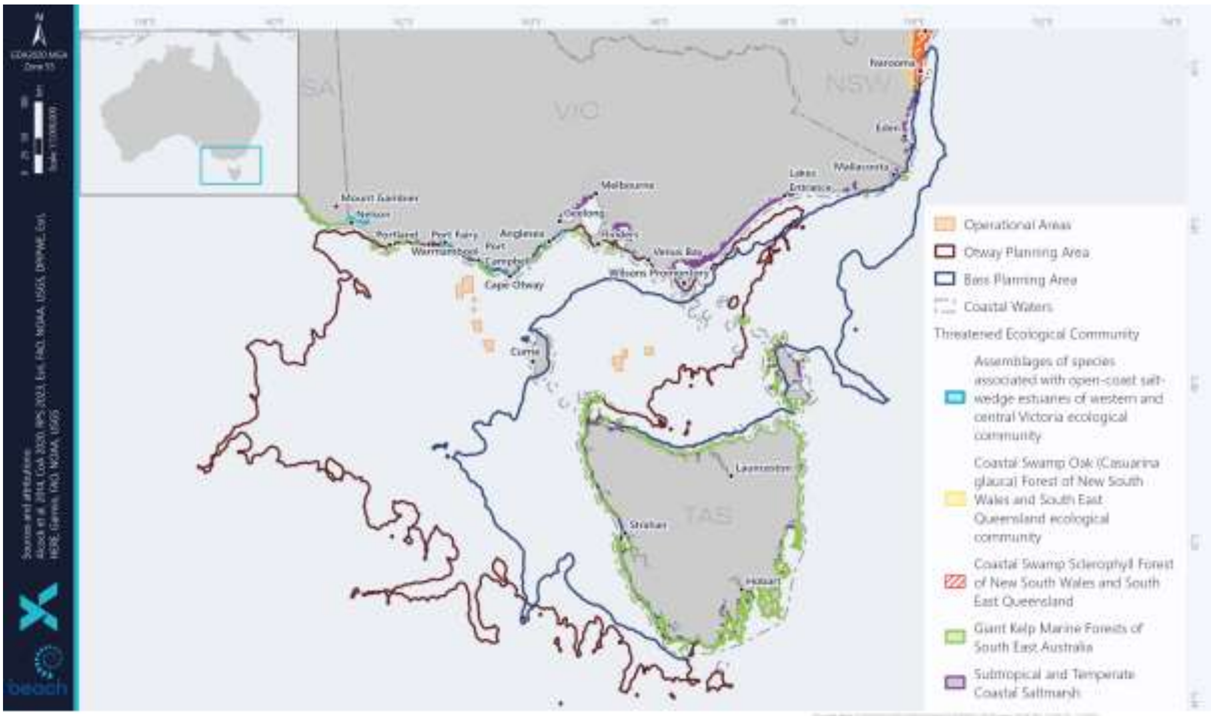


Figure 6-29: Threatened Ecological Communities within the Planning Areas

Table 6-15 Threatened Ecological Communities within the Planning Areas

Threatened Ecological Community	Threatened Category	Coastal Component	Planning Area	
			Bass	Otway
Alpine Sphagnum Bogs and Associated Fens	Endangered	-	✓	X
Araluen Scarp Grassy Forest	Endangered	-	✓	-
Assemblages of species associated with open-coast salt-wedge estuaries of western and central Victoria ecological community	Endangered	✓	-	✓
Brogo Vine Forest of the South East Corner Bioregion	Endangered	-	✓	-
Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and South East Queensland ecological community	Endangered	✓	✓	-
Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland	Endangered	✓	✓	-
Giant Kelp Marine Forests of South East Australia	Endangered	✓	✓	✓
Grassy Eucalypt Woodland of the Victorian Volcanic Plain	Critically Endangered	-	-	✓
Illawarra and south coast lowland forest and woodland ecological community	Critically Endangered	-	✓	-
Karst springs and associated alkaline fens of the Naracoorte Coastal Plain Bioregion	Endangered	-	-	✓
Littoral Rainforest and Coastal Vine Thickets of Eastern Australia	Critically Endangered	-	✓	-
Lowland Grassy Woodland in the South East Corner Bioregion	Critically Endangered	-	✓	-
Lowland Native Grasslands of Tasmania	Critically Endangered	-	✓	✓
Natural Damp Grassland of the Victorian Coastal Plains	Critically Endangered	-	-	✓
Natural Temperate Grassland of the Victorian Volcanic Plain	Critically Endangered	-	-	✓
River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria	Critically Endangered	-	✓	-
Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains	Critically Endangered	-	-	✓
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	✓	✓	✓

Threatened Ecological Community	Threatened Category	Coastal Component	Planning Area	
			Bass	Otway
Tasmanian Forests and Woodlands dominated by black gum or Brookers gum (*Eucalyptus ovata / E. brookeriana*)	Critically Endangered	-	✓	✓
Tasmanian white gum (*Eucalyptus viminalis*) wet forest	Critically Endangered	-	✓	✓
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	-	-	✓

6.4.6.1 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).

6.4.6.2 Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and South East Queensland Ecological Community

This ecological community occurs in sub-tropical, sub-humid and temperate climate zones from Curtis Island in Queensland to Bermagui in southern NSW in coastal catchments, mostly at elevations less than 20 m above sea-level and typically within 30 km of the coast (TSSC 2018a). Typically, coastal swamp oak forest is found in association with other vegetation types such as coastal saltmarsh, mangroves, freshwater wetlands, littoral rainforests or swam sclerophyll forests in a mosaic of coastal communities. When ground water is more saline, like estuarine or coastal lake fringes, the ecological community is typically expressed as a low woodland or forest and the composition of the understory is likely to include saline tolerant (typically saltmarsh) species. Further, the vegetation of these communities provides a diverse habitat for a wide range of fauna, many of which are listed as conservation significant under government legislation (TSSC 2018a).

6.4.6.3 Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland

This ecological community is located between the Great Dividing Range and the coastline from Gladstone, Queensland to the south coast of NSW. The community includes any organisms typically associated with forested palustrine wetlands or swam forests, found in the temperate to subtropical coastal valleys of Australia's east coast and islands. It most commonly occurs within 20 km of the coast at elevations below 20 m above sea-level. Vegetation in the wetland system is governed by the hydrologic regime. Further, the coastal swamp sclerophyll forest can be found in, or as part of, nationally and internationally important wetlands. Notable species typically associated with these communities include waterbirds such as the Australian painted snipe, migratory waders like the great knot and the nationally listed green and golden bell frog (DAWE 2021)

6.4.6.4 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 (TSSC 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 (TSSC 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 6-29 shows that the largest extent of giant kelp marine forests are along the Tasmanian 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 m 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 Marine National Park (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).

6.4.6.5 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 (TSSC 2013). The community is found in coastal areas which have an intermittent or regular tidal influence. Figure 6-29 shows that from Corner Inlet to Marlo there is a substantial amount of subtropical and temperate coastal saltmarsh along the Victorian coastline, but only small patches mapped within the Otway Planning Area. The Bass Planning Area also overlaps a small patch of recorded subtropical and temperate coastal saltmarsh along the New South Wales coastline and north-west coast of Tasmania (Figure 6-29).

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.

6.4.7 Threatened and Migratory Species

PMST Reports were generated for the Operational and Planning Areas to identify the listed Threatened and Migratory species that may be present (Appendix E). The Planning Areas encompass the smaller Operational Areas.

6.4.7.1 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 or Planning Areas are provided in the following sections.

For the purpose of the EP, the following species are discussed in further detail:

- Species listed as threatened or migratory under the EPBC Act and known or likely to occur in the Operational or Planning Areas. Known and likely occurrence was determined from the PMST Report.
- Species that have a biologically important area (BIA). This was determined from the National Conservation Values Atlas (NCVA).
- Species undertaking biologically important behaviour such as breeding, foraging, resting or migration (DCCEEW 2023i). This was determined from the PMST Report.

6.4.7.2 Biologically Important Areas and Critical Habitat to the Survival of the Species

Biologically Important Areas are spatially, and temporally defined areas of the marine environment used by protected marine species for carrying out critical life functions (DCCEEW 2023h). BIAs are designated by identifying areas and times known or likely to be regularly or repeatedly used by individuals or aggregations of a single species, stock, or population for either reproduction, feeding, migration or resting (DCCEEW 2023h).

The Australian Government is currently in consultation with key stakeholders to conduct a review of BIAs, which includes updating the BIA designation framework and geospatial data for priority protected species including cetaceans, marine turtles, Australian sea lions, sharks, dugong, and seabirds (DCCEEW 2023h). Reconsideration of BIA designation and updates to geospatial data is ongoing. This EP uses the best available data at the time of writing, and Beach will review any new information available or changes in information as per the process described in Section 8.3.5.

CoA (2013) details that 'habitat critical to the survival of a species or ecological community' refers to areas that are necessary:

- For activities such as foraging, breeding, roosting, or dispersal.
- For the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators)
- To maintain genetic diversity and long-term evolutionary development, or
- For the reintroduction of populations or recovery of the species or ecological community.

Such habitat may be but is not limited to: habitat identified in a recovery plan for the species or ecological community as habitat critical for that species or ecological community; and/or habitat listed on the Register of Critical Habitat maintained by the minister under the EPBC Act.

Habitat critical to the survival of a species is listed in Table 6-16. No habitat critical to the survival of species was identified within the Operational Areas. BIAs and within the Operational and Planning Areas are detailed in and Table 6-17. Further details are provided in the relevant species sections.

Table 6-16: Habitat Critical to the Survival of a Species within the Planning Areas

Habitat Critical to the Survival of a Species	**Planning Area**	
	Bass	**Otway**
Shy Albatross *(Thalassarche cauta)* - Albatross Island, The Mewstone, Pedra Branca	✓	✓

Table 6-17: BIAs within the Planning Area

Receptor	Type of BIA	Operational Area		Planning Area	
		Bass	Otway	Bass	Otway
Birds					
Antipodean albatross	Foraging	-	✓	✓	✓
Australasian gannet	Foraging	-	-	✓	✓
	Aggregation	-	-	✓	✓
Black-browed albatross	Foraging	✓	✓	✓	✓
Black-faced cormorant	Breeding	-	-	✓	✓
	Foraging	-	-	✓	✓
Black petrel	Foraging	-	-	✓	-
Buller's albatross	Foraging	✓	✓	✓	✓
Campbell albatross	Foraging	✓	-	✓	✓
Common diving-petrel	Foraging	✓	✓	✓	✓
	Breeding	-	-	✓	✓
Crested tern	Breeding	-	-	✓	-
	Foraging	-	-	✓	-
Flesh-footed shearwater	Foraging	-	-	✓	-
Great-winged petrel	Foraging	-	-	✓	-
Indian yellow-nosed albatross	Foraging	✓	✓	✓	✓
Little penguin	Foraging	-	-	✓	✓
	Breeding	-	-	✓	✓
Northern giant petrel	Foraging	-	-	✓	-
Short-tailed shearwater	Foraging	✓	✓	✓	✓
	Breeding	-	-	✓	✓
Shy albatross	Breeding	-	-	✓	✓
	Foraging likely	✓	✓	✓	✓
Soft-plumaged petrel	Foraging	-	-	✓	✓
	Breeding	-	-	✓	✓
Sooty shearwater	Foraging	-	-	✓	✓
	Breeding	-	-	✓	✓
Southern giant petrel	Foraging	-	-	✓	-
Wandering albatross	Foraging	✓	✓	✓	✓
Wedge-tailed shearwater	Foraging	-	✓	✓	✓
	Breeding	-	-	✓	✓
White-capped albatross	Foraging	-	-	✓	-

Receptor	Type of BIA	Operational Area		Planning Area	
		Bass	Otway	Bass	Otway
White-faced storm petrel	Foraging	✓	-	✓	✓
	Breeding	-	-	✓	✓
White-fronted tern	Breeding	-	-	✓	-
	Foraging	-	-	✓	-
Wilson's storm petrel	Migration	-	-	✓	-
Fish					
Grey nurse shark	Foraging	-	-	✓	-
	Migration	-	-	✓	-
White shark	Breeding (nursery area)	-	-	✓	✓
	Foraging	-	-	✓	✓
Cetaceans					
Humpback whale	Foraging	-	-	✓	-
Indo-pacific/Spotted bottlenose dolphin	Breeding	-	-	✓	-
Pygmy blue whale	Foraging	✓	✓	✓	✓
	Foraging (annual high use area)	-	✓	✓	✓
	Known Foraging Area	-	✓	✓	✓
Southern right whale	Reproduction	-	-	✓	✓
	Migration	✓	✓	✓	✓

6.4.7.3 Fish

Fish species present in the Operational or Planning Areas are either pelagic (living in the water column) or demersal (benthic). Fish species inhabiting the region are largely cool temperate species, common within the South-east Marine Region. Table 6-18 details the listed fish species identified in the Operational and Planning Area PMST Reports (Appendix E).

Two fish species identified in the PMST Reports are freshwater species, dwarf galaxias and Yarra pygmy perch, and are not discussed further as they occur outside of the area potentially affected by the Drilling Program.

Threatened or migratory species that are likely or known to occur in the area or have an intercepting BIA with the Operational or Planning Areas are discussed more detail.

Seven species of fish are classed as conservation dependent which do not receive special protection, as they are not considered "matters of national environmental significance" under the EPBC Act.

Information on eels is also provided as Beach's consultation with the Eastern Maar Aboriginal Corporation for the previous Otway Project activities identified that they have interests regarding eels, and they are possibly present within the Planning Areas during migration and spawning seasons.

Table 6-18: Listed Fish Species identified in the Planning Areas

Common Name	Scientific Name	EPBC Status			Operational Area		Planning Area	
		Listed Threatened	Listed Migratory	Listed Marine	Bass	Otway	Bass	Otway
Fish								
Australian Grayling	*Prototroctes maraena*	Vulnerable	-	-	-	Species or species habitat may occur within area	Species or species habitat known to occur within area	Species or species habitat known to occur within area
		National Recovery Plan for the *Prototroctes maraena* (Australian grayling) (Backhouse et al. 2008).						
Black Rockcod, Black Cod, Saddled Rockcod	*Epinephelus daemelii*	Vulnerable	-	-	-	-	Species or species habitat likely to occur within area	-
Blue Warehou	*Seriolella brama*	Conservation Dependent	-	-	Species or species habitat known to occur within area	Species or species habitat known to occur within area	Species or species habitat known to occur within area	Species or species habitat known to occur within area
Eastern Dwarf Galaxias, Dwarf Galaxias	*Galaxiella pusilla*	Endangered	-	-	-	-	Species or species habitat known to occur within area	Species or species habitat known to occur within area
		Conservation Advice for *Galaxiella pusilla* (dwarf galaxias) (DCCEEW 2023m).						
Eastern Gemfish	*Rexea solandri (eastern Australian population)*	Conservation Dependent	-	-	-	-	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area
Orange Roughy, Deep-sea Perch, Red Roughy	*Hoplostethus atlanticus*	Conservation Dependent	-	-	-	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area
Red Handfish	*Thymichthys politus*	Critically Endangered	-	-	-	-	Species or species habitat may occur within area	Species or species habitat may occur within area
Southern Bluefin Tuna	*Thunnus maccoyii*	Conservation Dependent	-	-	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area
Yarra Pygmy Perch	*Nannoperca obscura*	Endangered	-	-	-	-	-	Species or species habitat known to occur within area
		Conservation Advice for *Nannoperca obscura* (Yarra pygmy perch) (DCCEEW 2023n).						
Ziebell's Handfish, Waterfall Bay Handfish	*Brachiopsilus ziebelli*	Vulnerable	-	-	-	-	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area
Sharks and Rays								
Giant Manta Ray	*Mobula birostris*	-	Migratory (as *Manta birostris*)	-	-	-	Species or species habitat known to occur within area	-
Grey Nurse Shark (east coast population)	*Carcharias taurus (east coast population)*	Critically Endangered	-	-	-	-	Congregation or aggregation known to occur within area	-
		Recovery Plan for the Grey Nurse Shark (*Carcharias taurus*) (DoE 2014).						
Harrisson's Dogfish, Endeavour Dogfish, Dumb Gulper Shark, Harrison's Deepsea Dogfish	*Centrophorus harrissoni*	Conservation Dependent	-	-	-	-	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area
Little Gulper Shark	*Centrophorus uyato*	Conservation Dependent	-	-	-	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area
Maugean Skate, Port Davey Skate	*Zearaja maugeana*	Endangered	-	-	-	-	Species or species habitat known to occur within area	Species or species habitat known to occur within area

Common Name	Scientific Name	EPBC Status			Operational Area		Planning Area	
		Listed Threatened	Listed Migratory	Listed Marine	Bass	Otway	Bass	Otway
Oceanic Whitetip Shark	*Carcharhinus longimanus*	-	Migratory	-	-	-	Species or species habitat may occur within area	Species or species habitat may occur within area
Porbeagle, Mackerel Shark	*Lamna nasus*	-	Migratory	-	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area
School Shark, Eastern School Shark, Snapper Shark, Tope, Soupfin Shark	*Galeorhinus galeus*	Conservation Dependent	-	-	-	Species or species habitat may occur within area	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area
Shortfin Mako, Mako Shark	*Isurus oxyrinchus*	-	Migratory	-	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area
Whale Shark	*Rhincodon typus*	Vulnerable	Migratory	-	-	-	Species or species habitat may occur within area	Species or species habitat may occur within area
		Approved Conservation Advice for the *Rhincodon typus* (whale shark) (TSSC 2015a).						
White Shark, Great White Shark	*Carcharodon carcharias*	Vulnerable	Migratory	-	Species or species habitat known to occur within area	Species or species habitat known to occur within area	Breeding known to occur within area	Breeding known to occur within area
		Recovery Plan for the *Carcharodon carcharias* (white shark) (DSEWPaC 2013a).						
Pipefish, Seahorses, and Seadragons								
Australian Smooth Pipefish, Smooth Pipefish	*Lissocampus caudalis*	-	-	Listed	-	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
Big-belly Seahorse, Eastern Potbelly Seahorse, New Zealand Potbelly Seahorse	*Hippocampus abdominalis*	-	-	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
Brushtail Pipefish	*Leptoichthys fistularius*	-	-	Listed	-	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
Bullneck Seahorse	*Hippocampus minotaur*	-	-	Listed	Species or species habitat may occur within area	-	Species or species habitat may occur within area	Species or species habitat may occur within area
Common Seadragon, Weedy Seadragon	*Phyllopteryx taeniolatus*	-	-	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
Crested Pipefish, Briggs' Crested Pipefish, Briggs' Pipefish	*Histiogamphelus briggsii*	-	-	Listed	-	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
Deepbody Pipefish, Deep-bodied Pipefish	*Kaupus costatus*	-	-	Listed	-	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish	*Syngnathoides biaculeatus*	-	-	Listed	-	-	Species or species habitat may occur within area	Species or species habitat may occur within area
Hairy Pipefish	*Urocampus carinirostris*	-	-	Listed	-	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
Halfbanded Pipefish	*Mitotichthys semistriatus*	-	-	Listed	-	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
Javelin Pipefish	*Lissocampus runa*	-	-	Listed	-	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
Knifesnout Pipefish, Knife-snouted Pipefish	*Hypselognathus rostratus*	-	-	Listed	-	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
Leafy Seadragon	*Phycodurus eques*	-	-	Listed	-	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
Longsnout Pipefish, Australian Long-snout	*Vanacampus poecilolaemus*	-	-	Listed	-	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area

Common Name	Scientific Name	EPBC Status			Operational Area		Planning Area	
		Listed Threatened	Listed Migratory	Listed Marine	Bass	Otway	Bass	Otway
Pipefish, Long-snouted Pipefish								
Lord Howe Pipefish	*Cosmocampus howensis*	-	-	Listed	-	-	Species or species habitat may occur within area	-
Mollison's Pipefish	*Mitotichthys mollisoni*	-	-	Listed	-	-	Species or species habitat may occur within area	Species or species habitat may occur within area
Mother-of-pearl Pipefish	*Vanacampus margaritifer*	-	-	Listed	-	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
Port Phillip Pipefish	*Vanacampus phillipi*	-	-	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
Pugnose Pipefish, Pug-nosed Pipefish	*Pugnaso curtirostris*	-	-	Listed	-	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
Red Pipefish	*Notiocampus ruber*	-	-	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
Rhino Pipefish, Macleay's Crested Pipefish, Ring-back Pipefish	*Histiogamphelus cristatus*	-	-	Listed	-	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
Ringback Pipefish, Ring-backed Pipefish	*Stipecampus cristatus*	-	-	Listed	-	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
Robust Ghostpipefish, Blue-finned Ghost Pipefish,	*Solenostomus cyanopterus*	-	-	Listed	-	-	Species or species habitat may occur within area	-
Robust Pipehorse, Robust Spiny Pipehorse	*Solegnathus robustus*	-	-	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
Sawtooth Pipefish	*Maroubra perserrata*	-	-	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
Short-head Seahorse, Short-snouted Seahorse	*Hippocampus breviceps*	-	-	Listed	-	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
Shortpouch Pygmy Pipehorse	*Acentronura tentaculata*	-	-	Listed	-	-	Species or species habitat may occur within area	-
Spiny Pipehorse, Australian Spiny Pipehorse	*Solegnathus spinosissimus*	-	-	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
Spotted Pipefish, Gulf Pipefish, Peacock Pipefish	*Stigmatopora argus*	-	-	Listed	-	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
Trawl Pipefish, Bass Strait Pipefish	*Kimblaeus bassensis*	-	-	Listed	Species or species habitat may occur within area	-	Species or species habitat may occur within area	Species or species habitat may occur within area
Tucker's Pipefish	*Mitotichthys tuckeri*	-	-	Listed	-	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish	*Heraldia nocturna*	-	-	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish	*Stigmatopora nigra*	-	-	Listed	-	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area

Australian 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 (DSE 2008), though its precise marine habitat requirements remain unknown (DSE 2008). 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 2008).

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

Black Rockcod

The black rockcod (*Epinephelus daemelii*) is listed as vulnerable and is a large marine groper or 'cod' species.

In Australia, the distribution of black rockcod ranges from southern Queensland through NSW to northern Victoria. However, records from Queensland and Victoria are rare, and the single specimen recorded from South Australian waters is considered a vagrant (DSEWPaC 2012c). The NSW coastline forms the species' main range, both in Australia and internationally. Black rockcod are known to occur to some degree in all six NSW Marine Parks – Lord Howe, Cape Byron, Solitary Island, Port Stephens, Jervis Bay and Batemans Bay (DSEWPaC 2012c).

Black rockcod generally inhabit near-shore rocky and offshore coral reefs at depths down to 50 m. In coastal waters adult black rockcod are found in rock caves, rock gutters and on rocky reefs (DSEWPaC 2012c). Black rockcod are an aggressive, territorial species and individuals may occupy one particular cave for most of their adult life.

Overfishing by commercial and recreational line fishers caused the first localised declines of the black rockcod in the early 1900s (DSEWPaC 2012c).

Red Handfish

The red handfish (*Thymichthys politus*) is endemic to south-eastern Tasmania and are currently only found in Primrose Sands Reed in Fredrick Genry Bay. Due to their rarity, small size and cryptic nature current population trends are difficult to determine (DoE and TG 2015). The inhabit a variety of locations, such as on top of rocks, amongst macro-algae, in sandy areas between rocks and reef sand interfaces at depths up to 20 m (DoE and TG 2015). They are small slow moving benthic fish that use their fins to crawl across the sea floor and have a of small crustaceans and polychaete worms.

The recovery plan for three handfish species, including the red handfish, identifies primary threats as habitat degradation and waterway pollution. Climate change and bioaccumulation of heavy metals are considered secondary threats. Due to the current population factors such as small population size, fragmented distribution and low dispersal these species have an increased risk of localised extinction as a result of stochastic events (DoE and TG 2015).

Ziebell's Handfish

Ziebell's handfish (*Brachiopsilus ziebelli*) is restricted to eastern and southern Tasmania in fragmented populations. The species is known from the Forestier Peninsula, Tasman Peninsula, Waterfall Bay and

Acton Islands occurring at depths between 10 and 20 m. Recent population studies have not been undertaken, and the extent and size of the handfish population is unknown. Ziebell's handfish is known to prefer soft bottomed habitats, however it is also found in giant kelp forests, on rocky substrates, and on rock ledges. Due to a lack of information and contemporary surveys of the handfish, threatening processes impacting species population size are unknown (DoE and TG 2015).

Eels

Ecology & Biology

The shortfinned eel (*Anguilla australis australis*) and the longfinned eel (*A. reinhardtii*) both occur naturally within Victoria and are the target species of the Victorian eel fishery (See Section 6.5.13). The eels have differing but overlapping distributions east and south of the Great Dividing Range in estuarine and freshwater catchments (VFA 2022b) (Figure 6-30).

The shortfinned eel is widespread across the southern parts of the Victoria and occurring occasionally in northern streams draining into the Murray River, while the longfinned eel is found within southeast parts of Victoria only (VFA 2022a). Both species spend the majority of their life cycle in fresh water or estuaries before travelling to the ocean to spawn once before dying (VFA 2022a). Shortfinned eels are listed as 'near threatened' on the IUCN red list, with barriers to riverine movement and freshwater habitat loss being key threats. Additionally changes in ocean currents, primary production, and thermal regimes may also affect eel migration, spawning success, and recruitment (Koster et al. 2021). The longfinned eel is listed as 'least concern' by the IUCN. Neither species are listed as threatened under the EPBC Act.

Both species of eel are primarily carnivorous, however, they will both opportunistically eat plant material (VFA 2022a, 2022c). The shortfinned eel is known to eat various types of fish, worms, insects, small crustaceans, molluscs, and water plants and can grow up to 1.1 m long and weigh up to 6.8 kg (VFA 2022a). The longfinned eel consumes primarily fish and insects The longfinned eel is larger in size compared to the shortfinned, reported to grow up to 2 m and weigh up to 16 kg, however, they are usually much smaller and often reach 1 m in length (VFA 2022c). Both species are believed to follow a seasonal feeding pattern, with the most intense feeding window being at night during summer and spring (VFA 2022a, 2022c). Both species sexes are determined by influences such as salinity, temperature, diet, and population density (more females as the population density decreases) (VFA 2017a).

Migration & Spawning

Both species of eel have a remarkable lifecycle that is not entirely understood, remaining a natural phenomenon. They spend most of their life cycle in freshwater or estuaries before undergoing a mass migration into the ocean, travelling in excess of 3,000 km to spawn once (VFA 2022b). Spawning location is believed to be in the Coral Sea near New Caledonia although no precise spawning location for either species has been identified (VFA 2022a). Both species migrate to the ocean once matured; male shortfinned eels generally mature at 8-12 years of age, whilst females mature at 10-20 years and longfinned eels can take double this time to mature. Migration occurs during late summer to autumn, and after a period of insatiable feeding and significant growth, the eels undergo a series of physical changes to prepare for their migration (VFA 2022a).

Once the eels are prepared for spawning, they move out of their freshwater environments into the ocean in total darkness and swim north against the current to reach the Coral Sea. By the time they arrive, they have used up all their energy resources then they spawn and die, and their young commence the cycle over again. Their life begins at unknown spawning sites at a depth of 200 m as larvae. The pelagic larvae are then carried southwards by the ocean currents that parallel the east coast of Australia such as the EAC and swing east past Tasmania and then north to New Zealand. Along the way, they feed on microscopic organisms and develop into transparent, leaf-shaped larvae and eventually metamorphose into 'glass eels' which are eel-shaped, but extremely small and still transparent. At this stage, they move closer to land and commence migrating towards estuaries. Most shortfinned glass eels migrate in the winter and spring, while longfinned glass eels migrate during summer and autumn (VFA 2022a), although glass eels of both species may continue to arrive anytime throughout the year (VFA 2017).

Koster et al. (2021) tracked the shortfinned eel spawning migration for the first time in Australia. Sixteen eels were collected and tagged from the Hopkins and Fitzroy River estuaries as they migrated from the river mouths outwards to the Southern Ocean over a sandbar in 2019. They were then released at either Warrnambool Harbour, Hopkins mouth beach or Killarney beach. Of the 16 tags twelve returned data. The results showed that the shortfinned eels exhibit diel vertical migration, meaning they travel in the top layers of water during the night and travel further down in the water column during the day (Koster et al. 2021). Of the small number of eels that made the entire journey to the spawning location their last movements were recorded in the Coral Sea. Many of the eels (about 30%) migrations were cut short due to predation, suspected by sharks, tuna, or other marine mammals. The conclusion of the study talks about the need for further research to determine the eel’s exact spawning locations and timing and how the information can be used to support conservation management, particularly when looking at anthropogenic impacts on the species. Koster et al. (2021) listed construction and operation of energy developments as having potential to interact with eel migration.

Victorian Eel Fishery
Both the longfinned and shortfinned eel are the target species for the Victorian eel fishery. The first commercial catches of eel were recorded in 1914, and up until 1950 eel was primarily fished for bait. Export of frozen shortfinned eel to Europe began in the 1960s (VFA 2022a). Eel are harvested in Victorian coastal river basins south of the Great Dividing Range using fyke nets, with a maximum of 18 licences allowed in Victoria. Certain waterways are closed to fishing to allow for eels to escape and spawn (VFA 2022a). Shortfinned eels are the most abundant and the most keenly targeted eel species in Victoria, productivity from the fishery is highly susceptible to short and long term and seasonal environmental variations, particularly drought (VFA 2017).

The eel fishery comprises both a wild catch sector and a culture (stock enhanced) sector. The culture sector has developed strategies for growth consistent with the species life cycle by translocating juvenile eels from other parts of Victoria into lakes and impoundments (culture waters) in western inland Victoria where they continue to grow (VFA 2017). Fishing for glass eels has been of limited success due to the highly variable abundance in Victoria. Most of Victoria’s eel catch is taken by commercial fishers and is comprised of adult eels during different stages of their migration.

First Nations connection to eels
Eels were, and continue to be, an important resource for certain First Nation communities. Their use for communal gatherings and for barter and trade was extensive in pre-colonial times. Today, eel remains a popular food for community events (VFA 2017). Shortfinned eels in particular hold a cultural significance to First Nations people. For example, the Gunditjmara people of south-western Victoria built and used sophisticated aquaculture systems throughout the Budj Bim cultural landscape to

exploit eel migrations at least 7,000 years ago. These systems and their eel catches have since provided a lasting and sustainable economic and social base for the Gunditjmara society (Koster et al. 2021). The Budj Bim cultural landscape is outside of the Planning Area.

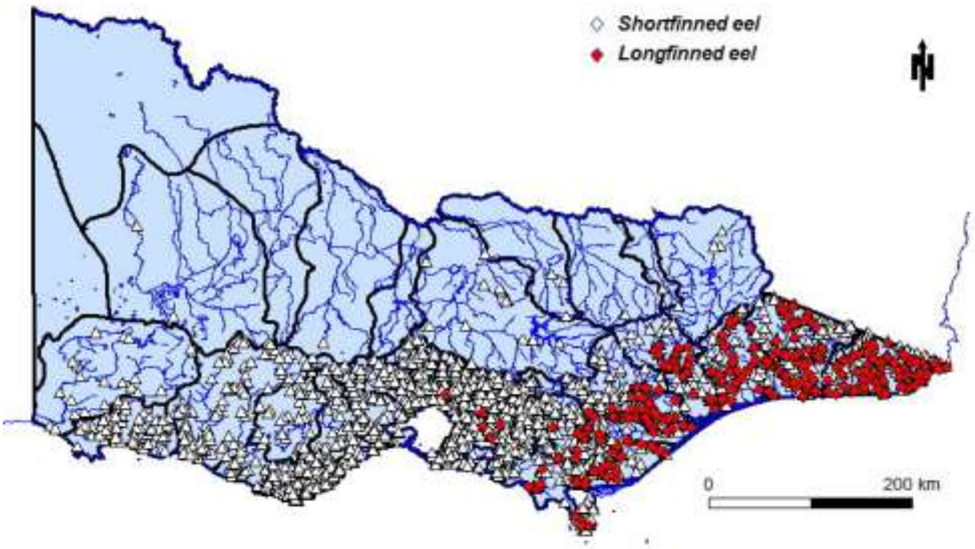


Figure 6-30: Distribution of Longfinned and Shortfinned Eels in Victoria (VFA 2017)

Giant Manta Ray

The giant manta ray is the world's largest ray species. The species is migratory, and many fragmented populations of the giant manta ray occur globally. Typically, this species is found in warm tropical, subtropical, and temperate bodies of water. The main threats to the species include overfishing and bycatch of the species as a result of commercial fishing (NOAA 2023).

Grey Nurse Shark

The grey nurse shark (*Carachariasmo taurus*) is widespread in most sub-tropical and cool temperate seas on the continental shelf, with separate east coast and west coast populations (DoE 2014). The east coast population extends from central Queensland to southern NSW, occasionally as far south as the NSW/Victoria border. Preferred habitat for grey nurse sharks is inshore rocky reefs or islands, generally aggregating near the seabed in water depths of 10 to 40 m in deep sandy or gravel filled gutters, or in rocky caves. The grey nurse shark feeds on a variety of bony fish, smaller sharks and rays, squid, crabs, and lobsters. The species has a gestational period of 9–12 months and females will birth 1 to 2 pups once every 2 years. Recent research shows that the grey nurse shark exhibits reproductive philanthropy meaning they return to specific nursery areas each year (Bray 2020). Foraging and migration BIAs for the grey nurse shark overlap the north-eastern extent of the Bass Planning Area (Figure 6-31).

The recovery plan for the grey nurse shark identifies primary threats to the species as accidental mortality and injury arising from interactions with commercial and recreational fishing activities and mortality related to shark control activities such as meshing or drum lining (DoE 2014).

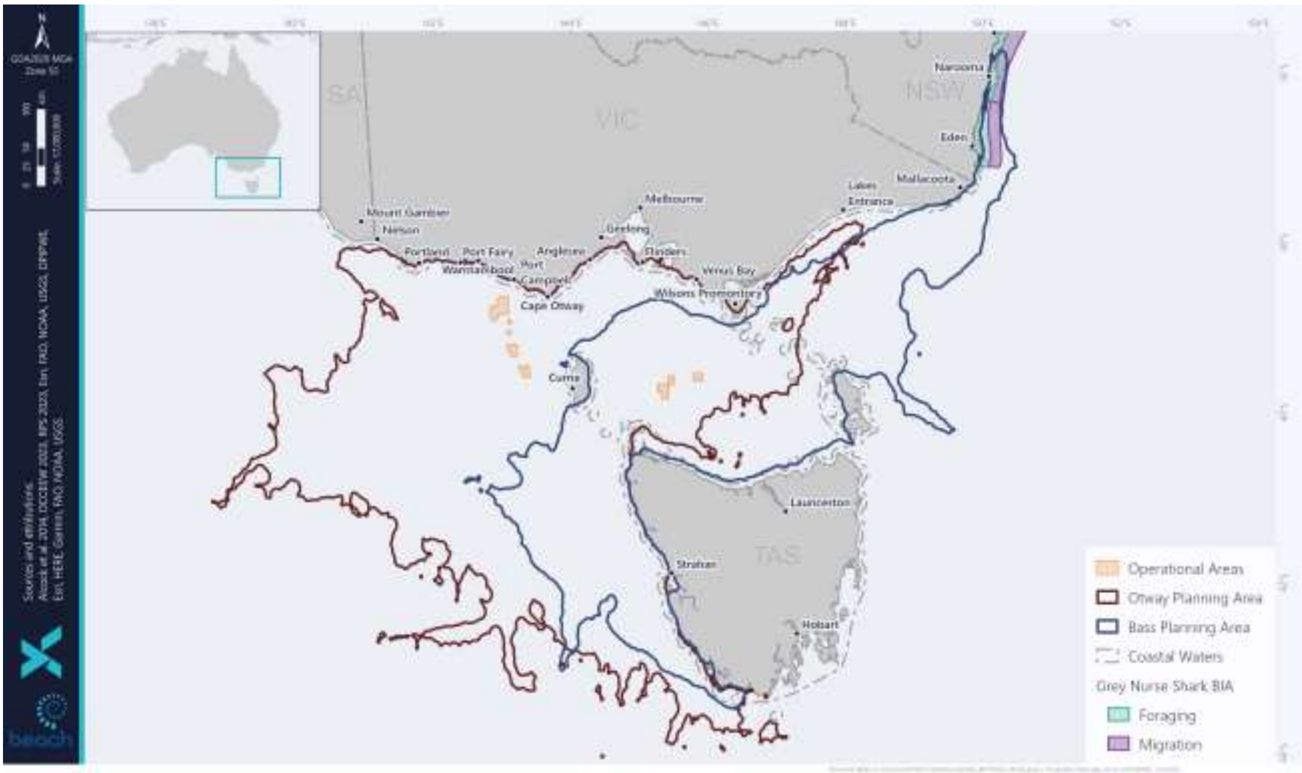


Figure 6-31: Grey Nurse Shark BIAs within the Planning Areas

Port Davey Skate

The Port Davey skate or Maugean skate (*Zearaja maugeana*) is known from both Macquarie Harbour and Port Davey Harbour in south-west Tasmania. The species inhabits low-nutrient, brackish water between 5 and 7 m deep. Preferred habitat are soft surface benthic areas. These habitats are thought to be relatively stable in terms of both light and nutrient levels. The skate is a dark brown, medium-sized primitive skate. Threats to the Port Davey skate include historical heavy metal pollution from mining operations, fish capture, and changes to the nutrient composition of waters by vessel and sewerage discharges, and land-use modifications in the form of catchment damning (DCCEEW 2023j).

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 be present in the Planning Areas in low numbers.

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 Great Australian Bight and south east of Kangaroo Island near the norther extent of the Bonney coast 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 be present in the Operational Areas and Planning Areas in low numbers.

Whale shark

The whale shark (*Rhincodon typus*) is most commonly seen in waters off Western Australia, Northern Territory and Queensland however is occasionally seen off Victoria and South Australia (DoE 2023a). 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 2015a) and may be present in the Planning Areas in low numbers.

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 (DoE 2023b). 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).

Breeding and foraging BIAs overlap the Planning Areas while the Operational Areas overlap the known distribution BIA (Figure 6-32). The known distribution is on the coastal shelf/upper slope waters out to 1000 m and the broader area where they are likely to occur extends from Barrow Island in WA to Yeppoon in New South Wales (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 South-east Marine Region. It is likely that white sharks are present in the Operational and Planning Areas.

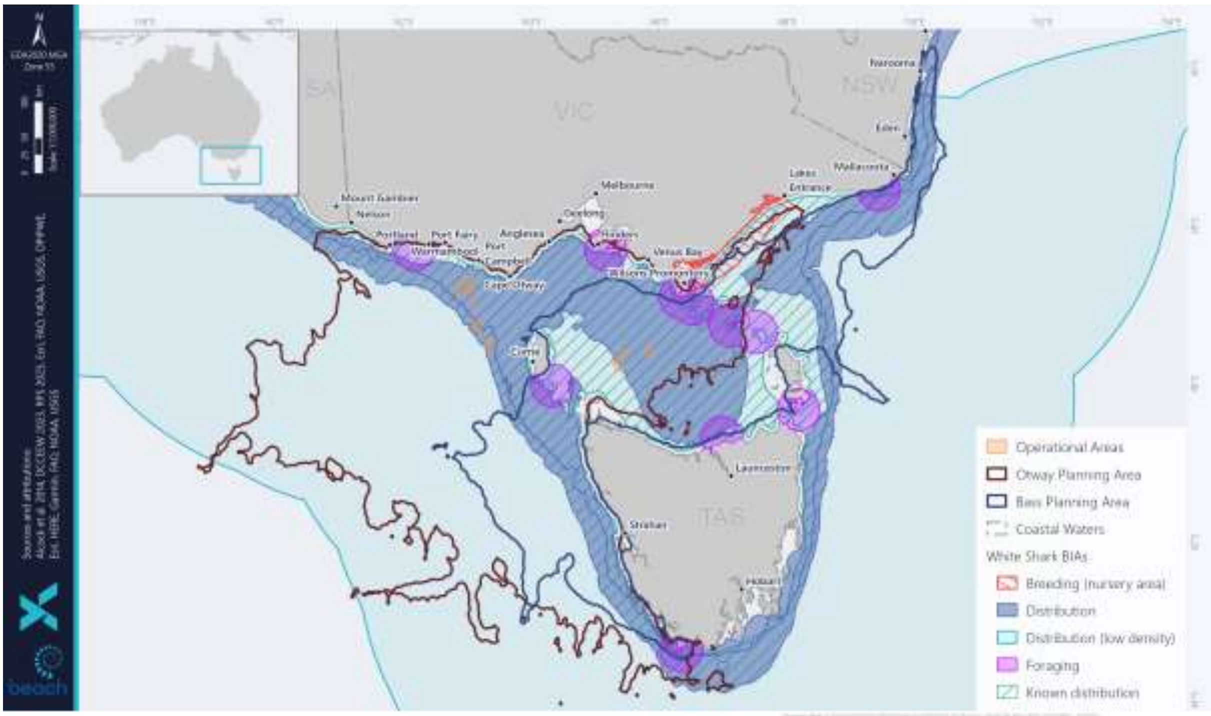


Figure 6-32: BIAs for the White Shark within the Operational and Planning Areas

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 33 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. The PMST Report species profile and threats profiles indicate that the syngnathid species listed in the Operational and Planning Areas are widely distributed throughout southern, south-eastern and south-western Australian waters.

6.4.7.4 Birds

A diverse array of seabirds and terrestrial birds utilise the Bass Strait and Otway regions and may potentially forage within or fly over the Operational or Planning Areas, 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 Bass Strait and Otway shelf, suggesting the birds have been blown off their normal course or are migrating.

Bird species listed in the PMST reports are displayed in Table 6-19. Threatened or migratory species that are likely or known to occur in or have an intercepting BIA with the Operational or Planning Areas are discussed in more detail.

The following conservation and recovery plans apply to birds with conservation and recovery plans and conservation advice relevant to individual species are detailed in Table 6-19.

National Recovery Plan for Albatrosses and Petrels 2022 (CoA 2022a). The recovery plan is a co-ordinated conservation strategy for albatrosses and giant petrels listed as threatened. Threats identified relevant to the activity:

- Marine pollution - Minimise the effects of marine debris, plastics and pollution.
- Marine debris - Minimise the effects of marine debris, plastics and pollution.
- Artificial lighting – no specific actions relevant to the activity.
- Climate variability and change - no specific actions relevant to the activity.

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. Threats identified relevant to the activity:

- Anthropogenic disturbance – artificial lighting.
- Habitat degradation/ modification - oil pollution).
- Climate variability and change.

Wildlife Conservation Plan for Seabirds (CoA 2020a). The Plan aims to provide a national framework for the research and management of listed marine and migratory seabirds and to outline national activities to support the conservation of listed seabirds in Australia and beyond. The Plan includes a summary of Australia's commitments under international conventions and agreements, and the identification of important habitats within Australia.

Threats identified relevant to the activity:

- Climate change
- Resource extraction
- Marine debris
- Light pollution
- Acute pollution – oil spills, discharges

With the action of manage the effects of anthropogenic disturbance to seabird breeding and roosting areas.

Table 6-19: Listed Bird Species identified in the Operational and Planning Areas

Common Name	Scientific Name	EPBC Status			Operational Area		Planning Area	
		Listed Threatened	Listed Migratory	Listed Marine	Bass	Otway	Bass	Otway
Albatrosses								
Antipodean Albatross	*Diomedea antipodensis*	Vulnerable	Migratory	Listed	Foraging, feeding or related behaviour likely to occur within area	Foraging, feeding or related behaviour likely to occur within area	Foraging, feeding or related behaviour likely to occur within area	Foraging, feeding or related behaviour likely to occur within area
Black-browed Albatross	*Thalassarche melanophris*	Vulnerable	Migratory	Listed	Foraging, feeding or related behaviour likely to occur within area	Foraging, feeding or related behaviour likely to occur within area	Foraging, feeding or related behaviour likely to occur within area	Foraging, feeding or related behaviour likely to occur within area
Buller's Albatross, Pacific Albatross	*Thalassarche bulleri*	Vulnerable	Migratory	Listed	Species or species habitat may occur within area	Foraging, feeding or related behaviour likely to occur within area	Foraging, feeding or related behaviour likely to occur within area	Foraging, feeding or related behaviour likely to occur within area
Campbell Albatross, Campbell Black-browed Albatross	*Thalassarche impavida*	Vulnerable	Migratory	Listed	Foraging, feeding or related behaviour likely to occur within area	Foraging, feeding or related behaviour likely to occur within area	Foraging, feeding or related behaviour likely to occur within area	Foraging, feeding or related behaviour likely to occur within area
Chatham Albatross	*Thalassarche eremita*	Endangered	Migratory	Listed	-	-	Foraging, feeding or related behaviour may occur within area	Foraging, feeding or related behaviour may occur within area
Gibson's Albatross	*Diomedea antipodensis gibsoni*	Vulnerable	-	Listed (as *Diomedea gibsoni*)	Foraging, feeding or related behaviour likely to occur within area	-	Foraging, feeding or related behaviour likely to occur within area	Foraging, feeding or related behaviour likely to occur within area
Grey-headed Albatross	*Thalassarche chrysostoma*	Endangered	Migratory	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
Indian Yellow-nosed Albatross	*Thalassarche carteri*	Vulnerable	Migratory	Listed	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area
Northern Buller's Albatross, Pacific Albatross	*Thalassarche bulleri platei*	Vulnerable	-	Listed (as *Thalassarche* sp. nov.)	Species or species habitat may occur within area	Foraging, feeding or related behaviour likely to occur within area	Foraging, feeding or related behaviour likely to occur within area	Foraging, feeding or related behaviour likely to occur within area
Northern Royal Albatross	*Diomedea sanfordi*	Endangered	Migratory	Listed	Foraging, feeding or related behaviour likely to occur within area	Foraging, feeding or related behaviour likely to occur within area	Foraging, feeding or related behaviour likely to occur within area	Foraging, feeding or related behaviour likely to occur within area
Salvin's Albatross	*Thalassarche salvini*	Vulnerable	Migratory	Listed	Foraging, feeding or related behaviour likely to occur within area	Foraging, feeding or related behaviour likely to occur within area	Foraging, feeding or related behaviour likely to occur within area	Foraging, feeding or related behaviour likely to occur within area
Shy Albatross	*Thalassarche cauta*	Endangered	Migratory	Listed	Foraging, feeding or related behaviour likely to occur within area	Foraging, feeding or related behaviour likely to occur within area	Breeding known to occur within area	Breeding known to occur within area
Sooty Albatross	*Phoebetria fusca*	Vulnerable	Migratory	Listed	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area
Southern Royal Albatross	*Diomedea epomophora*	Vulnerable	Migratory	Listed	Foraging, feeding or related behaviour likely to occur within area	Foraging, feeding or related behaviour likely to occur within area	Foraging, feeding or related behaviour likely to occur within area	Foraging, feeding or related behaviour likely to occur within area
Wandering Albatross	*Diomedea exulans*	Vulnerable	Migratory	Listed	Foraging, feeding or related behaviour likely to occur within area	Foraging, feeding or related behaviour likely to occur within area	Foraging, feeding or related behaviour likely to occur within area	Foraging, feeding or related behaviour likely to occur within area
White-capped Albatross	*Thalassarche steadi*	Vulnerable	Migratory	Listed	Foraging, feeding or related behaviour known to occur within area	Foraging, feeding or related behaviour likely to occur within area	Foraging, feeding or related behaviour known to occur within area	Foraging, feeding or related behaviour known to occur within area
Shearwaters								
Flesh-footed Shearwater, Fleshy-footed Shearwater	*Ardenna carneipes*	-	Migratory	Listed (as *Puffinus carneipes*)	Foraging, feeding or related behaviour likely to occur within area	Foraging, feeding or related behaviour likely to occur within area	Foraging, feeding or related behaviour likely to occur within area	Species or species habitat known to occur within area
Short-tailed Shearwater	*Ardenna tenuirostris*	-	Migratory	Listed (as *Puffinus tenuirostris*)	-	-	Breeding known to occur within area	Breeding known to occur within area

Common Name	Scientific Name	EPBC Status			Operational Area		Planning Area	
		Listed Threatened	Listed Migratory	Listed Marine	Bass	Otway	Bass	Otway
Sooty Shearwater	*Ardenna grisea*	Vulnerable	Migratory	Listed (as *Puffinus griseus*)	Species or species habitat may occur within area	Species or species habitat may occur within area	Breeding known to occur within area	Breeding known to occur within area
		Conservation Advice for *Ardenna grisea* (sooty shearwater) (DCCEEW 2023l).						
Wedge-tailed Shearwater	*Ardenna pacifica*	-	Migratory	Listed (as *Puffinus pacificus*)	-	-	Breeding known to occur within area	-
Petrels								
Blue Petrel	*Halobaena caerulea*	Vulnerable	-	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
		Approved Conservation Advice for the *Halobaena caerulea* (blue petrel) (TSSC 2015e).						
Common Diving-Petrel	*Pelecanoides urinatrix*	-	-	Listed	-	-	Breeding known to occur within area	Breeding known to occur within area
Gould's Petrel, Australian Gould's Petrel-	*Pterodroma leucoptera leucoptera-*	Endangered	-	-	Species or species habitat may occur within area	Species or species habitat may occur within area	Breeding known to occur within area	Species or species habitat may occur within area
		National Recovery Plan for *Pterodroma leucoptera leucoptera* (Gould's petrel) (DEC NSW 2006).						
Kermadec Petrel (western)	*Pterodroma neglecta neglecta*	Vulnerable	-	-	-	-	Foraging, feeding or related behaviour may occur within area	-
Northern Giant Petrel	*Macronectes halli*	Vulnerable	Migratory	Listed	Foraging, feeding or related behaviour likely to occur within area	Foraging, feeding or related behaviour likely to occur within area	Foraging, feeding or related behaviour likely to occur within area	Foraging, feeding or related behaviour likely to occur within area
Soft-plumaged Petrel	*Pterodroma mollis*	Vulnerable	-	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Breeding known to occur within area	Breeding known to occur within area
		Approved Conservation Advice for *Pterodroma mollis* (soft-plumaged petrel) (TSSC 2015c).						
Southern Giant-Petrel, Southern Giant Petrel	*Macronectes giganteus*	Endangered	Migratory	Listed	Foraging, feeding or related behaviour likely to occur within area	Foraging, feeding or related behaviour likely to occur within area	Foraging, feeding or related behaviour likely to occur within area	Foraging, feeding or related behaviour likely to occur within area
White-bellied Storm-Petrel (Tasman Sea), White-bellied Storm-Petrel (Australasian)	*Fregetta grallaria grallaria*	Vulnerable	-	-	Species or species habitat likely to occur within area	-	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area
White-faced Storm-Petrel	*Pelagodroma marina*	-	-	Listed	-	-	Breeding known to occur within area	Breeding known to occur within area
White-necked Petrel	*Pterodroma cervicalis*	-	-	Listed	-	-	Species or species habitat may occur within area	-
Seabird								
Australian Fairy Tern	*Sternula nereis nereis*	Vulnerable	-	-	Foraging, feeding or related behaviour likely to occur within area	-	Species or species habitat known to occur within area	Species or species habitat known to occur within area
		National Recovery Plan for the Australian Fairy Tern (*Sternula nereis nereis*). (CoA 2020b).						
Black-faced Cormorant	*Phalacrocorax fuscescens*	-	-	Listed	-	-	Breeding known to occur within area	Breeding known to occur within area
Brown Skua	*Stercorarius antarcticus*	-	-	Listed (as *Catharacta skua*)	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
Cape Gannet	*Morus capensis*	-	-	Listed	-	-	-	Breeding known to occur within area
Caspian Tern	*Hydroprogne caspia*	-	Migratory	Listed (as *Sterna caspia*)	-	-	Breeding known to occur within area	Breeding known to occur within area

Common Name	Scientific Name	EPBC Status			Operational Area		Planning Area	
		Listed Threatened	Listed Migratory	Listed Marine	Bass	Otway	Bass	Otway
Fairy Prion	*Pachyptila turtur*	-	-	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat known to occur within area	Species or species habitat known to occur within area
Fairy Prion (southern)	*Pachyptila turtur subantarctica*	Vulnerable	-	-	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat known to occur within area	Species or species habitat known to occur within area
		Approved Conservation Advice for *Pachyptila subantarctica* (fairy prion (southern)) (TSSC 2015d).						
Fairy Tern	*Sternula nereis*	-	-	Listed (as Sterna nereis)	-	-	Breeding known to occur within area	Breeding known to occur within area
Greater Crested Tern	*Thalasseus bergii*	-	Migratory	Listed (as *Sterna bergii*)	-	-	Breeding known to occur within area	Breeding known to occur within area
Little Penguin	*Eudyptula minor*	-	-	Listed	-	-	Breeding known to occur within area	Breeding known to occur within area
Little Tern	*Sternula albifrons*	-	Migratory	Listed (as *Sterna albifrons*)	-	-	Breeding known to occur within area	Breeding known to occur within area
Shorebirds								
Australasian Bittern	*Botaurus poiciloptilus*	Endangered	-	-	-	-	Species or species habitat known to occur within area	Species or species habitat known to occur within area
		Conservation Advice *Botaurus poiciloptilus* (Australasian bittern) (TSSC 2019). National Recovery Plan for the Australasian Bittern (*Botaurus poiciloptilus*) (DCCEEW 2022)						
Australasian Gannet	*Morus serrator*	-	-	Listed	-	-	-	Breeding known to occur within area
Australian Painted Snipe	*Rostratula australis*	Endangered	-	Listed - overfly marine area (as *Rostratula benghalensis* (*sensu lato*))	-	-	Species or species habitat known to occur within area	Species or species habitat known to occur within area
		National Recovery Plan for the Australian Painted Snipe (*Rostratula australis*) (CoA 2022).						
Alaskan Bar-tailed Godwit	*Limosa lapponica baueri*	Endangered			-	-	Species or species habitat known to occur within area	Species or species habitat known to occur within area
		Conservation Advice *Limosa lapponica baueri* (Alaskan bar-tailed godwit) (DCCEEW 2024d).						
Bar-tailed Godwit	*Limosa lapponica*	-	Migratory	Listed - overfly marine area	-	-	Species or species habitat known to occur within area	Species or species habitat known to occur within area
Black-tailed Godwit	*Limosa limosa*	Endangered-	Migratory	Listed - overfly marine area	-	-	Roosting known to occur within area	Roosting known to occur within area
		Conservation Advice for *Limosa limosa* (black-tailed godwit) (DCCEEW 2024c).						
Broad-billed Sandpiper	*Limicola falcinellus*	-	Migratory	Listed - overfly marine area	-	-	-	Roosting known to occur within area
Common Greenshank, Greenshank	*Tringa nebularia*	Endangered	Migratory	Listed - overfly marine area	-	-	Species or species habitat known to occur within area	Species or species habitat known to occur within area
		Conservation Advice for *Tringa nebularia* (common greenshank) (DCCEEW 2024a)						
Common Noddy	*Anous stolidus*	-	Migratory	Listed	-	-	-	Species or species habitat likely to occur within area
Common Sandpiper	*Actitis hypoleucos*	-	Migratory	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat known to occur within area	Species or species habitat known to occur within area
Curlew Sandpiper	*Calidris ferruginea*	Critically Endangered	Migratory	Listed - overfly marine area	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat known to occur within area	Species or species habitat known to occur within area
		Conservation Advice *Calidris ferruginea* (curlew sandpiper) (DoE 2015e).						
Double-banded Plover	*Charadrius bicinctus*	-	Migratory	Listed - overfly marine area	-	-	Roosting known to occur within area	Roosting known to occur within area

Common Name	Scientific Name	EPBC Status			Operational Area		Planning Area	
		Listed Threatened	Listed Migratory	Listed Marine	Bass	Otway	Bass	Otway
Eastern Hooded Plover, Eastern Hooded Plover	*Thinornis cucullatus cucullatus*	Vulnerable	-	Listed - overfly marine area (as *Thinornis rubricollis rubricollis*)	-	-	Species or species habitat known to occur within area	Species or species habitat known to occur within area
Eastern Curlew, Far Eastern Curlew	*Numenius madagascariensis*	Critically Endangered	Migratory	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat known to occur within area	Species or species habitat known to occur within area
		Conservation Advice for *Numenius madagascariensis* (eastern curlew) (DoE 2015e).						
Great Knot	*Calidris tenuirostris*	Vulnerable	Migratory	Listed - overfly marine area	-	-	Roosting known to occur within area	Roosting known to occur within area
		Conservation Advice for *Calidris tenuirostris* (great knot) (DCCEEW 2024f).						
Greater Sand Plover, Large Sand Plover	*Charadrius leschenaultii*	Vulnerable	Migratory	Listed	-	-	Species or species habitat known to occur within area	Species or species habitat known to occur within area
		Conservation Advice for *Charadrius leschenaultia* (greater sand plover) (TSSC 2016b).						
Grey Plover	*Pluvialis squatarola*	Vulnerable	Migratory	Listed - overfly marine area	-	-	Roosting known to occur within area	Roosting known to occur within area
		Conservation Advice for *Pluvialis squatarola* (grey plover) (DCCEEW 2024b).						
Hooded Plover, Hooded Dotterel	*Thinornis cucullatus*	-	-	Listed - overfly marine area (as *Thinornis rubricollis*)	-	-	Species or species habitat known to occur within area	Species or species habitat known to occur within area
Latham's Snipe, Japanese Snipe	*Gallinago hardwickii*	Vulnerable	Migratory	Listed - overfly marine area	-	-	Species or species habitat known to occur within area	Species or species habitat known to occur within area
		Conservation Advice for *Gallinago hardwickii* (Latham's snipe) (DCCEEW 2024e).						
Lesser Sand Plover, Mongolian Plover	*Charadrius mongolus*	Endangered	Migratory	Listed	-	-	Roosting known to occur within area	Roosting known to occur within area
Little Curlew, Little Whimbrel	*Numenius minutus*	-	Migratory	Listed - overfly marine area	-	-	Roosting likely to occur within area	Roosting likely to occur within area
Marsh Sandpiper, Little Greenshank	*Tringa stagnatilis*	-	Migratory	Listed - overfly marine area	-	-	Species or species habitat known to occur within area	Roosting known to occur within area
Oriental Plover, Oriental Dotterel	*Charadrius veredus*	-	Migratory	Listed - overfly marine area	-	-	-	Species or species habitat known to occur within area
Pacific Golden Plover	*Pluvialis fulva*	-	Migratory	Listed	-	-	Roosting known to occur within area	Roosting known to occur within area
Pectoral Sandpiper	*Calidris melanotos*	-	Migratory	Listed - overfly marine area	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat likely to occur within area	Species or species habitat known to occur within area
Pied Stilt, Black-winged Stilt	*Himantopus himantopus*	-	-	Listed - overfly marine area	-	-	Roosting known to occur within area	Roosting known to occur within area
Red-capped Plover	*Charadrius ruficapillus*	-	-	Listed - overfly marine area	-	-	Roosting known to occur within area	Roosting known to occur within area
Red-necked Avocet	*Recurvirostra novaehollandiae*	-	-	Listed - overfly marine area	-	-	Species or species habitat known to occur within area	Roosting known to occur within area
Red-necked Stint	*Calidris ruficollis*	-	Migratory	Listed - overfly marine area	-	-	Roosting known to occur within area	Roosting known to occur within area
Red-necked Phalarope	*Phalaropus lobatus*	-	Migratory	Listed	-	-	-	Roosting known to occur within area
Red Knot, Knot	*Calidris canutus*	Vulnerable	Migratory	Listed - overfly marine area	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat known to occur within area	Species or species habitat known to occur within area
		Conservation Advice for Calidris canutus (red knot) (DCCEEW 2024g).						

Common Name	Scientific Name	EPBC Status			Operational Area		Planning Area	
		Listed Threatened	Listed Migratory	Listed Marine	Bass	Otway	Bass	Otway
Ruddy Turnstone	*Arenaria interpres*	Vulnerable	Migratory	Listed	-	-	Roosting known to occur within area	Roosting known to occur within area
		Conservation Advice for *Arenaria interpres* (ruddy turnstone) (DCCEEW 2024i).						
Ruff (Reeve)	*Philomachus pugnax*	-	Migratory	Listed - overfly marine area	-	-	Roosting known to occur within area	Roosting known to occur within area
Sanderling	*Calidris alba*	-	Migratory	Listed	-	-	Roosting known to occur within area	Roosting known to occur within area
Sharp-tailed Sandpiper	*Calidris acuminata*	Vulnerable	Migratory	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Roosting known to occur within area	Roosting known to occur within area
		Conservation Advice for *Calidris acuminata* (sharp-tailed sandpiper) (DCCEEW 2024h).						
Silver Gull	*Chroicocephalus novaehollandiae*	-	-	Listed (as *Larus novaehollandiae*)	-	-	Breeding known to occur within area	Breeding known to occur within area
Sooty Tern	*Onychoprion fuscatus*	-	-	Listed (as *Sterna fuscata*)	-	-	Breeding known to occur within area	Breeding known to occur within area
Swinhoe's Snipe	*Gallinago megala*	-	Migratory	Listed - overfly marine area	-	-	Roosting likely to occur within area	Roosting likely to occur within area
Terek Sandpiper	*Xenus cinereus*	Vulnerable	Migratory	Listed - overfly marine area	-	-	Roosting known to occur within area	Roosting known to occur within area
		Conservation Advice for *Xenus cinereus* (terek sandpiper) (DCCEEW 2024)						
Wandering Tattler	*Tringa incana*	-	Migratory	Listed (as *Heteroscelus incanus*)	-	-	-	Roosting known to occur within area
Whimbrel	*Numenius phaeopus*	-	Migratory	Listed	-	-	Roosting known to occur within area	Roosting known to occur within area
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	-	-	Listed	-	-	Breeding known to occur within area	Breeding known to occur within area
White-fronted Tern	*Sterna striata*	-	-	Listed	Foraging, feeding or related behaviour likely to occur within area	Migration route may occur within area	Breeding known to occur within area	Foraging, feeding or related behaviour likely to occur within area
White-tailed Tropicbird	*Phaethon lepturus*	-	Migratory	Listed	-	-	Species or species habitat may occur within area	-
Wood Sandpiper	*Tringa glareola*	-	Migratory	Listed - overfly marine area	-	-	Species or species habitat known to occur within area	Roosting known to occur within area
Other Species								
Black Currawong (King Island)	*Strepera fuliginosa colei*	Vulnerable	-	-	-	-	Breeding likely to occur within area	Breeding likely to occur within area
Black-eared Cuckoo	*Chalcites osculans*	-	-	Listed - overfly marine area (as *Chrysococcyx osculans*)	-	-	-	Species or species habitat known to occur within area
Black-faced Monarch	*Monarcha melanopsis*	-	Migratory	Listed - overfly marine area	-	-	Species or species habitat known to occur within area	Species or species habitat known to occur within area
Blue-winged Parrot	*Neophema chrysostoma*	Vulnerable	-	Listed - overfly marine area	-	-	Species or species habitat known to occur within area	Species or species habitat known to occur within area
Brown Treecreeper (south-eastern)	*Climacteris picumnus victoriae*	Vulnerable	-	-	-	-	Species or species habitat known to occur within area	Species or species habitat may occur within area
Cattle Egret	*Bubulcus ibis*	-	-	Listed - overfly marine area (as *Ardea ibis*)	-	-	Species or species habitat may occur within area	Species or species habitat may occur within area
Diamond Firetail	*Stagonopleura guttata*	Vulnerable	-	-	-	-	Species or species habitat known to occur within area	Species or species habitat known to occur within area
Eastern Bristlebird	*Dasyornis brachypterus*	Endangered	-	-	-	-	Species or species habitat known to occur within area	-

Common Name	Scientific Name	EPBC Status			Operational Area		Planning Area	
		Listed Threatened	Listed Migratory	Listed Marine	Bass	Otway	Bass	Otway
Fork-tailed Swift	*Apus pacificus*	-	Migratory	Listed - overfly marine area	-	-	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area
Forty-spotted Pardalote	*Pardalotus quadragintus*	Endangered	-	-	-	-	Species or species habitat known to occur within area	-
		Approved Conservation Advice for *Pardalotus quadragintus* (forty-spotted pardalote) (TSSC 2016c).						
Gang-gang Cockatoo	*Callocephalon fimbriatum*	Endangered	-	-	-	-	Species or species habitat known to occur within area	Species or species habitat known to occur within area
Green Rosella (King Island)	*Platycercus caledonicus brownii*	Vulnerable	-	-	-	-	Species or species habitat known to occur within area	Species or species habitat known to occur within area
Grey Falcon	*Falco hypoleucos*	Vulnerable	-	-	-	-	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area
Grey-tailed Tattler	*Tringa brevipes*	-	Migratory	Listed (as *Heteroscelus brevipes*)	-	-	Roosting known to occur within area	Roosting known to occur within area
Kelp Gull	*Larus dominicanus*	-	-	Listed	-	-	Breeding known to occur within area	Breeding known to occur within area
King Island Brown Thornbill, Brown Thornbill (King Island)	*Acanthiza pusilla magnirostris*	Endangered	-	-	-	-	Species or species habitat known to occur within area	Species or species habitat known to occur within area
King Island Scrubtit, Scrubtit (King Island)	*Acanthornis magna greeniana*	Critically Endangered	-	-	-	-	Species or species habitat known to occur within area	Species or species habitat known to occur within area
Magpie Goose	*Anseranas semipalmata*	-	-	Listed - overfly marine area	-	-	-	Species or species habitat may occur within area
Masked Owl (Tasmanian)	*Tyto novaehollandiae castanops (Tasmanian population)*	Vulnerable	-	-	-	-	Breeding known to occur within area	Breeding known to occur within area
		Approved Conservation Advice for *Tyto novaehollandiae castanops* (Tasmanian Masked Owl) (TSSC 2010)						
Orange-bellied Parrot	*Neophema chrysogaster*	Critically Endangered	-	Listed - overfly marine area	Migration route likely to occur within area		Breeding known to occur within area	Breeding known to occur within area
		National Recovery Plan for the Orange-bellied Parrot, *Neophema chrysogaster (*DELWP 2016).						
Oriental Cuckoo, Horsfield's Cuckoo	*Cuculus optatus*	-	Migratory	-	-	-	Species or species habitat may occur within area	-
Osprey	*Pandion haliaetus*	-	Migratory	Listed	-	-	Species or species habitat known to occur within area	Species or species habitat known to occur within area
Pacific Gull	*Larus pacificus*	-	-	Listed	-	-	Breeding known to occur within area	Breeding known to occur within area
Painted Honeyeater	*Grantiella picta*	Vulnerable	-	-	-	-	Species or species habitat known to occur within area	Species or species habitat known to occur within area
Pilotbird	*Pycnoptilus floccosus*	Vulnerable	-	-	-	-	Species or species habitat known to occur within area	Species or species habitat known to occur within area
Plains-wanderer	*Pedionomus torquatus*	Critically Endangered	-	-	-	-	-	Species or species habitat may occur within area
		Conservation Advice *Pedionomus torquatus* plains-wanderer (DoE 2015c). National Recovery Plan for the Plains-wanderer (*Pedionomus torquatus*) DoE and Govt SA DoEWNR 2016).						
Rainbow Bee-eater	*Merops ornatus*	-	-	Listed - overfly marine area	-	-	Species or species habitat may occur within area	Species or species habitat may occur within area
Regent Honeyeater	*Anthochaera phrygia*	Critically Endangered	-	-	-	-	Species or species habitat known to occur within area	Foraging, feeding or related behaviour likely to occur within area

Common Name	Scientific Name	EPBC Status			Operational Area		Planning Area	
		Listed Threatened	Listed Migratory	Listed Marine	Bass	Otway	Bass	Otway
		Conservation Advice *Anthochaera phrygia* regent honeyeater (DoE 2015g)						
Rufous Fantail	*Rhipidura rufifrons*	-	Migratory	Listed - overfly marine area	-	-	Species or species habitat known to occur within area	Species or species habitat known to occur within area
Satin Flycatcher	*Myiagra cyanoleuca*	-	Migratory	Listed - overfly marine area	-	-	Breeding known to occur within area	Breeding known to occur within area
South-eastern Glossy Black-Cockatoo	*Calyptorhynchus lathami lathami*	Vulnerable	-	-	-	-	Species or species habitat known to occur within area	Species or species habitat may occur within area
South-eastern Hooded Robin, Hooded Robin (south-eastern)	*Melanodryas cucullata cucullata*	Endangered	-	-	-	-	Species or species habitat may occur within area	Species or species habitat may occur within area
South-eastern Red-tailed Black-Cockatoo	*Calyptorhynchus banksii graptogyne*	Endangered	-	-	-	-	-	Species or species habitat likely to occur within area
Southern Whiteface	*Aphelocephala leucopsis*	Vulnerable	-	-	-	-	Species or species habitat may occur within area	Species or species habitat known to occur within area
Spectacled Monarch	*Symposiachrus trivirgatus*	-	Migratory (as Monarcha trivirgatus)	Listed - overfly marine area (as *Monarcha trivirgatus*)	-	-	Species or species habitat known to occur within area	-
Swift Parrot	*Lathamus discolor*	Critically Endangered	-	Listed - overfly marine area	-	-	Breeding known to occur within area	Species or species habitat known to occur within area
		National Recovery Plan for the Swift Parrot *Lathamus discolour* (Saunders and Tzaros 2011).						
Tasmanian Azure Kingfisher	*Ceyx azureus diemenensis*	Endangered	-	-	-	-	Breeding known to occur within area	Breeding known to occur within area
Tasmanian Wedge-tailed Eagle, Wedge-tailed Eagle (Tasmanian)	*Aquila audax fleayi*	Endangered	-	-	-	-	Breeding likely to occur within area	Breeding likely to occur within area
White-throated Needletail	*Hirundapus caudacutus*	Vulnerable	Migratory	Listed - overfly marine area	-	-	Species or species habitat known to occur within area	Species or species habitat known to occur within area
Yellow Wagtail	*Motacilla flava*	-	Migratory	Listed - overfly marine area	-	-	Species or species habitat known to occur within area	Species or species habitat 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. 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 Albatrosses and Petrels (CoA 2022a). 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).

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, common diving-petrel, great-winged petrel, Indian yellow-nosed albatross, northern giant petrel, shy albatross, soft-plumaged petrel, southern giant petrel, wandering albatross, white-capped albatross and white-faced storm petrel have BIAs for foraging that overlap the Planning Area (Figure 6-33, Figure 6-34, Figure 6-35 and Figure 6-36). These BIAs cover either most or all the South-east Marine Region. Therefore, it is likely that these species will be present and forage in the Operational and Planning Areas. The Chatham albatross, Gibson's albatross, grey-headed albatross, northern Buller's albatross, northern royal albatross, Salvin's albatross, southern royal albatross, blue petrel, Gould's petrel, Kermadec petrel (western) have biologically important behaviours identified within the PMST Report that occur within either the Operational or Planning Area.

The shy albatross breeds on three offshore islands adjacent to Tasmania: Albatross Island, the Mewstone and Pedra Branca. These three areas are regarded as habitats critical to the survival of the threatened species (CoA 2022a) and are within the Planning Areas.

The Antipodean albatross is recognised as a conservation value in the South-east and Temperate East Marine Region (CoA 2015a, DSEWPaC 2012d). It is a sub-species of the wandering albatross. It breeds on islands in the New Zealand subantarctic with egg-laying during the austral summer and fledging from December to March (ACAP 2023). The species forages in all areas of the South-east Marine Region, excluding Bass Strait, and feeds primarily on cephalopods, fish and crustaceans (BirdLife International 2009, Gales 1998). The South-east Marine Region, excluding Bass Strait, is recognised as a foraging BIA for the species and overlaps the Planning Areas (Figure 6-33).

The black-browed albatross is recognised as a conservation value in the South-east and Temperate East Marine Region (CoA 2015a, DSEWPaC 2012d). It has a circumpolar distribution and is found over Antarctic, subantarctic and sub-tropical waters (CoA 2015a). Breeding populations occur on Macquarie Island, adjacent Bishop and Clerk Islets, as well as locations outside the South East region at Heard Island and McDonald Islands (Australian external territory) (Figure 6-33). Black-browed albatross breed annually, with the breeding season beginning in September and fledging in April to May. In southern Australia, black-browed albatrosses mainly forage along the southern coasts from Perth to Sydney (Marchant and Higgins 1990, Reid et al. 2002). The majority of black-browed albatrosses seen in south-eastern Australian waters between October and January are immature birds (Reid et al. 2002), probably coming from Indian Ocean and Southern Georgian breeding colonies. Sub-adults are observed in

Australian waters all year round. The entire South-east Marine Region is recognised as a foraging BIA for the species and overlaps the Planning Areas (Figure 6-33)

Buller's albatross is recognised as a conservation value in the South-east Marine Region (CoA 2015a). This species breeding is endemic to New Zealand, but it forages across the South Pacific, in general, adults forage between 40–50°S from Tasmania eastwards to the Chatham Rise (NZ), while juveniles and non-breeding adults disperse across the South Pacific Ocean to the coast of South America (BirdLife International 2004, DSEWPaC 2011b). This species is mainly present around Tasmania from January to July (DCCEEW 2023i). Satellite tracking studies of this species from the Snares and Solander Islands (NZ) (Sagar and Weimerskirch 1996; Stahl and Sagar 2006) have shown that during much of the breeding season birds forage in New Zealand waters. However, both breeding adults and juveniles and non-breeding adults also forage around Tasmania. A foraging BIA occurs for this species in the South-east Marine Region and overlaps the Planning Areas (Figure 6-33).

Campbell albatross is a sub-species of black-browed albatross and is recognised as a conservation value in the South-east and Temperate East Marine Region (CoA 2015a, DSEWPaC 2012d). The Campbell albatross is endemic to Campbell Island (New Zealand subantarctic) and breeds annually from early August to May (ACAP 2023). Juveniles appear to migrate north and disperse through the subtropics in winter, including along the eastern coast of Australia (ACAP 2023). During winter, adults are found widely dispersed around the Tasman Sea and the south-western Pacific Ocean east of New Zealand, whereas in summer the distribution of both breeding and non-breeding birds is more restricted and southerly (32°S to 44°S) (Waugh et al. 1999). The Campbell albatross feeds on krill and fish, with some cephalopods, salps and jellyfish. The entire South-east Marine Region is recognised as a foraging BIA for the species and overlaps the Planning Area (Figure 6-33).

The Chatham albatross is a small to medium size albatross and recognised as a conservation value in the South-east Marine Region (CoA 2015a). This endangered species is endemic to the Chatham Islands in New Zealand and breeds annually on Chatham during late August to December. This species travels in higher latitudes of the Pacific Ocean to South America. Australia is within the foraging range of the Chatham albatross (CoA 2022). Foraging, feeding or related behaviour may occur within the Planning Area.

The Gibson's albatross is recognised as a conservation value in the South-east Marine Region (CoA 2015a). This vulnerable species has been recorded foraging between Coffs Harbour in NSW and in Wilson's Promontory in Victoria. Males and females have been recorded using different foraging areas with females frequenting the Tasman Sea (40° S), while the males disperse in western area at lower latitudes or north-east towards the mid Pacific Ocean. This species is rarely observed in the Pacific or Indian Ocean, with the only Australian record occurring in Wollongong. This albatross visits Australian wasters during non-breeding seasons with breeding occurring in New Zealand. Foraging usually occurs between 30° and 50°S (DoE 2024j). Foraging, feeding or related behaviour is likely to occur within the Operational and Planning Area.

The Indian yellow-nosed albatross is recognised as a conservation value in the South-east and Temperate East Marine Region (CoA 2015a, DSEWPaC 2012d). It breeds on the French subantarctic islands and on South Africa's Prince Edward Islands (ACAP 2023). At-sea records indicate that, for the non-breeding range, birds disperse from their breeding islands and commonly occur off southern Africa and Australia (ACAP 2023). Recent satellite tracking data shows that, during the winter months this species occurs throughout the South-east Marine Region as far south as latitude 45ºS (Delord and

Weimerskirch 2011) during winter months. The Planning Areas overlap the foraging BIA within the South-east Marine Region (Figure 6-34).

The northern Buller's albatross (*Thalassarche bulleri platei*) is a subspecies of the Buller's albatross (*Thalassarche bulleri*). This smaller albatross is a non-breeding visitor to Australia who forages mostly in the Pacific Ocean and the Tasman Sea, although birds have been recorded on the east coast of the mainland of Australia. This species breeds only on Chatham and Three Kings Island in New Zealand (DoE 2024k). The northern Buller's albatross is likely to have foraging and feeding behaviour occur within the Operational and Planning Area.

The northern royal albatross is recognised as a conservation value in the South-east Marine Region (CoA 2015a). This endangered species is endemic to New Zealand and breeds only on New Zealand islands. It is a biennial breeder and visits southern and sub-Antarctic Australian waters during non-breeding seasons traversing widely over the Southern Ocean and feeding regularly in Tasmanian and Southern Australian waters. The northern royal albatross has a circumpolar distribution of higher latitudes spanning from 30°-52°S (CoA 2022). Foraging, feeding or related behaviour is likely to occur within the Operational and Planning Area.

Salvin's albatross is recognised as a conservation value in the South-east Marine Region (CoA 2015a). This vulnerable species is endemic to New Zealand and breeds only on New Zealand islands. Australian waters are within the foraging range of Salvin's albatross which it visits during non-breeding seasons (CoA 2022). Foraging, feeding or related behaviour is likely to occur within the Operational and Planning Area.

The shy albatross is recognised as a conservation value in the South-east Marine Region (CoA 2015a). It is the only endemic Australian albatross species, and breeds on Albatross Island, Bass Strait, and the Mewstone and Pedra Branca (Figure 6-34), off southern Tasmania in the Tasmanian Wilderness World Heritage Area (Gales 1998, Alderman et al. 2010). The species breeds annually, laying eggs in September and fledging chicks in April (Gales 1998). Shy albatrosses are less oceanic than many other albatross species, are usually found over the continental shelf, and regularly venture close to shore along the coasts of Tasmania and southern Australia (CoA 2022). Habitats critical for the shy albatross include breeding grounds at Albatross Island, Bass Strait, Mewstone and Pedra Branca and there is a breeding BIA around Albatross Island within the Planning Areas in addition to the foraging likely BIA which encompasses the South-east Marine Region (Figure 6-34).

The southern royal albatross is recognised as a conservation value in the South-east Marine Region (CoA 2015a). Endemic to New Zealand, this species has four breeding sites located in the sub-Antarctic Islands of New Zealand. It is a biennial breeder and visits Australian waters to forage during non-breeding seasons. This albatross has a circumpolar range in the higher altitudes of the southern hemisphere between 30-55°S including sub-Antarctica Australia and the Australian Antarctic Territory (CoA 2022). Foraging, feeding or related behaviour is likely to occur within the Operational and Planning Area.

The wandering albatross is recognised as a conservation value in the South-east and Temperate East Marine Region (CoA 2015a, DSEWPaC 2012d). It breeds on six sub-Antarctic island groups (Marchant and Higgins 1990, ACAP 2023). The wandering albatross breeds biennially, laying eggs in December and fledging chicks between mid-November and late February. In Australian waters, a very small population breeds on Macquarie Island, which is outside the Planning Areas (ACAP 2023). Limited satellite tracking of wandering albatross from Macquarie Island shows that breeding females forage north of the Island in waters off southern Tasmania, while males forage in open waters of the Southern Ocean, south of 50°S, reflecting a spatial segregation seen in other populations of this species. Juveniles are concentrated in lower latitudes north and east of Macquarie Island in Pacific waters, off the south east coast of Australia and in New Zealand waters. Wandering albatross feed in the Southern Ocean (Nicholls et al. 1997) mainly on squid and fish but also crustaceans and carrion (Marchant and Higgins 1990). Foraging trips by breeding wandering albatross have exceeded 15,200 km between incubation bouts (Jouventin and Weimerskirch 1990). Southern Australia is an important wintering ground for non-breeding and juvenile birds from the Atlantic and Indian Ocean breeding colonies. Non-breeding and juvenile birds remain north of 50°S. During the non-breeding season, birds disperse more widely with females generally foraging in more northerly latitudes of the southern hemisphere and males generally foraging further south (Baker and Hamilton 2013). The entire South-east Marine Region north of 50°S is recognised as a foraging BIA for the species and overlaps the Planning Areas (Figure 6-34).

The white-capped albatross is endemic to New Zealand and is limited to five breeding sites on the Auckland Islands, and Antipodes Islands (New Zealand), with the largest population on Disappointment Island in the Auckland Islands (CoA 2022a). Australia is within the foraging range of the White-capped Albatross (Figure 18). Tracking studies indicate that dispersal from the breeding colonies is generally in the higher latitudes of the southern hemisphere including waters adjacent to south-eastern Australia, particularly north-east of Tasmania. At sea records are problematic due to similarities between and overlapping range of white-capped albatross and shy albatross (CoA 2022). The Bass Planning Area overlaps the foraging BIA for this species (Figure 6-35).

The black petrel is recognised as a conservation value in the Temperate East Marine Region (DSEWPaC 2012d). This species is endemic to New Zealand and breeds annually and exclusively on Little Barrier Island and Great Barrier Island where eggs are laid in December and chicks fledge in May (ACAP 2023). They are typically surface feeders and shallow divers foraging in groups of up to 300 and preying mainly on squid with the occasional fish, tunicates, crustaceans, and cyclostomes (ACAP 2023). Little is known about the foraging range and at-sea distribution of the black petrel; however banding data suggests that this species does forage as far as eastern Australia (ACAP 2023, Bell et al. 2009). Eastern Australia is recognised as a foraging BIA for this species and overlaps the Bass Planning Area (Figure 6-35).

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 and planning areas. The common-diving petrel has breeding and foraging BIAs that overlap the Planning Areas (Figure 6-35). The white-faced storm petrel has foraging and breeding BIAs that overlap the Planning Areas (Figure 6-36).

Gould's petrel is recognised as a conservation value in the South-east and Temperate East Marine Region (CoA 2015a, DSEWPaC 2012d). This endangered species breeds in NSW on Cabbage Tree

Island and nearby to Boondelbah Island, close to Port Stephens, and at least one pair breeds on Montague Island near Narooma. The petrel is seldomly recorded away from its breeding islands. However, it has been recorded absent from the islands between May and late August. It's distribution while at sea is poorly known, however it has been suggested that most would occur in the Tasman sea and waters off the south-east of Australia and Tasmania between December and April (DEC NSW 2006, DoE 2024l). Breeding is known to occur within the Planning Area.

The Kermadec petrel (western) is recognised as a conservation value in the Temperate East Marine Region. This species is listed as vulnerable and breeds on Balls Pyramid and Phillip island where there is estimated to be 40 breeding birds in the Norfolk Island Group (DSEWPaC 2012d). The pelagic distribution of this species is poorly known. However, it usually occurs in subtropical and tropical waters from 20° to 30°S or south into temperate waters of the Tasman Sea to forage during non-breeding seasons (DoE 2024m). Foraging, feeding or related behaviour may occur within the Planning Area.

The soft-plumaged petrel is recognised as a conservation value in the South-east marine region (CoA 2015a). This petrel is listed as vulnerable and is usually found over temperate and subantarctic waters in the South Atlantic, southern Indian and western South Pacific Oceans. The soft-plumaged petrel is a regular visitor to Australian seas and is most numerous between 30° and 50°S. This species breed on Maatsuyker Island off southern Tasmania with six breeding pairs recorded between 2001 and 2002 (DoE 2024n). Breeding is known to occur within the Planning Area.

The Wilson's storm-petrel (*Oceanites oceanicus*) is recognised as a conservation value in the Temperate East Marine Region (DSEWPaC 2012d). This species is one of the world's most abundant seabirds and the smallest endotherm that breeds in Antarctic waters (DoE 2023). They are a gregarious species congregating when feeding and migrating and breeding colonially, however at sea they are found singularly or in a small flock. Wilson's storm-petrels undertake a trans-equatorial migration in autumn spending the non-breeding season in the northern hemisphere (DoE 2023). The autumn months are when most species observations occur in Australia along the coast of NSW, Victoria, Tasmania and South Australia. The Wilson's storm petrel has a migration BIA that overlaps the Bass Planning Area (Figure 6-36).

The great-winged petrel (*Pterodroma macroptera*) is recognised as a conservation value in the Temperate East Marine Region and has a widespread and sparse distribution (DSEWPaC 2012d). Breeding occurs between June to January in the southern hemisphere. It nests in burrows or above ground in rock crevices, among tree roots or under scrub usually below 400 m Above Sea Level and lays a single egg (CoA 2020a). Outside the breeding season it disperses widely feeding mainly at night on squid, with some fish and crustaceans most of which is obtained by dipping and surface-seizing (CoA 2022a). The great-winged petrel has a foraging BIA that overlaps the Bass Planning Area (Figure 6-35).

Within Australia, the northern giant petrel is limited to a breeding colony on Macquarie Island, and visits areas off Australia's mainland predominantly during the winter months (May-October) (DoE 2023d). It is thought to be a predominantly diurnal forager, but it feeds its chicks during both the day and at night (DoE 2023d). The northern giant petrel has a foraging BIA that overlaps the Bass Planning Area (Figure 6-35).

The southern giant petrel is marine bird that occurs in Antarctic to subtropical waters and is common in Australian waters (DoE 2023e). The southern giant petrel is an opportunist scavenger and predator. At sea, it forages largely by surface-seizing. It also scavenges on land and regularly follows ships. It apparently locates food by smell and feeds its chicks both day and night (DoE 2023e). The southern giant petrel has a foraging BIA that overlaps the Bass Planning Area (Figure 6-37).

Shearwaters

Four species of shearwater (flesh-footed shearwater (*Ardenna carneipes*), short-tailed shearwater (*Ardenna tenuirostris*), sooty shearwater (*Ardenna grisea*), wedge-tailed shearwater (*Ardenna pacifica*)) may occur within the Planning Area. All of the shearwater species listed are managed under the Wildlife Conservation Plan for Seabirds (CoA 2020a). There are a range of anthropogenic threats that affect the shearwater family which may vary based on species, stocks and life history stage. Pertinent threats relating to the activity include climate change, marine pollution, and mortality and injury arising from interactions with commercial fishing activities (CoA 2020). In addition, the short-tailed shearwater, fledglings in particular, appear to have an increased sensitivity to artificial light although fewer than 1% of fledglings produced annually are thought to be affected by mortality (CoA 2020).

The flesh-footed shearwater (*Ardenna carneipes*) has a foraging BIA that overlaps the Bass Planning Area (Figure 6-37). This species is recognised as a conservation value in the Temperate East Marine Region (DSEWPaC 2012d). They are 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, the majority of which lie off the coast of southern WA, with the remaining being Smith Island (SA) and Lord Howe Island (NSW). 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') (DoE 2023f).

The short-tailed shearwater (*Ardenna tenuirostris*) has a foraging BIA (September to May) and breeding BIAs that overlap the Planning Areas (Figure 6-37). This species is recognised as a conservation value in the South-East and Temperate East Marine Regions (CoA 2015a, DSEWPaC 2012d). The short-tailed shearwater migrates to the Northern hemisphere for the austral winter and is generally only present in Australian waters from September to May. They are common in the South-east Marine Region and largely found on numerous islands off Victoria and Tasmania during breeding (Baker and Hamilton 2013, Skira et al. 1996). During breeding they conduct a bimodal feeding strategy, alternating short foraging trips to local waters with long foraging trips (up to 17 days) to the Polar Frontal Zone. Short trips allow greater chick provisioning at the sacrifice of body condition, which is then recovered in richer subantarctic waters. Diet includes fish (particularly myctophids), crustaceans and squid (Weimerskirch and Cherel 1998). Feeding occurs in flocks of up to 20,000 birds, and it has been seen associated with cetaceans.

The short-tailed shearwater, also known as a muttonbird, is one of few Australian native birds that is harvested to this day (DNRET 2019). Mutton birding is a cultural, non-commercial, and commercial activity allowed for in reserves (excluding Nature Reserves) and private land in Tasmania. The season runs from the 27 March to 30 April each year when chicks are taken for their feathers, flesh and oil (DNRET 2019). To this day, muttonbird harvesting is an important part of Aboriginal culture in Tasmania. Commercial sheds are located on Babel, Chappell, Big Dog and Trefoil Islands all off Tasmania's north-west coast.

The sooty shearwater (*Ardenna grisea*) is listed as vulnerable and is recognised as a conservation value in the South-East and Temperate East Marine Regions (CoA 2015a, DSEWPaC 2012d). It nests on islands and headlands in large colonies. Burrows are dug for breeding under tussock grass and low scrub. Birds typically do not return to their natal colonies until age four. They feed on fish, crustacea and cephalopods, caught while diving. Short (1–3 days) and long (5–15 days) provisioning trips are made by parents; longer trips allow foraging along the Antarctic Polar Front, reducing competition close to breeding grounds and allowing vast colonies to persist (BirdLife International 2013). The Australian breeding population is estimated to be 6,500 pairs (DCCEEW 2023l). In Australian territory, the sooty shearwater breeds on offshore islands off New South Wales and Tasmania. Breeding populations within Tasmania are known on Tasman Island, Hippolyte Rock, Maatsuyker Island and Courts Island. These and associated substantial foraging areas are recognised as BIAs for the species and overlap the Planning Areas (Figure 6-37).

The wedge-tailed shearwater (*Ardenna pacifica*) is recognised as a conservation value in the Temperate East Marine Region (DSEWPaC 2012d). They have a foraging BIA (August to May) and breeding BIA that overlaps the Planning Areas (Figure 6-37). Movement patterns of the wedge-tailed shearwater are poorly known but populations at the northern and southern extremities of the known range are migratory, departing nests in early April to early May and spending the non-breeding season in the tropics (DoE 2023g). In Australia, wedge-tailed shearwaters have been observed feeding along the junction between inshore and offshore water masses. There is no detailed analysis of the diet of Australian adult wedge-tailed shearwaters, however tropical residing wedge-tailed shearwater birds are known to mostly consume fish, some cephalopods, insects, jellyfish and prawns (DoE 2023g). Food is taken by contact-dipping, dipping, surface-seizing and, rarely, deep-plunging up to 2 m deep (DoE 2023g).

Terns

The greater crested tern (*Thalasseus bergii*) is recognised as a conservation value in the Temperate East Marine Region (DSEWPaC 2012d). This species has distinctive features; large size, shaggy crest, yellow bill and can be found on islands and coastlines of tropical and subtropical areas from South Africa to Australia (CoA 2020b). The species breeds in large colonies, in small groups or amidst colonies of other species. Nests are shallow scrape in bare sand, rock or coral in flat open sites on offshore islands, low-lying coral reefs, sandy or rocky coastal islets, coastal spits, lagoon mudflats or islets in saltpans and sewage works (Del Hoyo et al. 1996). Outside the breeding season it can be found at sea throughout its range, with the exception of the central Indian Ocean. A foraging and breeding BIA for the greater crested tern overlaps the Bass Planning Area (Figure 6-38).

The white-fronted tern (*Sterna striata*) is recognised as a conservation value in the South-east Marine Region (CoA 2015a). They are a medium sized 'commic' tern endemic to Australasia breeding in New Zealand and on Flinders and Cape Barren Island off the north-east coast of Tasmania (CoA 2020b). It is also a winter visitor to Australia, from south Queensland to Tasmania and west to South Australia. This species can be found in coastal areas, nesting on rocky or sandy beaches and shingle islands in rivers, also on coastal cliffs and deserted barges, often close to the surf (CoA 2020b). The white-fronted tern often feeds in flocks and in winter it feeds over oceanic waters and feeds almost exclusively on fish, but will also take shrimp, feeding in the surf zone or several km out to sea (CoA 2020b). A foraging and breeding BIA for the white-fronted tern overlaps the Bass Planning Area (Figure 6-38).

The Australian fairy tern is recognised as a conservation value in the South-east Marine Region (CoA 2015a). This species is listed as vulnerable and occurs along the coasts of NSW, Victoria, Tasmania, South Australia, and Western Australia. These terns are found in a variety of habitats including offshore, estuarine, wetlands, beaches, and lakes. The subspecies migrate within Tasmania and southern Western Australia where they are observed less frequently in winter months. They are more sedentary in the north of Western Australia, South Australia, and Victoria (DSEWPaC 2011d). Foraging, feeding or related behaviours are likely to occur within the Operational Area.

The Caspian tern is recognised as a conservation value in the South-east Marine Region (CoA 2015a). This tern species is listed as marine and migratory. This species usually forages in open wetlands, lakes and rivers preferring shallow water but are also found in open coastal waters. It is the largest tern in Australia and has widespread breeding habitats located across all states in Australia in a range of different habitats including low islands, cays, banks, ridges, beaches, terrestrial wetlands, and rocky islets. Breeding habitats have been recorded in Corner Inlet, Mud Island in Port Phillip Bay and Mallacoota in Victoria, and on the Furneaux Group across the Tasmanian coastline (DoE 2024o). Breeding is known to occur within the Planning Area.

The fairy tern is a marine listed species. There is no approved conservation or listing advice for the fairy tern. Population estimates in 2011 indicate that there are a few hundred pairs of fairy terns breeding in South Australia and Tasmania with 120 to 150 in Victoria and up 70 individuals in NSW. The fairy tern breeds on sheltered mainland coastlines and close islands on sandy beaches above high tide but below where vegetation occurs. Breeding typically occurs from mid to late October through to February (BirdLife International 2024c). Breeding is known to occur within the Planning Area.

The little tern is recognised as a conservation value in the Temperate East Marine Region (DSEWPaC 2012d). The little tern is recognised as conservation dependant under the EPBC Act (TSSC 2002). This small tern is listed as marine and migratory under the EPBC Act, there is no approved conservation advice for this species. The Australian population is divided into two major subpopulations, the northern subpopulation which breeds along coastlines in the northern areas of Australia and an eastern subpopulation which breeds on the eastern and south-eastern coast of Tasmania and extending to western Victoria and South Australia. Breeding occurs during austral spring-summer. Non-breeding pairs extend further around the Australian coastline (DoE 2024p). Breeding is known to occur within the Planning Area.

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 (CoA 2015a). Important breeding locations for the Australasian gannet within the Planning Area include Pedra Branca, Eddystone Rocks, Sidmouth Rocks, and Black Pyramid (Tasmania) and Lawrence Rocks (Victoria). BIAs for foraging and aggregation occur within the Planning Areas with substantial foraging sites within Port Philip Bay and Pedra Branca (Figure 6-38).

Black-face Cormorant

The black-faced cormorant is recognised as a conservation value in the South-east Marine Region (CoA 2015a). They are a large seabird that is endemic to southern Australia and is mostly found along the coasts of Tasmania and Victoria (CoA 2020b). Breeding normally occurs on rocky islands, but also on stacks, slopes and sea cliffs in colonies of up to 2,500 individuals (del Hoyo et al. 1992). It feeds in coastal waters, sometimes in sheltered places in bays and islets and can even be found entering rivers along the coast (CoA 2020b). A foraging and breeding BIA for the black-faced cormorant overlaps the Planning Areas (Figure 6-38).

Cape Gannet

The cape gannet is a listed marine species. This species typically breeds in South Africa. However, several birds have occasionally been found to breed on offshore Australian islands, together with Australasian gannets, although the Cape species is never represented by more than a few pairs (Pizzey 2007). The PMST Report identified that breeding is known to occur within the Planning Area, but no records could be found as to where specifically.

Little Penguin

The little penguin is recognised as a conservation value in the South-east and Temperate East Marine Region (CoA 2015a, DSEWPaC 2012d). It 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 (CoA 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. Little penguins are also an important component of the Australian and New Zealand fur-seals' diet (Parliament of South Australia 2011).

BIAs for breeding and foraging have been identified for the little penguin within the Planning Areas (Figure 6-39).

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 (Figure 6-40). 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 2016). 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*) (DoE 2023r). There are also non-breeding orange-bellied parrots on mainland Australia, between Goolwa in Australia and Corner Inlet in Victoria.

The 2022-23 breeding season showed a record number of 74 orange-bellied parrots return to breeding grounds and production of 59 fledglings, the third highest fledgling production since 2004 (SWIFFT 2023). As of November 2023, 79 individuals had return to breeding grounds the largest number of returns in over 15 years (DNRET 2023).

The orange-bellied parrot is listed as one of the attributes that contribute to the Tasmanian Wilderness World Heritage Area's Outstanding Universal Value (DCCEEW 2021a).

The Planning Areas and Bass Operational Area overlap the orange-bellied parrot distribution and migration route (Figure 6-40). However, parrots rarely land or forage out at sea and Beach has not recorded the presence of any orange-bellied parrot at any of their offshore facilities or vessels over the past 15 years.

Black Currawong (King Island)

The black currawong (King Island) is listed as vulnerable and is endemic to King Island, Tasmania. This bird was located sporadically in all parts of the island, but has a declining population due to clearing of scrubland for agriculture. This species lives in wet sclerophyll forest, woodlands and heath and nests in trees (TSSC 2015h). The PMST Report identified breeding is likely to occur within the Planning Area however this is unlikely as it nests in trees which are inshore from coastal areas.

Grey-tailed Tattler

The grey-tailed tattler has a wide global and Australian distribution and is typically distributed in northern coastal areas. In NSW the grey-tailed tattler can be found along the coastline from the Queensland border southwards to Tilba Lake. This bird is rarely recorded in Victoria, however sightings have been recorded in Gippsland and east of McLaughlans Beach. The largest population of this bird is located in Corner Inlet, westwards of Wetsernport and Port Phillip bay. Occasional sightings have been recorded along the coast near Killarney, Port Fairy, Discovery Bay, and Sperm Whale Head. The grey-tailed tattler is migratory and arrives in Australia mostly in August and can remain on breeding grounds until September and October. Roosting typically occurs in the branches of mangroves and dense shrubs. If mangroves are not present, roosting can occur on rocks that can be partially submerged, and on rare occasions, sand dunes (DoE 2024q). The PMST Report identified roosting is known to occur within the Planning Area.

Kelp Gull

The kelp gull has a wide global distribution. It breeds on coasts and islands throughout the southern hemisphere and is found on subantarctic islands on the Antarctic peninsula, and on the southern coastline of Australia and all of New Zealand. This species is typically sedentary, however some southern populations migrate north during non-breeding seasons. They breed in rocky outcrops, reefs, offshore islands, estuaries, mudflats, sandbanks, and on rocky and beaches above the high tide mark between late September to January in large colonies of several hundred pairs. Habitat includes sheltered coastal harbours, bays, inlets, estuaries, beaches and rocky shores. They usually forage within 10 km of the shoreline in coastal habitats (BirdLife 2024d). The PMST Report identified breeding is known to occur within the Planning Area.

Masked Owl (Tasmanian)

The masked owl (Tasmania) is listed as vulnerable and endemic to Tasmania and several near shore islands. However, it is not found on the King Island and Furneaux Island Group. The highest densities of this bird are located in the east and northern areas of Tasmania. This species inhabits a diverse range of forests and woodlands nests in large tree hollows during mid-October to November. (TSSC 2010). The PMST Report identified breeding is known to occur within the Planning Area, however this is unlikely as it is associated with forests and woodlands which are inshore from coastal areas.

Pacific Gull

The pacific gull is recognised as a conservation value in the South-east Marine Region (CoA 2015a). This gull is the largest gull in Australia and endemic to the region. The subspecies *pacificus* breeds in Tasmania, and on many Bass Strait islands and westward along the Victorian coast ranging from Wilson's Promontory to the South Australian border. Breeding occurs between September and January (CoA 2020a). The PMST Report identified breeding is known to occur within the Planning Area.

Regent Honeyeater

The regent honeyeater is listed as a critically endangered species and is distributed between the south-east of Queensland and central Victoria. This bird occurs primarily in box-ironbark woodlands but is also found in other forest types. It usually feeds on nectar from eucalyptus and mistletoe and prefers larger trees for foraging but its diet can also include insects and fruit (DoE 2015g). The PMST Report identified foraging, feeding or related behaviour is likely to occur within the Planning Area, however this is unlikely as foraging occurs within woodlands and forests which are inshore from coastal areas.

Satin Flycatcher

The satin flycatcher is widely distributed across eastern Australia and will also migrate to New Zealand. In Victoria, the species is found along the south and the east, in the area south of a line joining Numurkah, Maldon, the northern Grampians, Balmoral and Nelson. In Tasmania, they are widespread along the east and regularly occur on islands in the Bass Strait including Albatross Island, King Island, and the Furneaux Group. They usually inhabit eucalypt forests and prefer to nest in the outer branches of trees such as paperbarks, eucalypts, and banksias (DoE 2024r). The PMST Report identified breeding is known to occur within the Planning Area, however this is unlikely as it is associated with forests which are inshore from coastal areas.

Swift Parrot

The swift parrot is listed as critically endangered and a marine fly over species. The swift parrot breeds in Tasmania during summer months before migrating northwards to mainland Australia during winter. They are found in a range of habitats. The breeding areas of this parrot are found in the east and south-east coast of Tasmania which closely mirrors the distribution of the blue gum (*Eucalyptus globulus*) and in the north-west of the state between Launceston and Smithton. When on the mainland Victoria, the parrots are usually found in dry forests and woodlands of the box-ironbark region in the Great Dividing Range (TSSC 2016d). The PMST Report identified breeding is known to occur within the Planning Area, however this is unlikely as it is associated with forests which are inshore from coastal areas.

Tasmanian Azure Kingfisher

The Tasmanian azure kingfisher is an endangered species which is endemic to Tasmania. This bird occurs along river systems and in eucalypt forests in the south, west and north-west coast with occasional sightings in the north-east, east, centre and Bass Strait Islands. Irregular sightings have been recorded on King Island, Flinders Islands and Bass Pyramid. The Tasmanian azure kingfisher builds burrow nests near the tops of streams and riverbanks with a tunnel that extends 20 to 40 cm into a widened chamber. This bird typically forages in freshwater bodies and occasionally on the ground (DoE 2024s). The PMST Report identified breeding is known to occur within the Planning Area, however this is unlikely as it is associated with river systems and forests which are inshore from coastal areas.

Tasmanian Wedge-tailed Eagle

The Tasmanian wedge-tailed eagle is an endangered species that is found only in Tasmania and surrounding islands. It is widely distributed on mainland Tasmania along both coastal and inland regions. It is also found on Flinders Island, Three Hummock Island, Schouten Island, Maria Island and Bruny Island. Breeding occurs throughout these areas. These birds typically reside in temperate rainforests, dry woodlands, coastal heathland, wetlands. It nests in a range of old-growth native forests which are usually dominated by eucalyptus. The total population of these species was estimated to be less than 1,000 birds in 1997 (DoE 2024t). The PMST Report identified breeding is likely to occur within the Planning Area, however, this is more likely to occur within forest area inshore from coastal areas.

Shorebirds

45 shorebirds were identified as breeding or roosting within the Planning Area. 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. Many of the wader species are migratory travelling from the Northern Hemisphere in non-breeding months (Higgins & Davies 1996). Travelling across the East Asian-Australasian Flyway, migratory shorebirds travel thousands of kilometres each year during their annual return journeys between their breeding grounds in the northern hemisphere and their non-breeding grounds in the southern hemisphere (DoE 2015b). Most shorebirds 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).

The Great knot is listed as a vulnerable marine and migratory species. It is recorded around the entirety of the Australian coastline with the greatest numbers occurring in northern Australia. This species breeds in north-east Siberia. The numbers of birds present in Victoria has had a marked decline from 810 to 167 birds which may reflect the population that is arriving in Australia rather than the changes in habitat. Their habitat includes sheltered coastal habitats, mudflats, estuaries and lagoons. This bird arrives in large numbers in late August to early September until March and April (DoE 2024u). Roosting is known to occur within the Planning Area.

The Grey plover is a vulnerable species which has been recorded in all Australian coastlines. It is abundant along the western and southern coast. Most records of this bird in Victoria are from Jack Smith Lake, Corner Inlet, Westernport, Port Phillip Bays, and along the western coast between Warrnambool and the South Australian border. Records in Tasmania are from the northern and eastern coasts. This species breeds in the northern hemisphere before migrating southwards during the non-breeding season (DCCEEW 2024b). Roosting is known to occur within the Planning Area.

The Ruddy turnstone is listed as a vulnerable species. It is widespread through Australia during its non-breeding season and is mostly found in coastal areas and occasionally inland. This bird prefers rock shores or beaches where there are large deposits of decomposing seaweed. This species breeds on the coasts of Europe, Asia, and North America (DCCEEW 2024i). Roosting is known to occur within the Planning Area.

The Terek sandpiper is primarily found along Australian coastlines during its non-breeding season. In Victoria this species has been recorded from Corner Inlet, Anderson Inlet, Westernport Bay, and west

Port Phillip Bay. The terek sandpiper regularly seen in Tasmania. This bird prefers to roost in mangroves and perch in branches that are 2 m off the ground. They occasionally roost in dead trees or among driftwood. In Westernport Bay, Victoria, they prefer to roost in isolated banks of mangroves surrounded by water (DCCEEW 2024). Roosting is known to occur within the Planning Area.

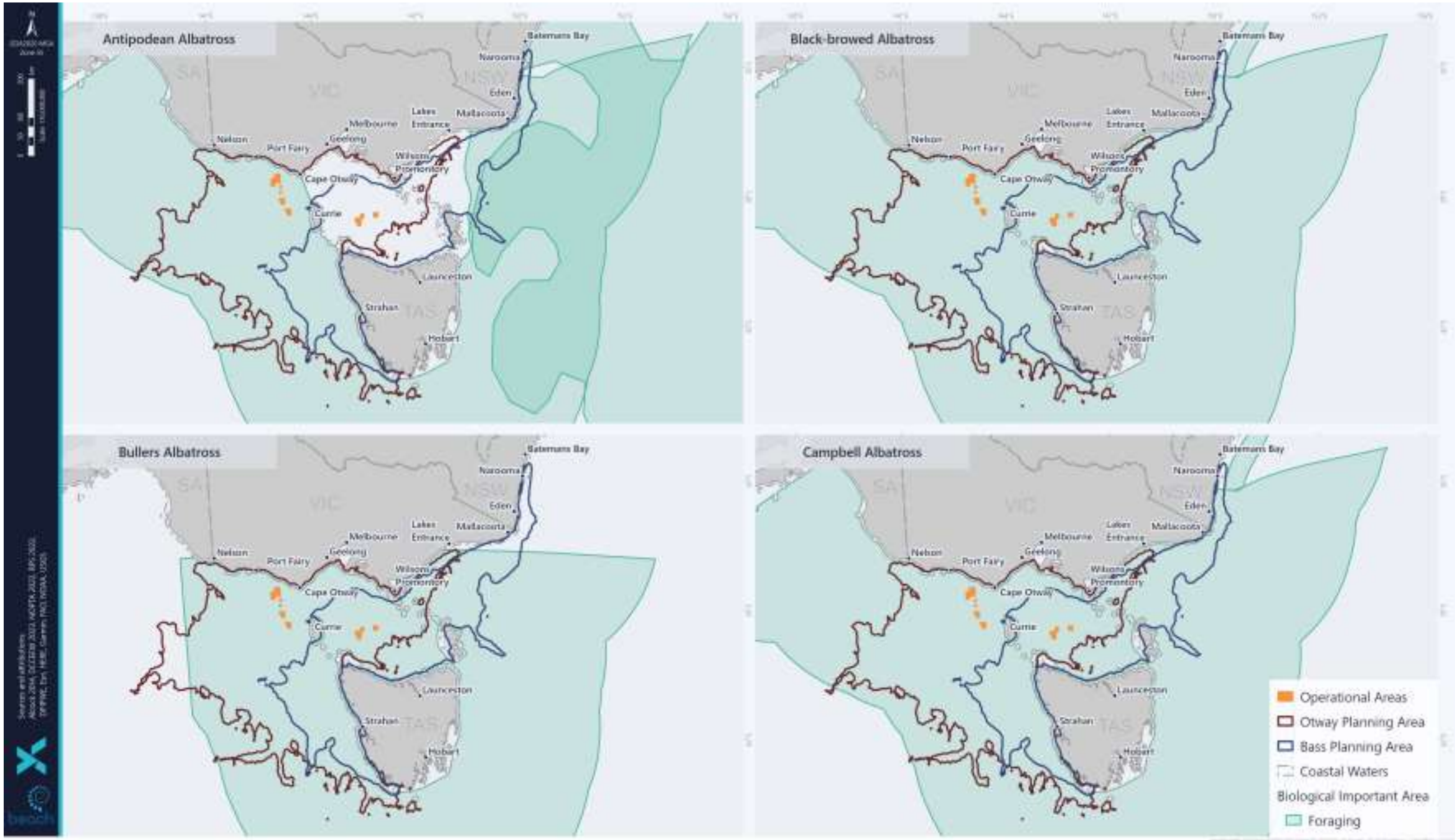


Figure 6-33: BIAs for Antipodean Albatross, Black-browed Albatross, Buller's Albatross and Campbell Albatross within the Operational and Planning Areas

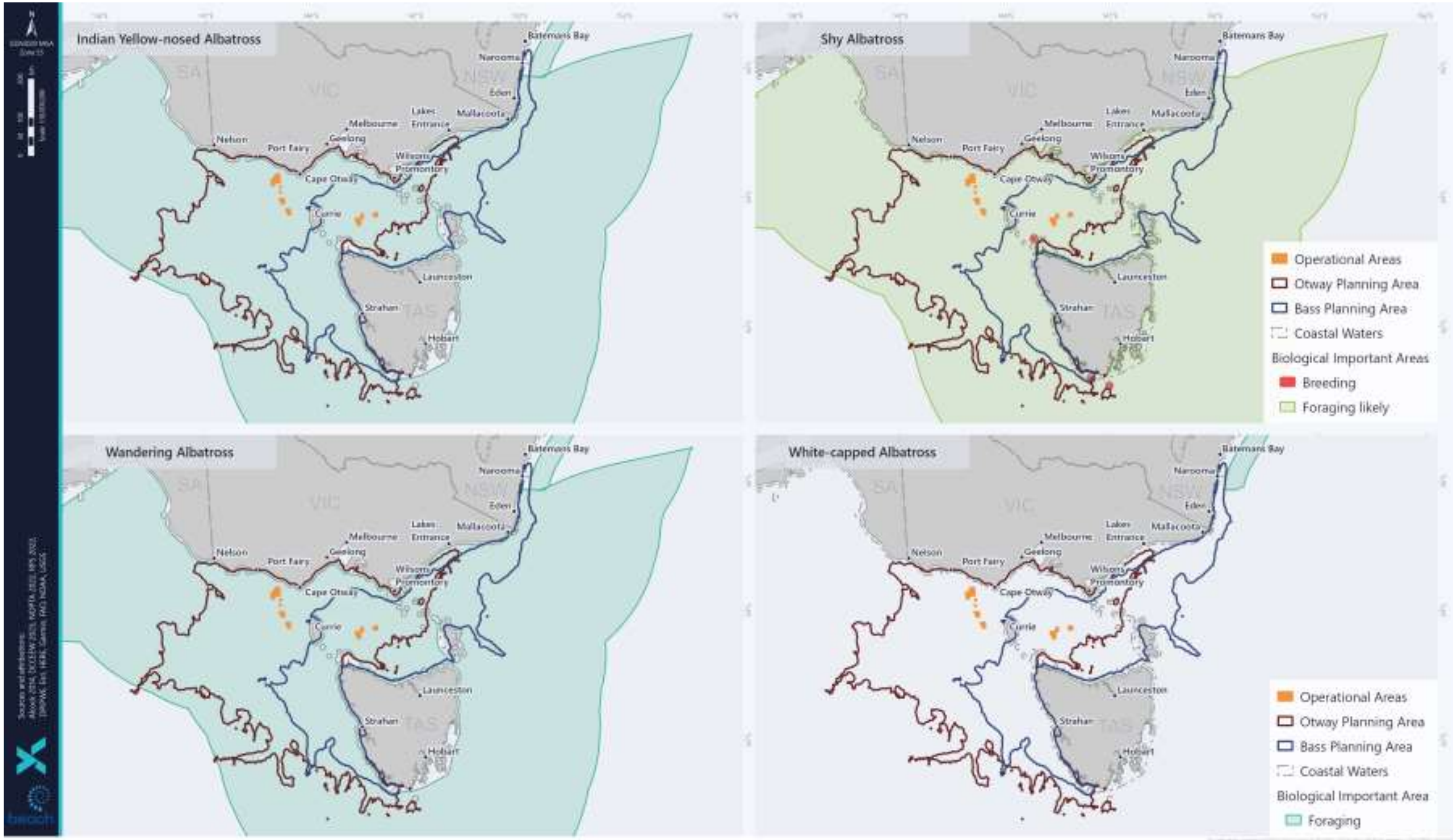


Figure 6-34: BIAs for the Indian Yellow-nosed Albatross, Shy Albatross, Wandering Albatross and White-capped Albatross within the Operational and Planning Areas

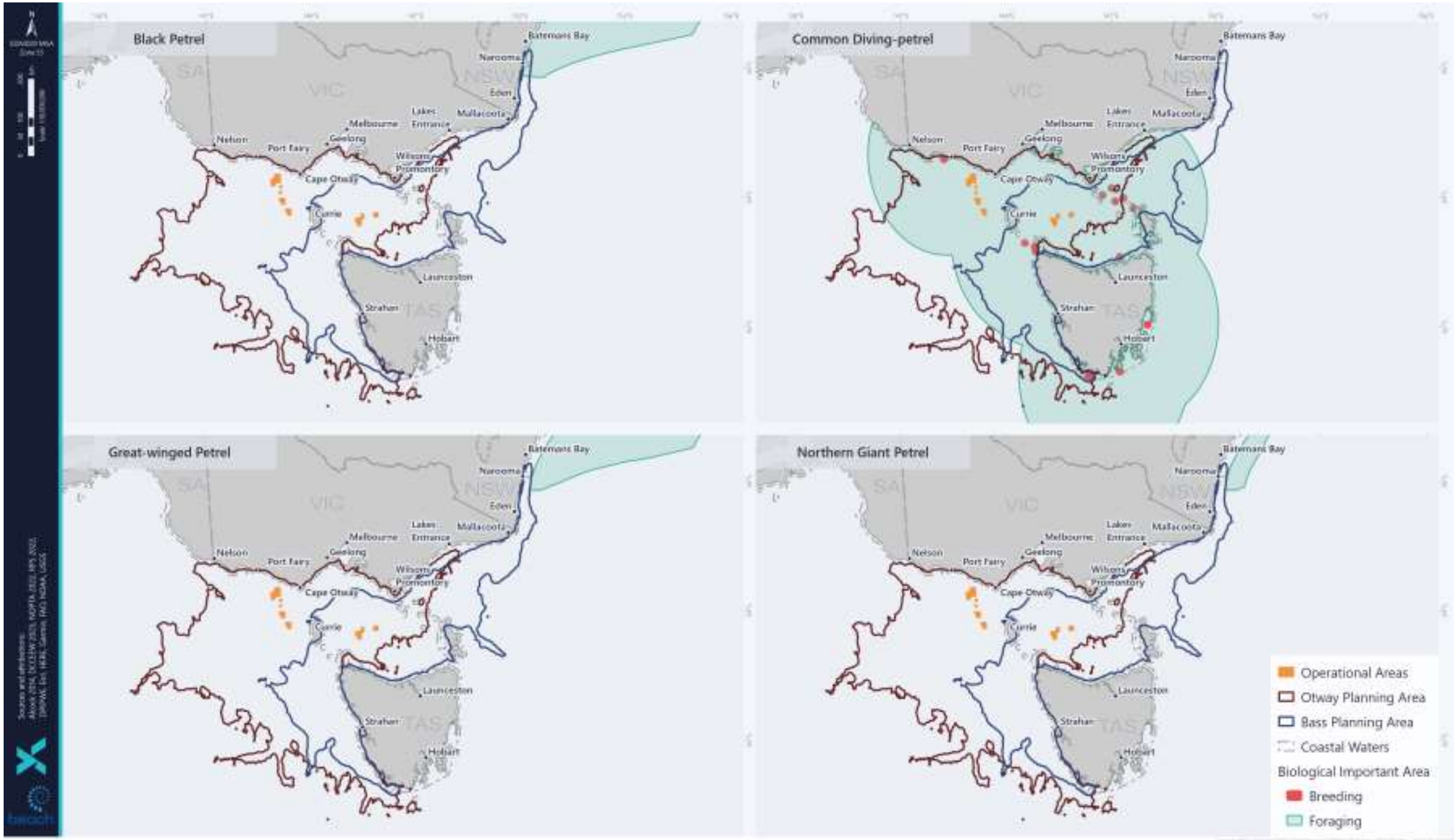


Figure 6-35: BIAs for the Black Petrel, Common Diving-petrel, Great-winged Petrel and Northern Giant Petrel within the Operational and Planning Areas

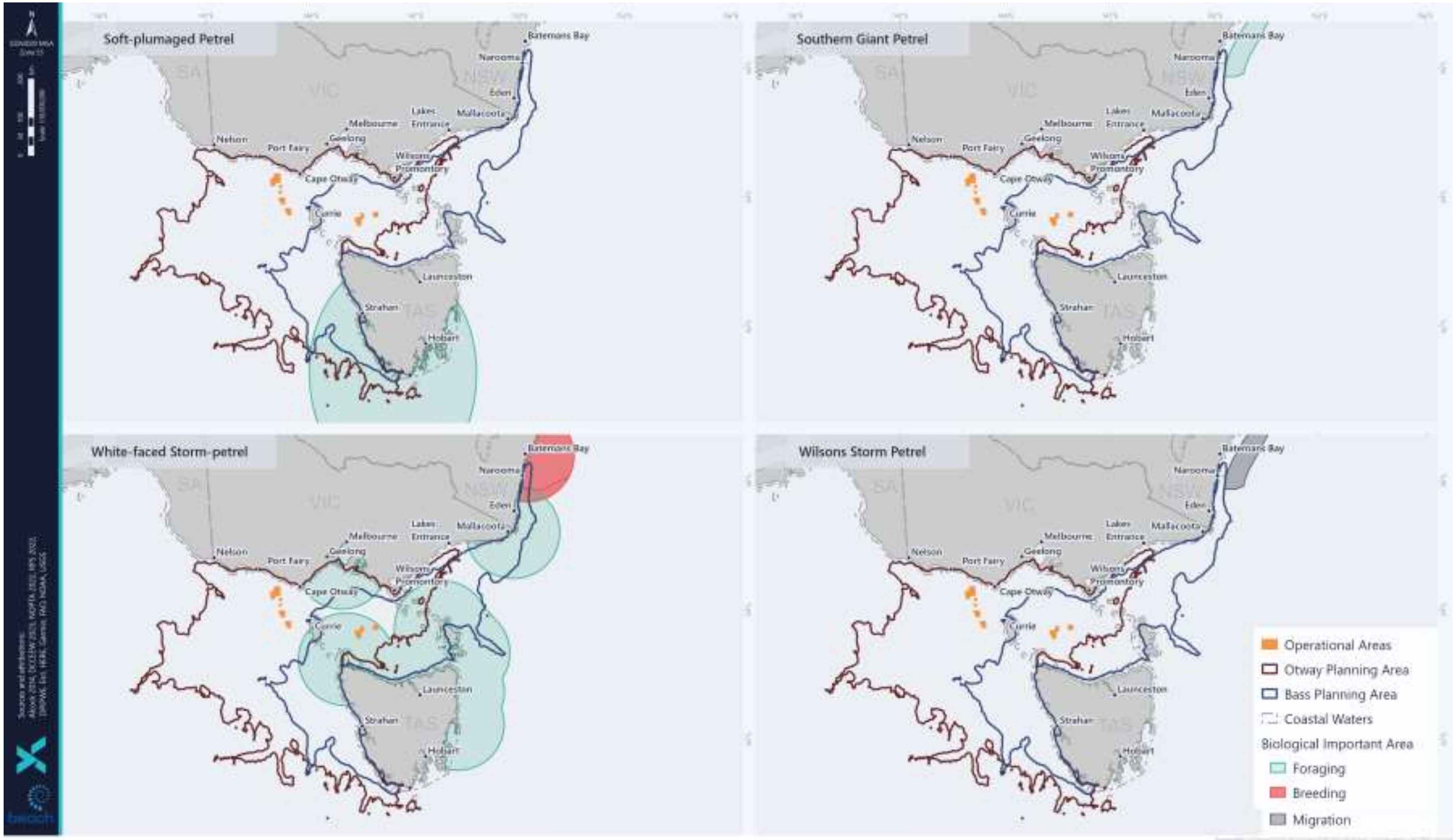


Figure 6-36: BIAs for the Soft-plumaged Petrel, Southern Giant Petrel, White-faced Storm-petrel and Wilson's Storm Petrel within the Operational and Planning Areas

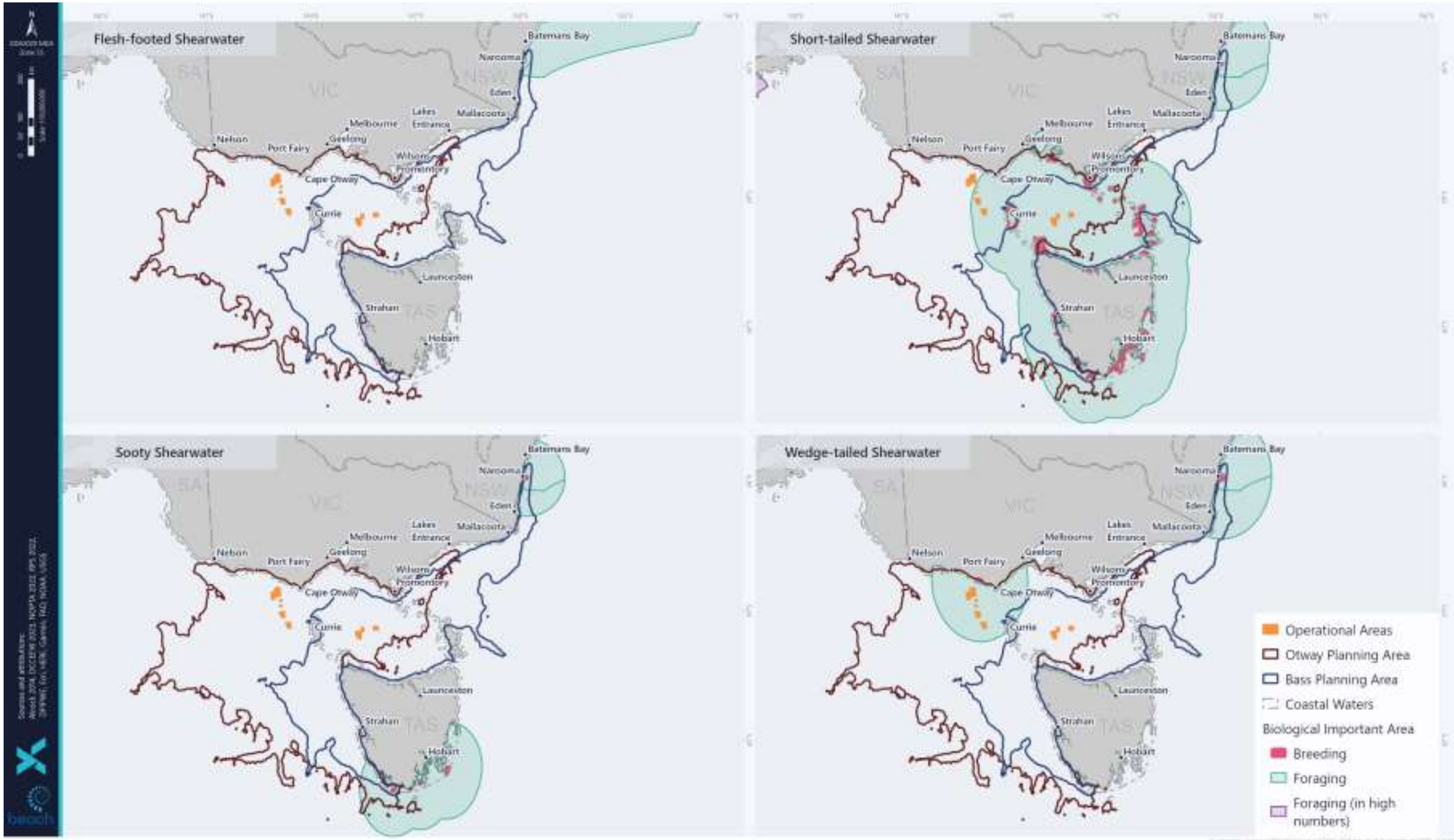


Figure 6-37: BIAs for Flesh-footed Shearwater, Short-tailed Shearwater, Sooty Shearwater and Wedge-tailed Shearwater within the Operational and Planning Areas

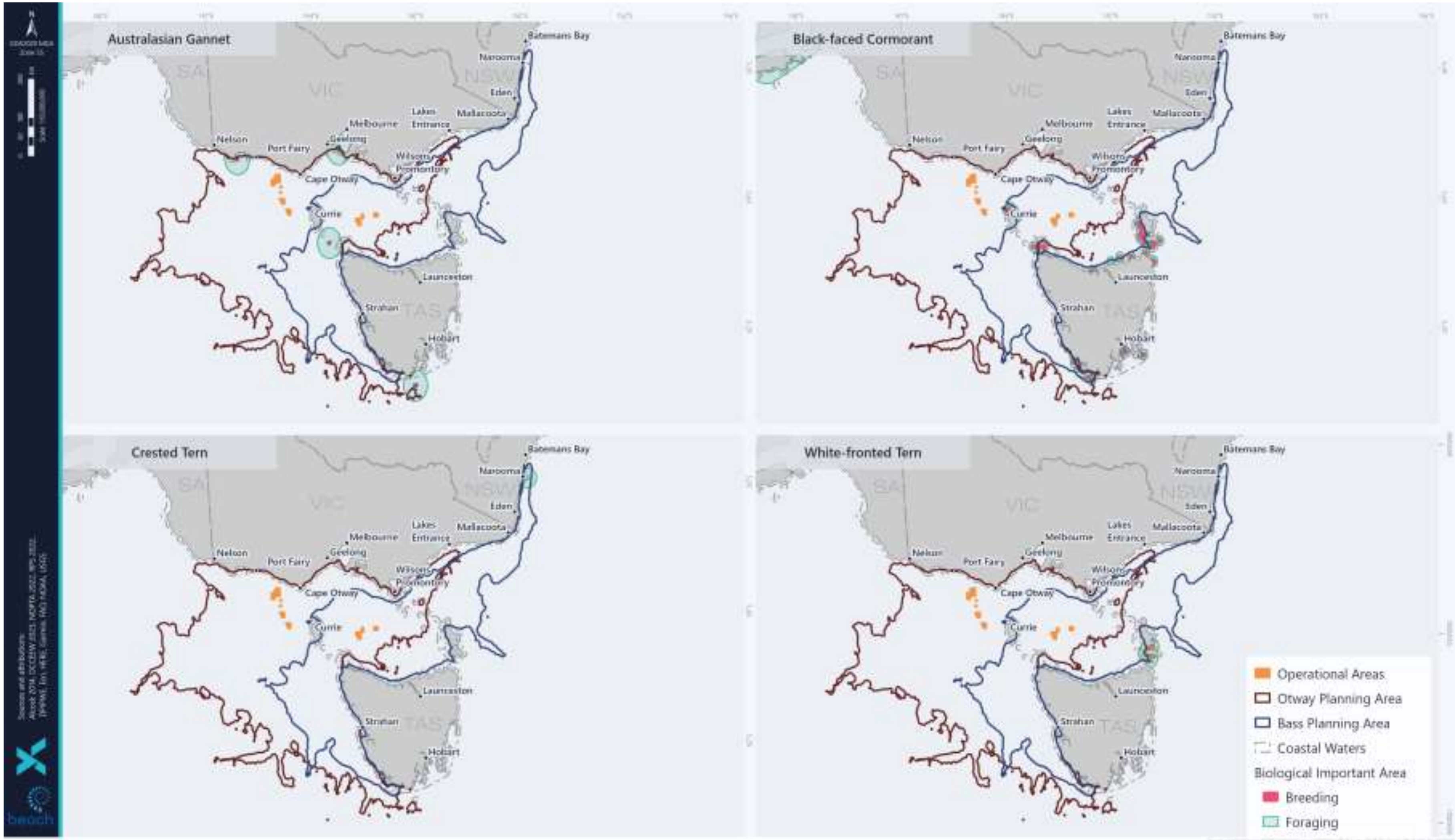


Figure 6-38: BIAs for Australasian Gannet, Black-faced Cormorant, Crested Tern and White-fronted Tern within the Operational and Planning Areas

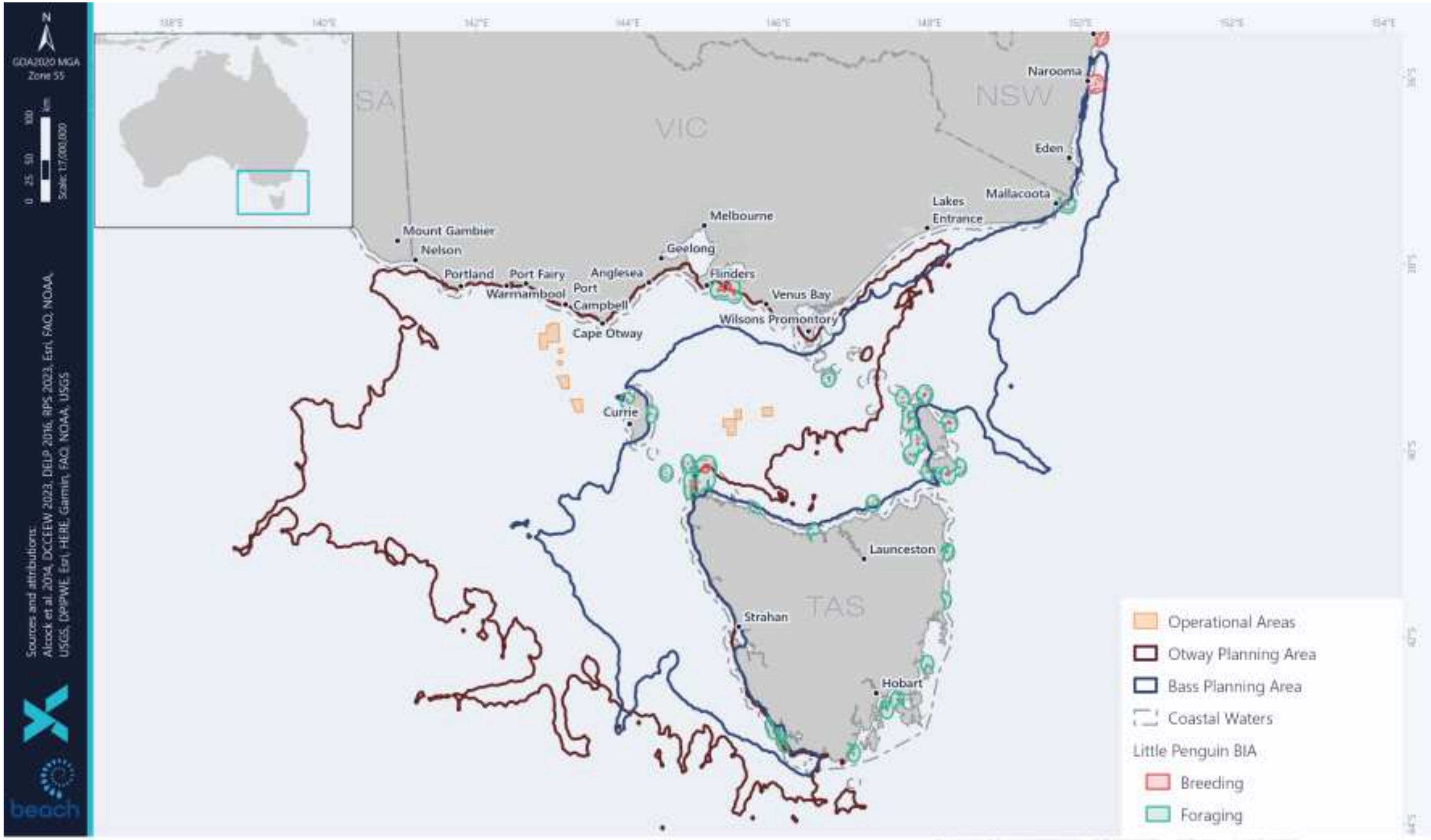


Figure 6-39: BIAs for Little Penguin within the Planning Areas

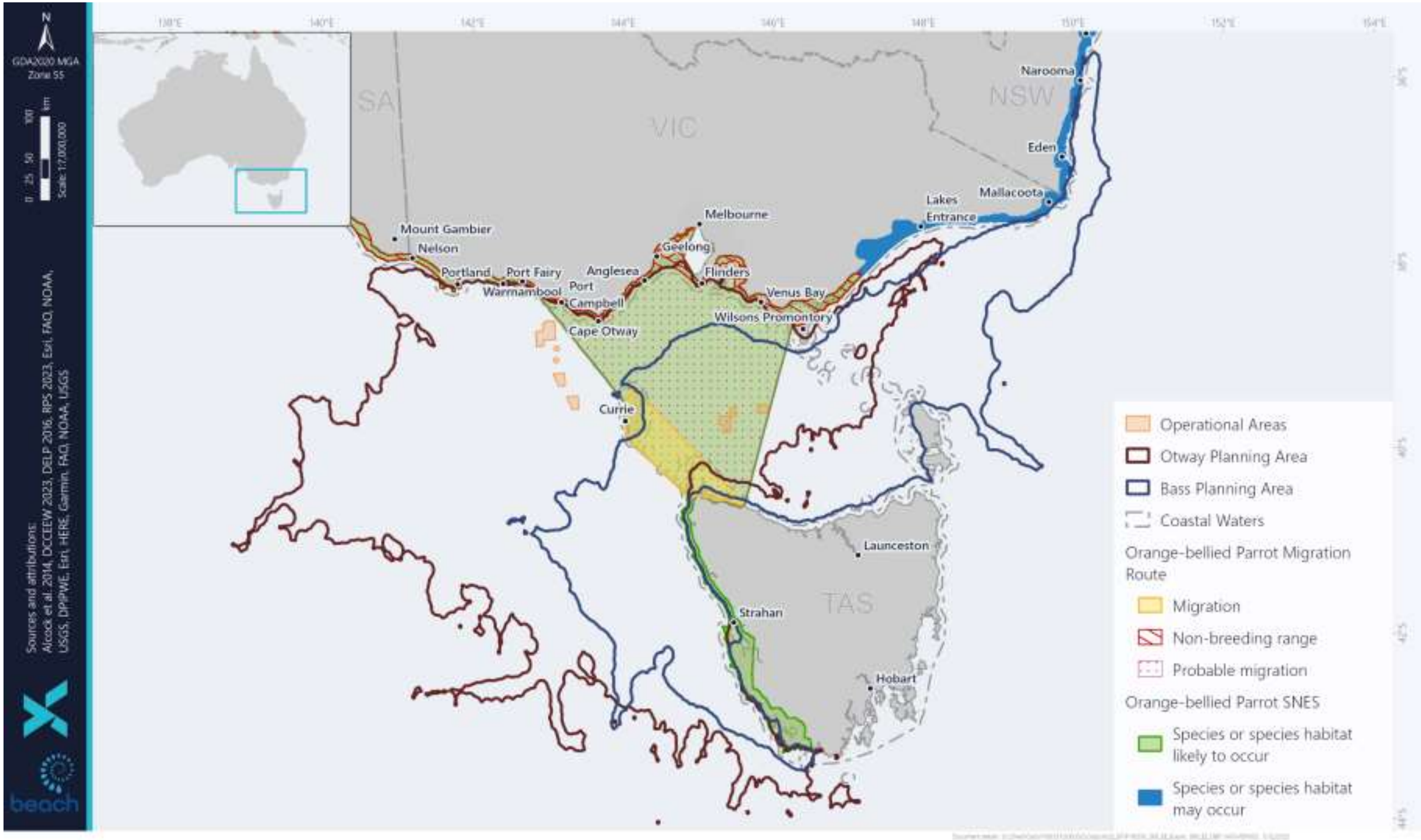


Figure 6-40: Distribution of the Orange-bellied Parrot within the Operational and Planning Areas

6.4.7.5 Marine Reptiles

The PMST Report for the Planning Areas identified five marine turtle species known to occur (Table 6-20, Appendix E). All five species of marine turtles are protected by the Recovery Plan for Marine Turtles in Australia (CoA 2017b). There are no identified BIAs for marine reptiles in the Planning Areas.

The Recovery Plan for Marine Turtles in Australia (CoA 2017b) details that the long-term recovery plan objective for marine turtles is to minimise anthropogenic threats to allow for the conservation status of marine turtles. Threats identified relevant to the activity are:

- Chemical and terrestrial discharge
- Marine debris
- Light pollution
- Habitat modification
- Vessel strike
- Noise interference
- Vessel disturbance

Table 6-20: Listed Turtle Species identified in the Planning Area

Common Name	Scientific Name	EPBC Status			Operational Area		Planning Area	
		Listed Threatened	**Listed Migratory**	**Listed Marine**	**Bass**	**Otway**	**Bass**	**Otway**
Flatback Turtle	*Natator depressus*	Vulnerable	Migratory	Listed	-	-	Species or species habitat known to occur within area	-
Green Turtle	*Chelonia mydas*	Vulnerable	Migratory	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Foraging, feeding or related behaviour known to occur within area	Species or species habitat may occur within area
Hawksbill Turtle	*Eretmochelys imbricata*	Vulnerable	Migratory	Listed	-	-	Foraging, feeding or related behaviour known to occur within area	-
Leatherback Turtle, Leathery Turtle	*Dermochelys coriacea*	Endangered	Migratory	Listed	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area	Foraging, feeding or related behaviour known to occur within area	Foraging, feeding or related behaviour known to occur within area
		Approved Conservation Advice for *Dermochelys coriacea* (leatherback turtle) (DEWHA 2008).						
Loggerhead Turtle	*Caretta caretta*	Endangered	Migratory	Listed	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area	Species or species habitat known to occur within area	Foraging, feeding or related behaviour known to occur within area

Flatback Turtle

The flatback turtle (*Natator depressus*) in Australia is found only in the tropical waters of northern Australia, where it feeds on soft-bodied prey. Nesting occurs only in these tropical waters. The CoA (2020) maps the flatback turtle as having a known or likely range north of the Victorian/NSW border.

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 (Limpus 2008; CoA 2017b). 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 (CoA 2017b), therefore it is expected they would only be occasional visitors in the Planning Areas.

Hawksbill Turtle

The hawksbill turtle (*Eretmochelys imbricata*) is widely distributed in the tropical and subtropical waters of Australia. Their eggs are laid on warm beaches with the most important nesting sites for the species located in northern Queensland, north-east Arnhem Land and WA (CoA 2017b). Adult hawksbill turtles are primarily found in tropical reefs where they are usually seen resting in caves and ledges or otherwise feeding on sea sponge, soft corals or other soft-bodied invertebrates.

No major nesting sites have been recorded in Victoria or Tasmania, however the CoA (2017b) maps the hawksbill turtle as having a known or likely range in eastern Bass Strait.

Leatherback turtle

The leatherback turtle (Dermochelys coriacea) is widely distributed throughout tropical, sub-tropical and temperate waters of Australia (CoA 2017b), including in oceanic waters and continental shelf waters along the coast of southern Australia (Limpus 2009). More so than other marine turtle species, the leatherback turtle utilises cold water foraging areas, with the species most commonly reported foraging along the coastal waters of central eastern Australia (southern Queensland to central NSW), south-east Australia (Tasmania, Victoria, and eastern SA), and southwestern WA (Limpus 2009). Leatherback turtles are more commonly found foraging in Australian waters along the east coast and in Bass Strait. The southern waters of Australia are one of five identified foraging sites (where area restricted behaviour occurs) for leatherback turtles (CoA 2017b).

Leatherbacks feed on soft-bodied invertebrates, including jellyfish (Limpus 2009). No major nesting has been recorded in Victoria or Tasmania, with isolated nesting recorded in the Northern Territory, Queensland, and northern NSW (CoA 2017b). The CoA (2020) maps the leatherback turtles as having a known or likely range within Bass Strait. The waters of the Planning Areas do not represent critical habitat for the species, though it is possible it may occur in low numbers during upwelling.

Loggerhead turtle

The loggerhead turtle (Caretta caretta) (EPBC Act: Endangered, Marine, Migratory) is globally distributed in sub-tropical waters (Limpus 2008), including those of eastern, northern, and western Australia (CoA 2017b), and are rarely sighted off the Victorian coast. The main Australian breeding areas for loggerhead turtles are generally confined to southern Queensland and WA (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 are carnivorous and feed predominantly on benthic invertebrates up to 55 m offshore. Loggerhead turtles forage in all coastal states and the Northern Territory, but are uncommon in South Australia, Victoria, and Tasmania (Commonwealth of Australia 2017b). Due to waters depths, it is unlikely loggerhead turtles would be present in most of the Planning Areas, but areas which overlap nearshore waters may provide suitable habitat along the coast.

6.4.7.6 Cetaceans

The PMST Reports identify several cetaceans that potentially occur in the Operational and Planning Areas (Appendix E). Table 6-21 details cetaceans identified in the PMST Reports. Threatened or migratory species that are likely or known to occur in the area or have an intercepting BIA within the Planning Areas are discussed in more detail in the following sections.

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 coast 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.

First nation’s people around Australia have long had a strong connection to whales, which has significance as totemic ancestors to some groups. See Section 6.6.3 for further information.

Otway Whale Surveys
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) (See below section on blue whales).

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 6-22 and Table 6-23). 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 Transitions 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.

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 6-23 lists the species present in the area Origin surveyed.

As part of Beach's Otway Drilling Campaign, marine fauna observations occurred through most of 2021 (2 February to 31 December 2021) from the drill rig and support vessels at the Artisan-1, Geographe-4, Geographe-5, Thylacine North-1 and West-1 drilling locations. Table 6-25 provides this cetacean sighting data. For whales, the highest number of detections was for blue whales (198), while for dolphins, it was the common dolphin (519). Further detail on marine fauna observations of blue whales through to 30 April 2022 is provided in the section on blue whales).

Table 6-21: Listed Cetacean Species identified in the Planning Area

Common Name	Scientific Name	EPBC Status			Operational Area		Planning Area	
		Listed Threatened	Listed Migratory	Listed Cetacean	Bass	Otway	Bass	Otway
Whales								
Andrew's Beaked Whale	*Mesoplodon bowdoini*	-	-	Listed	-	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
Antarctic Minke Whale, Dark-shoulder Minke Whale	*Balaenoptera bonaerensis*	-	Migratory	Listed	-	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area
Arnoux's Beaked Whale	*Berardius arnuxii*	-	-	Listed	-	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
Blainville's Beaked Whale, Dense-beaked Whale	*Mesoplodon densirostris*	-	-	Listed	-	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
Blue Whale	*Balaenoptera musculus*	Endangered	Migratory	Listed	Species or species habitat likely to occur within area	Foraging, feeding or related behaviour known to occur within area	Foraging, feeding or related behaviour known to occur within area	Foraging, feeding or related behaviour known to occur within area
		Conservation Management Plan for the Blue Whale (CoA 2015).						
Bryde's Whale	*Balaenoptera edeni*	-	Migratory	Listed	-	-	Species or species habitat may occur within area	Species or species habitat may occur within area
Cuvier's Beaked Whale, Goose-beaked Whale	*Ziphius cavirostris*	-	-	Listed	-	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
Dwarf Sperm Whale	*Kogia sima*	-	-	Listed	-	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
False Killer Whale	*Pseudorca crassidens*	-	-	Listed	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area
Fin Whale	*Balaenoptera physalus*	Vulnerable	Migratory	Listed	Foraging, feeding or related behaviour likely to occur within area	Foraging, feeding or related behaviour likely to occur within area	Foraging, feeding or related behaviour likely to occur within area	Foraging, feeding or related behaviour known to occur within area
		Approved Conservation Advice for *Balaenoptera physalus* (fin whale) (TSSC 2015f).						
Gingko-toothed Beaked Whale, Gingko-toothed Whale, Gingko Beaked Whale	*Mesoplodon ginkgodens*	-	-	Listed	-	-	Species or species habitat may occur within area	-
Gray's Beaked Whale, Scamperdown Whale	*Mesoplodon grayi*	-	-	Listed	-	-	Species or species habitat may occur within area	Species or species habitat may occur within area
Hector's Beaked Whale	*Mesoplodon hectori*	-	-	Listed	-	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
Humpback Whale	*Megaptera novaeangliae*	-	Migratory	-	Species or species habitat known to occur within area	Species or species habitat likely to occur within area	Foraging, feeding or related behaviour known to occur within area	Species or species habitat known to occur within area
		Listing Advice for *Megaptera novaeangliae* (humpback whale) (DAWE 2022a).						
Killer Whale, Orca	*Orcinus orca*	-	Migratory	Listed	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area
Long-finned Pilot Whale	*Globicephala melas*	-	-	Listed	-	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
Minke Whale	*Balaenoptera acutorostrata*	-	-	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
Pygmy Right Whale	*Caperea marginata*	-	Migratory	Listed	Foraging, feeding or related behaviour may occur within area	Foraging, feeding or related behaviour may occur within area	Foraging, feeding or related behaviour likely to occur within area	Foraging, feeding or related behaviour likely to occur within area
Pygmy Sperm Whale	*Kogia breviceps*	-	-	Listed	-	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area

Common Name	Scientific Name	EPBC Status			Operational Area		Planning Area	
		Listed Threatened	Listed Migratory	Listed Cetacean	Bass	Otway	Bass	Otway
Sei Whale	*Balaenoptera borealis*	Vulnerable	Migratory	Listed	Foraging, feeding or related behaviour likely to occur within area	Foraging, feeding or related behaviour likely to occur within area	Foraging, feeding or related behaviour likely to occur within area	Foraging, feeding or related behaviour known to occur within area
		Approved Conservation Advice for *Balaenoptera borealis* (sei whale) (TSSC 2015g).						
Shepherd's Beaked Whale, Tasman Beaked Whale	*Tasmacetus shepherdi*	-	-	Listed	-	-	Species or species habitat may occur within area	Species or species habitat may occur within area
Short-finned Pilot Whale	*Globicephala macrorhynchus*	-	-	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
Southern Bottlenose Whale	*Hyperoodon planifrons*	-	-	Listed	-	-	Species or species habitat may occur within area	Species or species habitat may occur within area
Southern Right Whale	*Eubalaena australis*	Endangered	Migratory (as Balaena glacialis australis)	Listed	Species or species habitat known to occur within area	Species or species habitat known to occur within area	Species or species habitat known to occur within area	Breeding known to occur within area
		Conservation Management Plan for the Southern Right Whale 2011-2021 (DSEWPaC 2012a). Draft National Recovery Plan for the Southern Right Whale (DCCEEW 2022a).						
Sperm Whale	*Physeter macrocephalus*	-	Migratory	Listed	-	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
Strap-toothed Beaked Whale, Strap-toothed Whale, Layard's Beaked Whale	*Mesoplodon layardii*	-	-	Listed	-	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
True's Beaked Whale	*Mesoplodon mirus*	-	-	Listed	-	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
Dolphins								
Bottlenose Dolphin	*Tursiops truncatus s. str.*	-	-	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
Common Dolphin, Short-beaked Common Dolphin	*Delphinus delphis*	-	-	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
Dusky Dolphin	*Lagenorhynchus obscurus*	-	Migratory	Listed	Species or species habitat may occur within area	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area
Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin	*Tursiops aduncus*	-	-	Listed	-	-	Species or species habitat likely to occur within area	Species or species habitat likely to occur within area
Risso's Dolphin, Grampus	*Grampus griseus*	-	-	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area
Southern Right Whale Dolphin	*Lissodelphis peronii*	-	-	Listed	-	Species or species habitat may occur within area	Species or species habitat may occur within area	Species or species habitat may occur within area

Table 6-22: 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	Longfinned 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 6-23: Temporal Occurrence 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 6-24: 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

Table 6-25: Marine fauna observations at project locations during the Otway drilling project in 2021

Species	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Whales												
Blue	0	101	66	16	2	0	0	1	0	7	5	**198**
SRW	0	0	0	0	1	1	1	0	0	0	0	**3**
Humpback	0	0	7	9	25	4	2	11	14	18	5	**95**
Minke	0	0	0	3	0	0	0	0	0	0	0	**3**
Pilot	0	0	0	0	1	0	0	0	0	0	0	**1**
No ID	0	0	0	3	0	0	0	0	1	2	1	**7**
Dolphins												
Common	40	103	44	28	16	37	8	21	37	85	100	**519**
Bottlenose	12	4	1	2	1	3	2	4	3	1	7	**40**
No ID	32	27	30	10	15	11	11	5	2	2	5	**150**

Artisan-1 (3 February to 27 March) – 38 km north-northwest of the activity area;
Geographe-4/-5 (27 March to 13 November) – 15 km north of the activity area; and
Thylacine North-1 (13 November to 31 December) (ongoing at the time of data collection) - 4 km northwest of the activity area.

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 (DoE 2024d). 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 (DoE 2024d). 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 (DoE 2024d).

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

Blue whale

The pygmy blue whale has a foraging (annual high use area) BIA within the Otway Operational Area and both Planning Areas, possible foraging area BIA overlapping all Operational and Planning Areas, and a known foraging BIA overlapping the Otway Operational Area and both Planning Areas (Figure 6-41).

Data, as detailed in this section, 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.

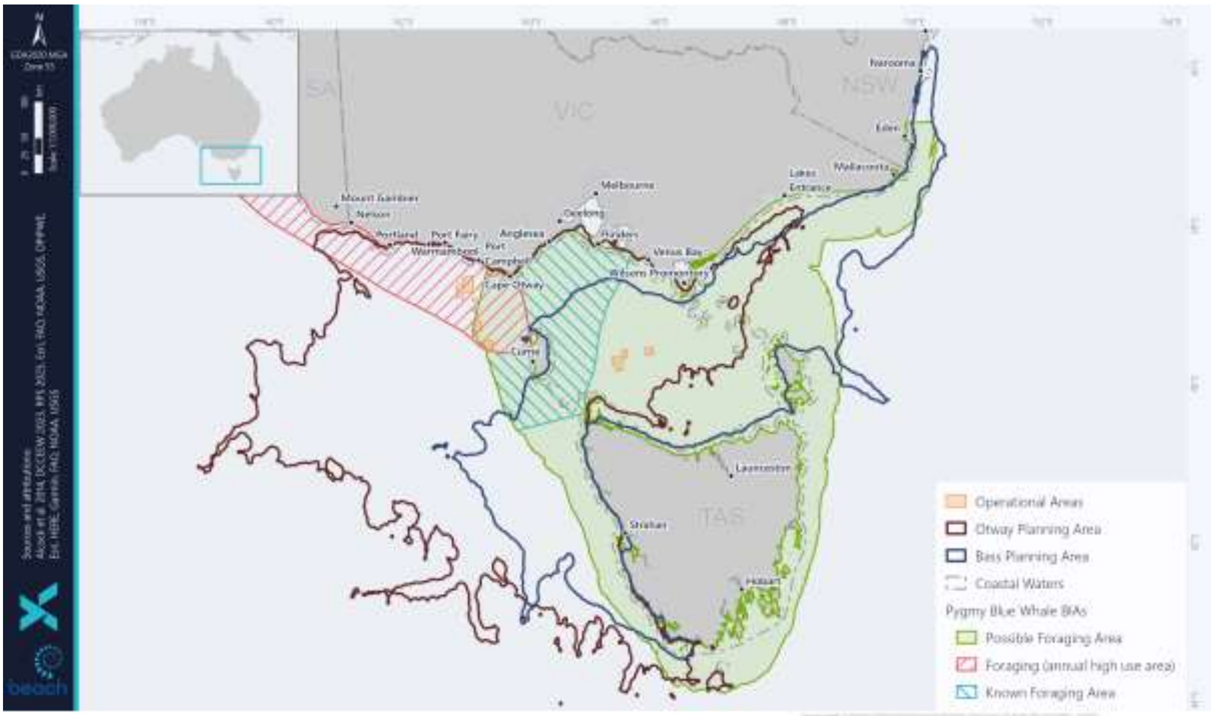


Figure 6-41: Pygmy Blue Whale BIAs within the Operational and Planning Areas

Status

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*). 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 (CoA 2015).

Population

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.

Genetic analysis has shown that pygmy blue whales which feed off the Perth Canyon, WA and the Bonney Upwelling, SA and Victoria constitute the same population (Attard et al. 2010, in CoA 2015). Photo identification and genomic studies suggest population exchange between the two feeding grounds of the Bonney coast upwelling and the Perth Canyon (Attard et al. 2018).

Global pygmy blue whale abundance estimates range from 2,000 to 5,000 individuals (Reilly et al. 2008). Abundance estimates based on photo-identification mark-recapture from 1999/2000 to 2004/2005 for blue whales in the Perth Canyon were between 532 and 1,754 individuals, which generally agree with acoustic abundance estimates of 662 to 1,559 calling blue whales migrating south in 2004 past Exmouth in Western Australia and a 1992/1993 season cruise which estimated 671 (95% interval 289–1,557) individuals offshore of southern Western Australia (35–45° South, 115–125° East) (CoA 2015).

Distribution

The blue whale is a cosmopolitan species, found in all oceans except the Arctic, but absent from some regional seas such as the Mediterranean, Okhotsk and Bering seas. Little is known about mating behaviour or breeding grounds. The pygmy blue whale is mostly found north of 55°S, while Antarctic blue whales are mainly sighted south of 60°S in Antarctic waters. Pygmy blue whales are most abundant in the southern Indian Ocean on the Madagascar plateau, and off South Australia and Western Australia, where they form part of a more or less continuous distribution from Tasmania to Indonesia. 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-A wellhead 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 (Figure 6-42). 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 this 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. Sighting data indicates that blue whales are seasonally distributed (Gill et al. 2011, McCauley et al. 2018).

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 coast upwelling) and the associated aggregations of krill that they feed on (Gill and Morrice 2003). The

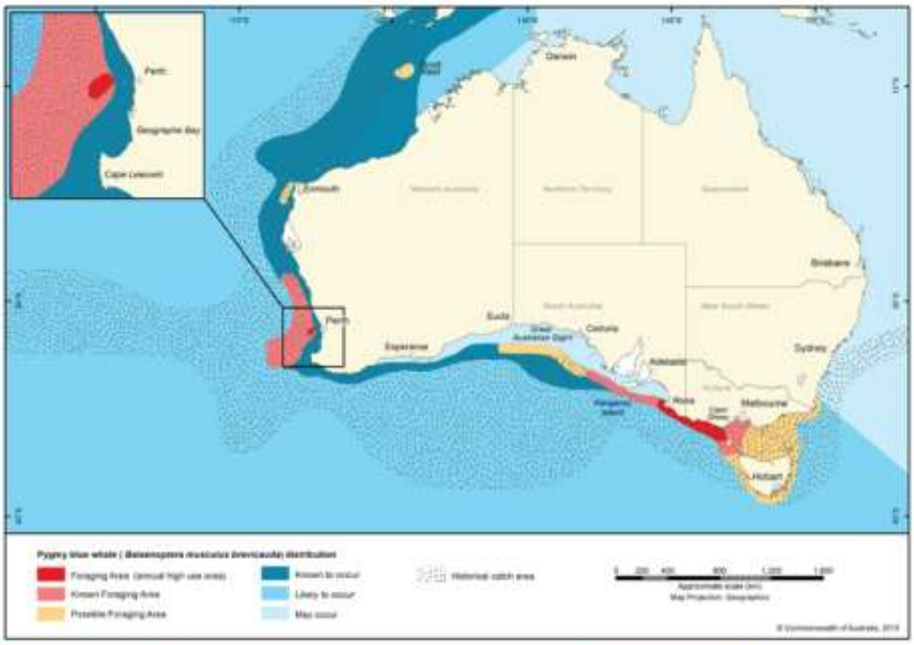
Bonney coast upwelling generally starts in the eastern part of the Great Australian Bight in November or December and spreads eastwards to the Otway Basin around February as southward migration of the subtropical high-pressure cell creates upwelling favourable winds.

There are two known seasonal feeding aggregations areas in Australia, the Bonney Coast Upwelling KEF and adjacent waters off South Australia and Victoria (Figure 6-48), and the Perth Canyon KEF and adjacent waters 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 (CoA 2015). McCauley et al. (2018) suggests that acoustic detection of pygmy blue whales indicate they predominantly occur west of Bass Strait (Figure 6-49). Acoustic detections of pygmy blue whales off Portland Victoria correlated with upwelling indicators in the Bonney coast 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 (Figure 6-49).

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 coast 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 coast 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 coast 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.



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 6-42: Pygmy Blue Whale Foraging Areas around Australia (CoA 2015)

Foraging

There are two known seasonal feeding aggregations areas in Australia, the Bonney Coast Upwelling KEF and adjacent waters off South Australia and Victoria and the Perth Canyon KEF and adjacent waters in Western Australia (Figure 6-42). 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 (DoE 2015). Blue whales are known as 'constant foragers'; their ecology in feeding grounds consists of constantly searching for patchily distributed krill resources, preferably those that reward the effort involved in consuming them (Torres et al. 2020). They are physically well-adapted for rapid movement between widely separated foraging areas (Woodward et al. 2006), but when they enter areas where krill may occur, they carry out zig-zagging 'area-restricted searches' (ARS) patterns until either they find prey, or exhaust local possibilities, and move on to another possible foraging ground based on past experience (Abrahms et al. 2019). Based on this it is assumed that once the blues have finished feeding, they will move from the feeding area to commence searching for another area.

Diving behaviour of blue whales associated with feeding at depth was observed by Gill & Morris (2003) in the Otway region, who note that blue whales dived steeply, submerging for 1–4 minutes, then returned to the surface. Tagging of a pygmy blue whale at the Perth Canyon identified 1677 dives over the tag duration (7.6 days) (Owen et al. 2016). The duration of dives was:

- Feeding - mean of 7.6 minutes, maximum of 17.5 minutes.

- Migratory – mean of 5.2 minutes, maximum of 26.7 minutes.
- Exploratory – mean of 8.6 minutes, maximum of 22.05 minutes.

Tagging of 13 pygmy blue whales (five of which had tags that monitored dive depth and duration) in the Bonney upwelling identified (Möller et al. 2015):

- Whales predominantly carried out area-restricted search (presumably foraging) with generally shallow and short dives. However, dives were generally deeper at night compared to during the day.
- Whales performed mostly square shaped dives that were shallow in depth and short in duration.
- Dives recorded to a maximum of 492 m (mean = 59.5 m ± 94.3), and for a maximum duration of 112 minutes (mean = 6.1 minutes ± 5.2).

Although the maximum recorded dive time was 112 minutes, the mean dive time of 6.1 minutes ± 5.2 provides confidence that the typical dive time is less than 30 minutes (Möller et al. 2015). Tagging of eight blue whales off California (Irvine et al. 2019) identified that dive durations were as long as 30.7 minutes, and no feeding lunges were recorded during dives >20 minutes in duration.

Surveys
Several aerial and noise studies of blue whales within the Otway Basin have been conducted and are summarised below.

<u>Aerial Surveys (2001-02 to 2006-07)</u>
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 6-44 and Figure 6-45).

Blue whale encounter rates in the central and eastern study (Cape Nelson to Cape Otway) area by month is shown in Figure 6-43 with sighting and effort data presented geographically in Figure 6-44 and Figure 6-45. Data is pooled for all seasons, for central and eastern areas, overlaid on gridded aerial survey effort (10 km x 10 km squares), represented as minutes flown per grid square (key, upper right). Thick solid lines represent 50% and 95% probability contours for blue whale distribution from density kernel analysis. Dashed lines are central and eastern boundaries (Gill et al. 2011). The Otway Planning Area is within the central and eastern areas and the Otway Operational Area overlaps the eastern area.

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 (Figure 6-44).

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.

The data from Gill et al. (2011) shows:

- Blue whales are typically widely distributed throughout central and eastern areas shelf waters from January through to April.
- Blue whale numbers are significantly lower in November, December and January in the eastern area compared to the central area.
- No blue whales were sighted in the eastern area during November for any season despite significant effort. Pooled monthly encounter rates increased from 1.6 whales 1,000 km–1 in December, 5 whales 1,000 km–1 in January, peaked at 9.8 whales 1,000 km–1 in February, dropped slightly to 8.8 whales 1,000 km–1 in March, then declined sharply to a single sighting for May (0.4 whales 1,000 km–1).
- Encounter rates in central and eastern zones peaked in February, coinciding with peak upwelling intensity and primary productivity.

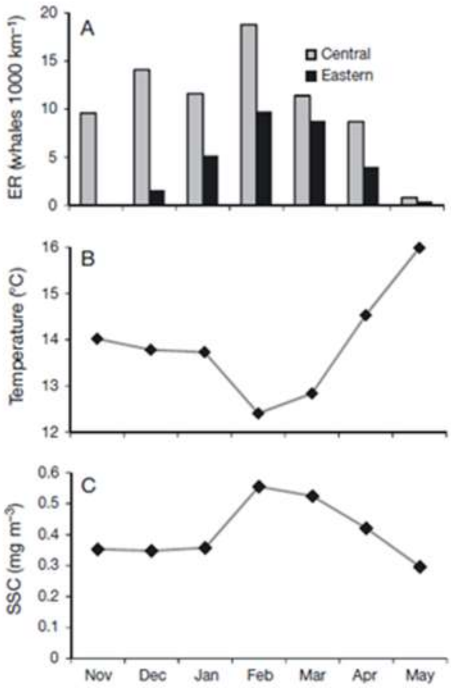


Figure 6-43: Blue Whale Encounter Rates in the Central and Eastern Study (Cape Nelson to Cape Otway) Area by Month (Gill et al. 2011)

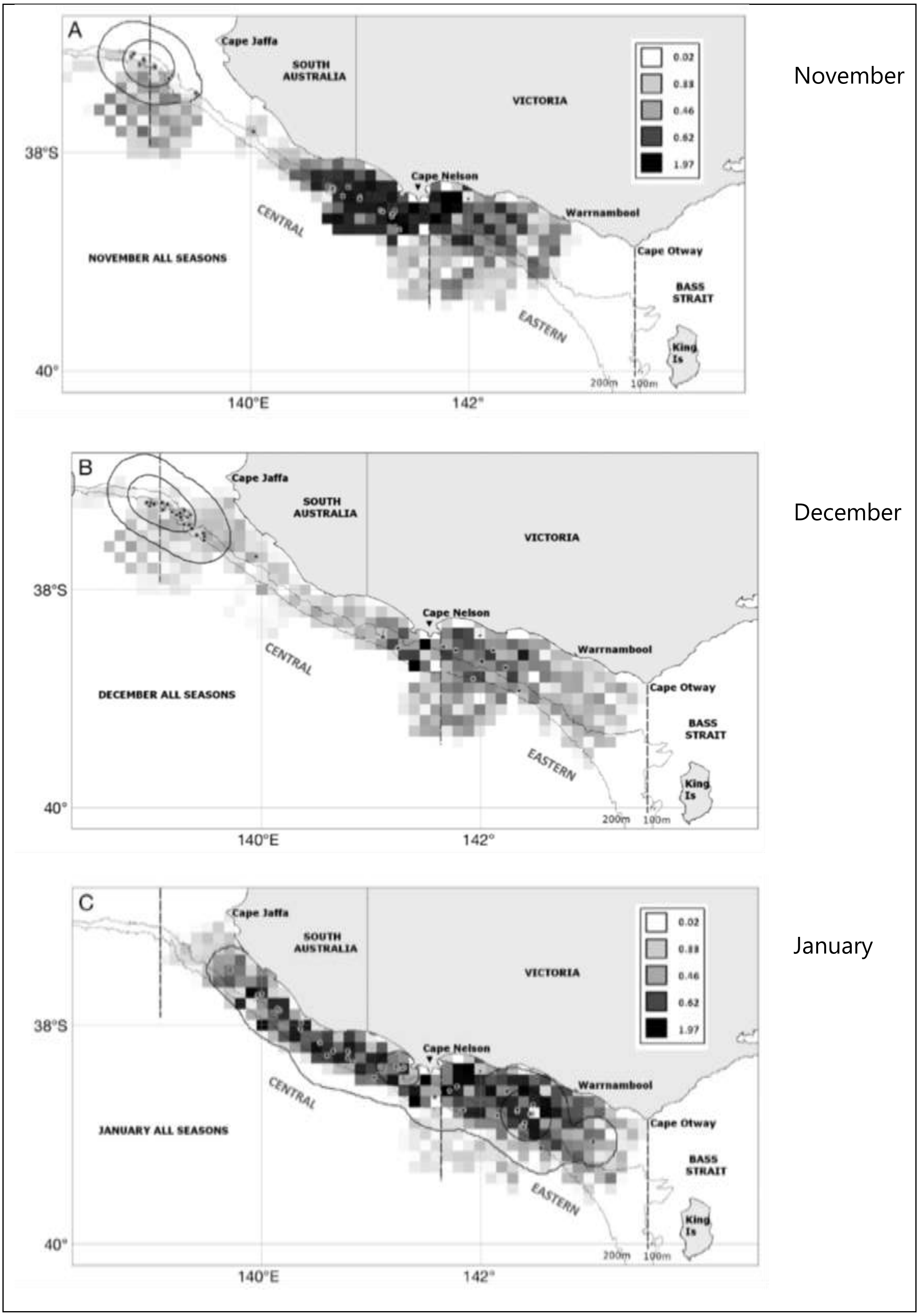


Figure 6-44: Blue Whale Sightings in the Otway Basin (Nov, Dec, Jan) (Gill et al. 2011)

Note: Dots represent blue whale sightings while squares are aerial survey effort (10 km x 10 km squares) represented as minutes flown per grid square (key, upper right corner of the November and January figures).

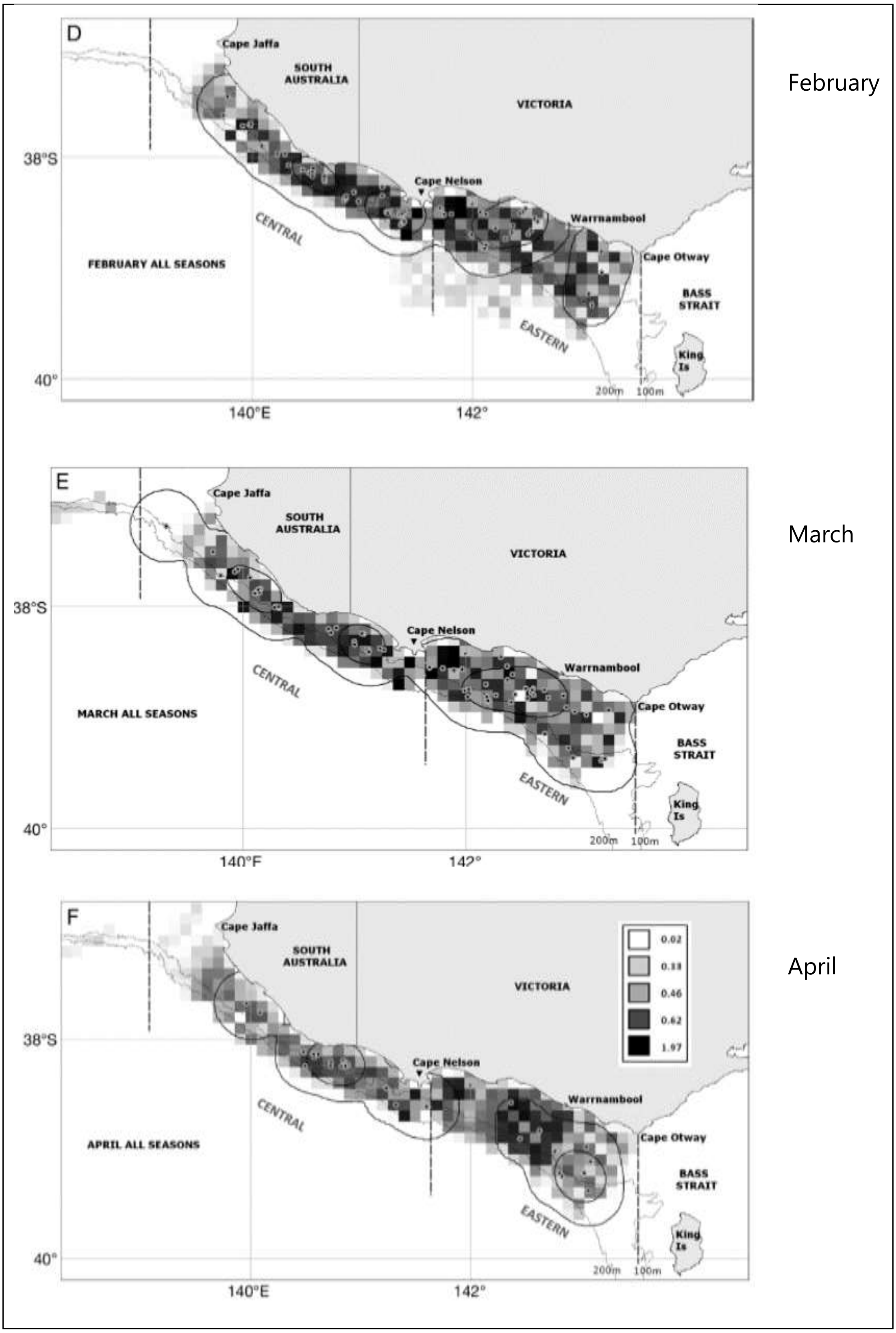


Figure 6-45: Blue Whale Sightings in the Otway Basin (Feb, Mar, Apr) (Gill et al. 2011)

Note: Dots represent blue whale sightings while squares are aerial survey effort (10 km x 10 km squares) represented as minutes flown per grid square (key, upper right corner of the April figure).

Origin Energy Surveys (2010-2014)

There were no confirmed sightings of blue whales during Origin's Speculant 3D Transition Zone marine 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).

From February to October 2011 Origin located an array of marine loggers east of the Thylacine platform to document nearby ambient marine noise, detect cetaceans and measure acoustics associated with the Origin 3D Bellerive Marine Seismic Survey. Pygmy and Antarctic blue whales were acoustically detected in the monitored area. Pygmy blue whales were observed from early February to early June being abundant from March to mid-May. Rare calls from Antarctic blue whales were observed in June.

Aerial surveys were commissioned by Origin and undertaken during 2011 and 2012 by the Blue Whale Study. During five aerial surveys between 8 and 25 February 2011, 56 blue whales were sighted. 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. Figure 6-46 shows sightings from 14 February 2011 (Gill 2020).

The 2012 aerial surveys found that blue whales were common in the eastern upwelling zone during November and December 2012 (Figure 6-46 and Figure 6-47). 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 coast upwelling since 1999 (Gill 2020).

The large numbers of whales found in this area during November and December indicated high productivity, although the krill was too deep to be seen from the air. Subsequent surveys in the same area for Origin Energy in early 2013 resulted in 17 blue whales sighted in January, eight in February, and two (a cow and calf) in March 2013, despite the extremely warm surface conditions. The high productivity of this area seen in November-December 2012 evidently tailed off during the next few months (Gill 2020).

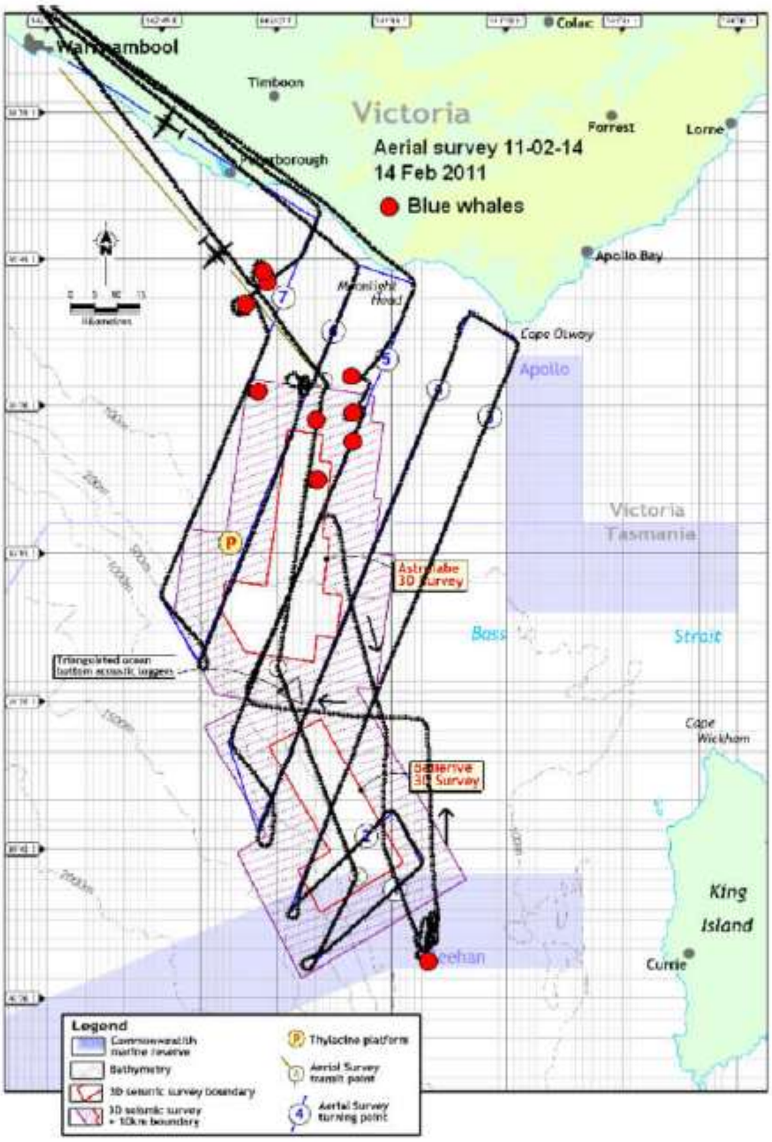


Figure 6-46: Blue Whale Sightings during an Aerial Survey for Origin Energy in February 2011 (Gill 2020)

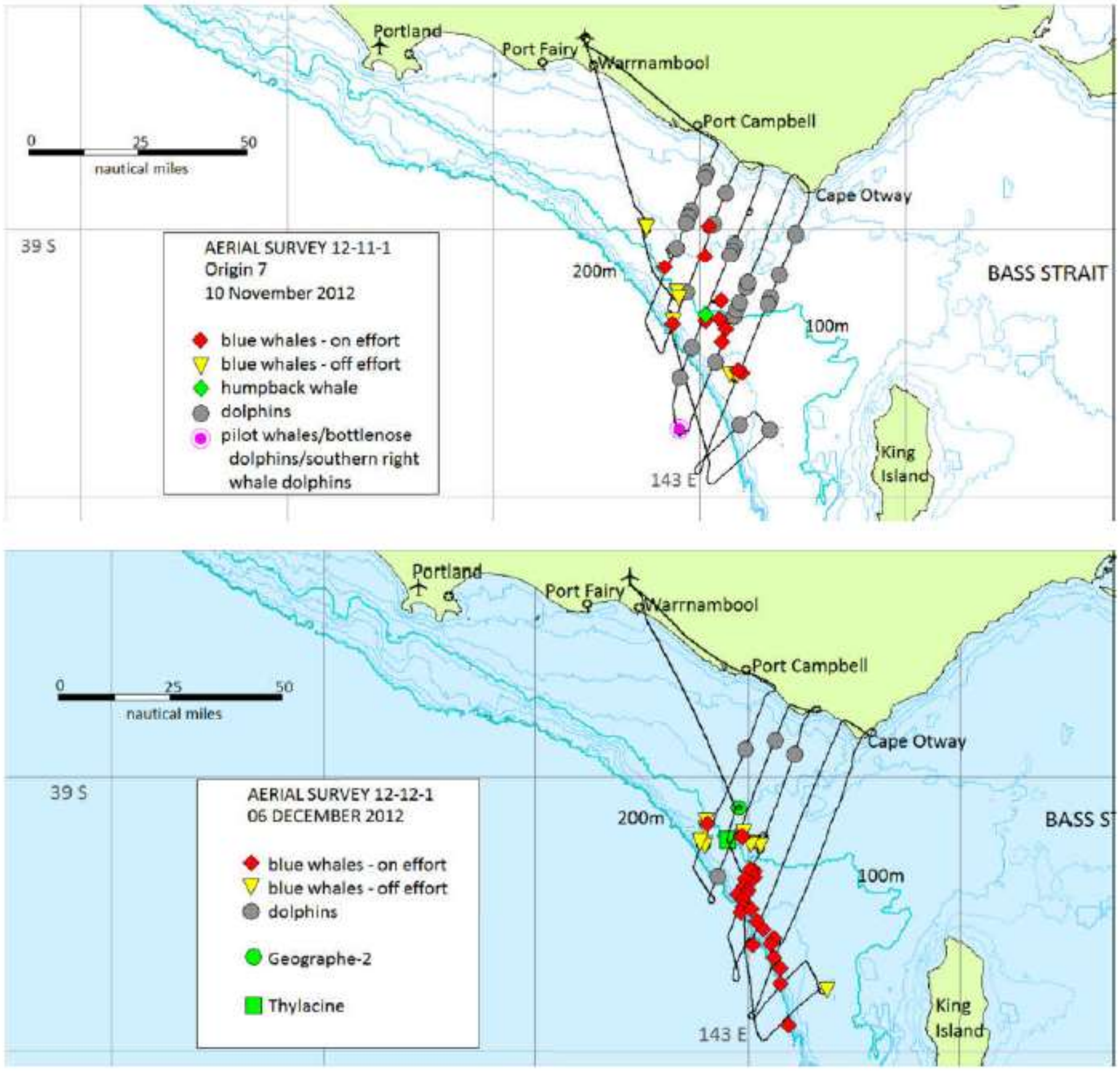


Figure 6-47: Blue Whale Sightings during an Aerial Survey for Origin Energy in November and December 2012 (Gill 2020)

Tagging Study (2015-2016)

Möller et al. 2020 analysis data from the tags of 13 pygmy blue whales who were tagged in the Bonney upwelling region in January 2015 with tags transmitting up to March 2016. In summary:

Whale movements in the Great Southern Australian Coastal Upwelling System (GSACUS) ranged mostly from eastern South Australia, over the continental shelf south of Kangaroo Island, to between mainland Australia and Tasmania), with a few whales performing some movements to the continental slope and the deep-sea (Figure 6-48).

In the GSACUS, most tagged whales remained over the continental shelf, utilising this region from at least January to July. This was the area of highest occupancy by the whales, with one whale returning to the Bonney Upwelling in January the year after and remaining there for at least three months. This timing coincides with the upwelling season, which generally occurs from November to March each year.

A low probability of area restricted search (ARS) behaviour (i.e. high probability of transiting behaviour) was mainly observed between April and June, and then between November and December, suggesting that the pygmy blue whales were mainly migrating during those times.

Seascape correlates of ARS behaviour for these whales suggested the importance of sea surface temperature, sea surface height anomaly, wind speed and chlorophyll a concentration as proxies of upwelling productivity and presence of krill patches.

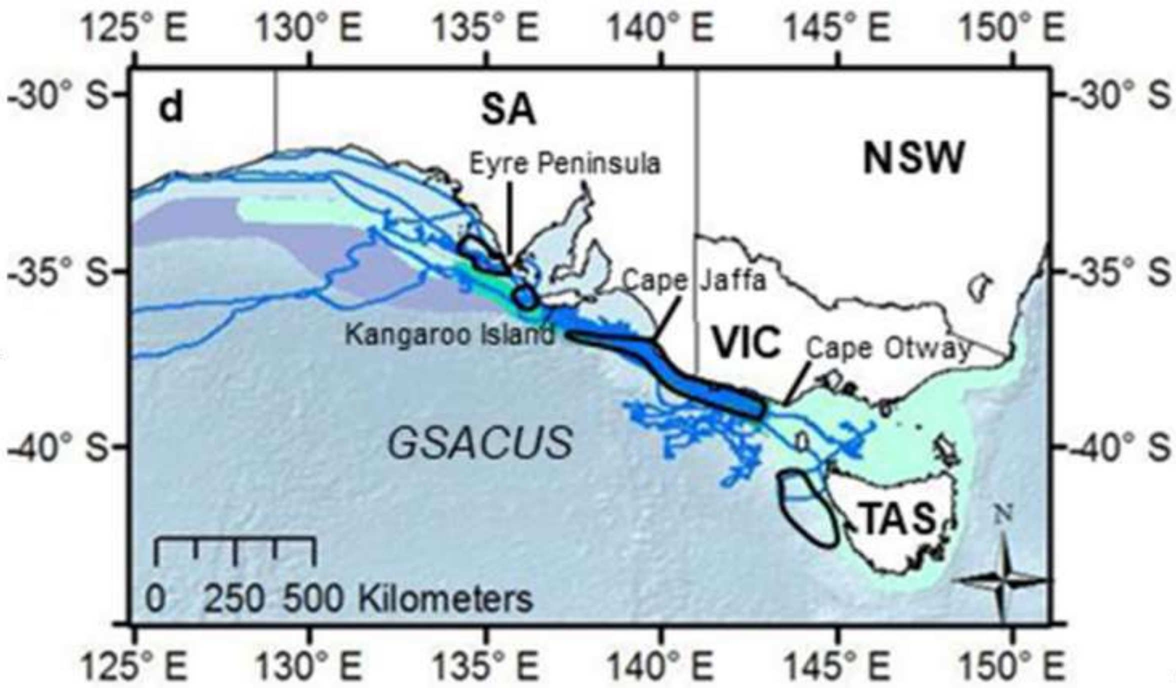


Figure 6-48: Tracks of 13 Pygmy Blue Whales in the GSACUS (Möller et al. 2020)

Passive Acoustic Recorders (2009-2017)
Between 2009 and 2016 the Integrated Marine Observing System (IMOS) has been recording underwater sound south of Portland, Victoria. McCauley et al. (2018) analysed the data from to look at blue whale presence, distribution, and population parameters.

McCauley et al. (2018) analysed data from passive acoustic recorders that were located around Australia to look at blue whale presence, distribution and population parameters. The primary sites comprised central Bass Strait, western Tasmania, the southeast Australian coast and the Great Australian Bight area. Each study area had multiple receivers and may have had several sites sampled within the area. Temporal sampling focussed on the southern Australian site south-west of Portland, Victoria. Data was used from 2004 to 2016. The study concluded:

- 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). McCauley et al. (2018) suggests that acoustic detection of Antarctic blue whales indicate they predominantly occur along the entire southern coastline.

- Pygmy blue whales have three migratory stages around Australia; the “southbound migration stage” were 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 feeding sites, feeding and then marking their way north towards June.
- Along the southern Australian coastline pygmy blue whales are most frequently detected towards the east along the Bonney coast over late February to early June, utilising secondary productivity produced by a seasonal upwelling event.
- Within a season it is difficult to predict whale numbers and their specific locations, but when correlated across seasons the strength and persistence of this upwelling event as given by time integrated water temperature south of Portland, significantly correlates with time integrated number of individual whales calling from the same site.
- The Bonney coast upwelling is a strong predicator of pygmy blue whale presence at Portland where whale presence in the area is linked to prey availability.

Sea noise data was available from the Portland site from 2009 to early 2017 detailed:

- 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 (Figure 6-49). There was substantial variation in presence within a season, with some whales remaining in the Portland detection area until mid-June each year.
- There was considerable variability in whale persistence and presence within a season (Figure 6-49) with no consistent trend other than a peak in presence somewhere over February to June.
- It is difficult to predict numbers within a season but when correlated across seasons the strength and persistence of the Bonney coast 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.

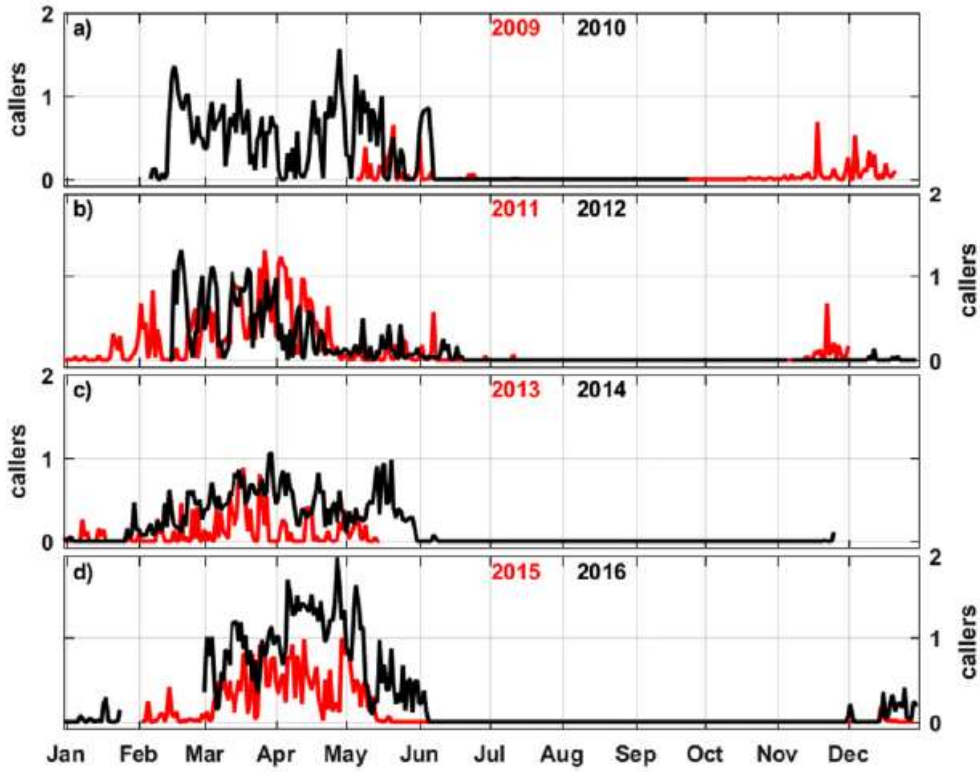


Figure 6-49: Mean Number of Individual Pygmy Blue Whales Calling (McCauley et al. 2018)

Beach Surveys (2019-2022)

During the Beach Otway Development Seabed Survey (November 2019 to January 2020) there were four sightings of blue whales within 3.5 km of the Thylacine Platform in November 2019 and one sighting in January 2020 about 1 km from the Artisan well location. The whales were identified as swimming.

As detailed in Section 6.3.2, JASCO completed a monitoring study for Beach in relation to exploration drilling activities at the Artisan-1 well from the 1 Feb to 6 April 2021 (McPherson et al. 2021). Songs of pygmy blue whales were detected sporadically through February and the first half of March. By the end of March, the signals were present in almost every hour of recording. This pattern of occurrence was reflected across all recording stations. The data were too sparse to confirm anything about animal movements.

Beach commenced its Otway drilling program in February 2021 in the Otway Development Area, including:

- Exploration drilling at the Artisan-1 location (2 February 2021 – 27 March 2021).
- Development drilling, well abandonment, subsea installation, and commissioning activities in the Geographe field (27 March 2021 – 13 November 2021).
- Development drilling of the Thylacine North-1 well (16 November 2021 – 11 January 2022).
- Development drilling of the Thylacine West wells (23 January 2022 – 30 April 2022).

Drilling was undertaken by offshore drilling unit (MODU), the *Ocean Onyx*. The Blue Whale Study was engaged to undertaken aerial surveys from February to May 2021 to identify blue whale and krill surface swarms within the Otway Development Area and outside of this area. A preliminary data summary provided to Beach detailed:

- Nine aerial surveys were undertaken from 25 February to 21 May 2021.
- There were 34 blue whale sightings consisting of 43 individuals.
- The highest number of blue whale sightings was on 7 April with 19 blue whales sighted.
- The first blue whale was sighted 25 February and final blue whale sighted 7 April.
- Blue whales and krill surface swarms were distributed throughout the area surveyed.

Throughout the drilling campaign marine fauna observers (MFOs) were employed (January 2021 to April 2022). to ensure activities complied with Beach's Whale Management Standard Operating Procedure (WMSOP) (Document No.: S4000AF726092). The data collected includes the numbers of blue whales observed at varying distances from the MODU, based on the WMSOP management zones, during different drilling activities, along with information on whether the whale was observed to be approaching the MODU or moving away from it. They also collect additional data whilst in transit, or at distances outside of the zones specified in the WMSOP. Observations are based on distances of:

- 0 – 500 m
- 501 – 1,500 m
- 1,501 – 2,000 m
- 2,001 – 3,000 m
- 3,000 m

The total number of blue whales sighted by the aerial surveys and by MFOs was 324 individuals (Figure 6-50), with a peak of 102 whales in March 2021 (note that the period February‐May 2021 includes aerial survey data). Over this period, whales were observed in most months apart from July, August, and October.

Figure 6-51 shows all whale sightings by MFOs between 2 February 2021 and 31 March 2022 across all well locations. Note that many observations were made whilst in transit.

The Lead MFO provided summary data collected under the WMSOP for the period between 2 February 2021 and 31 March 2022. This was reviewed and a brief analysis undertaken.

During this period, 127 blue whales were observed within 3 km of the MODU (Table 6-26). Thirty-two whales were first detected within 1,500 m of the MODU. Sixty-two were first detected at 1,501 to 3,000 m. Thirty-three were first observed to be further than 3 km from the MODU before moving towards it. The total number of blue whales observed to move towards the MODU (following first detection) was 70 (55%); 57 were observed to move away from the MODU (45%).

Of the 94 whales first detected within 3,000 m of the MODU, 32 were observed within 1,500 m and 62 observed between 1,501 and 3,000 m. The number of blue whales/km^2 observed was 2.7x higher in the 0-1,500 m zone (7.8 whales/km^2) than in the 1,501 to 3,000 m zone (2.9 whales/km^2) (Table 6-26).

It would be expected that the number of blue whales/km^2 would be the same in all zones if underwater noise was not displacing blue whales from the area. Alternatively, if whales are being displaced then it would be expected that the number of blue whales/km^2 would increase with increasing distance from the MODU. The apparent increased density of whales within 1,500 m of the MODU in Table 6-26 can be explained by the fact that it is harder to detect whales at greater distances (i.e., the probability of detection is inversely related to distance). To correct for this a detection function is needed. The data collection methods employed by the MFOs were not designed to enable detection functions to be generated so surrogate detection functions were applied.

Williams et al. (2016) collected 3,262 vessel-based observations from 2008 to 2015 of humpback whales in and near Glacier Bay National Park, Alaska, which is a site of a regionally important feeding aggregation of humpback whales. They analysed this data (85% truncated at 4,565 m) to generate detection functions to understand the probability of whale detection and how it varies with distance under different environmental and biological characteristics. Figure 6-52 shows the detection function for all data; Figure 6-53 shows the detection functions under different visibility conditions; Figure 6-54 shows the detection functions for different group sizes. Shaded areas show 95% confidence intervals. Arrows identify detection probability at 1,000 m reference distance.

Detection probability of surfacing whales decreased markedly with increasing distance from the ship. They found visibility and group size to be the most important variables influencing detection. The worst visibility conditions reduced detection probability to near 0 at 1000 m. Compared to detecting a single whale, a group of 2 or 3 whales almost doubled detection probability at 1000 m. Surface active behaviour increased detection compared to spouting while showing no flukes. In south-eastern Alaska, single whales that spouted during excellent visibility conditions were most commonly encountered and had a detection probability of 0.569 at 1000 m (Williams et al. 2016).

The Lead MFO for the Otway drilling program advised that they were only able to detect whales further than 3 km on 25% of occasions. The detection function from Williams et al. (2016) which best matches the MFOs advice was the curve showing '4+ group size' in Figure 6-54. Detection probabilities for this case, along with those for 'excellent visibility' conditions (Figure 6-53) and 'all' data (Figure 6-52) were extracted to provide probabilities in 500 m increments (Table 6-27). To allow these probabilities to be applied to the management zones shown in Table 6-26, the average probability for each management zone was calculated and expected numbers and densities calculated for the three scenarios (Table 6-28).

The total expected number of blue whales is 158.6 for the '4+ group size' scenario, 437.9 for the 'excellent visibility' scenario and 530.7 for the 'all data' scenario. The total observed blue whales was 127.

The expected densities for each management zone for the three scenarios are shown in Figure 6-55. The data shows that for the '4+ group size' there is no significant difference in expected blue whale densities between any of the four management zones, with highest expected densities in the 0–500 m zone. The 'excellent visibility' and 'all data' scenarios show significant expected differences between the 0 to 1,500 m and 1,501 to 3, 000 m management zones, however no significant differences between the 0–500 and 50 –1,500 m zones.

All the scenarios presented show similar expected densities for the 0 to 1,500 m zone. All three scenarios show that there is no increase in expected densities between the 0–500 and 501–1,500 m zones which implies that blue whales are not being displaced within 1,500 m. The '4+ group size' scenario (which most closely matches the Lead MFOs advice) implies that there is no displacement of blue whales within 3,000 m.

The '4+ group size' scenario has a mean expected density of 6.21 blue whales/km^2 across all zones, which (if correct) should apply to the wider area beyond observations. If whales are being displaced beyond 1,500 m as implied by the 'excellent visibility' and 'all data' scenarios, then the minimum mean expected densities for the wider area should be calculated using the observations between 1,501 and 3,000 m. These expected minimum mean densities are 18.70 blue whales/km^2 and 22.91 blue whales/km^2 for the 'excellent visibility' and 'all data' scenarios, respectively.

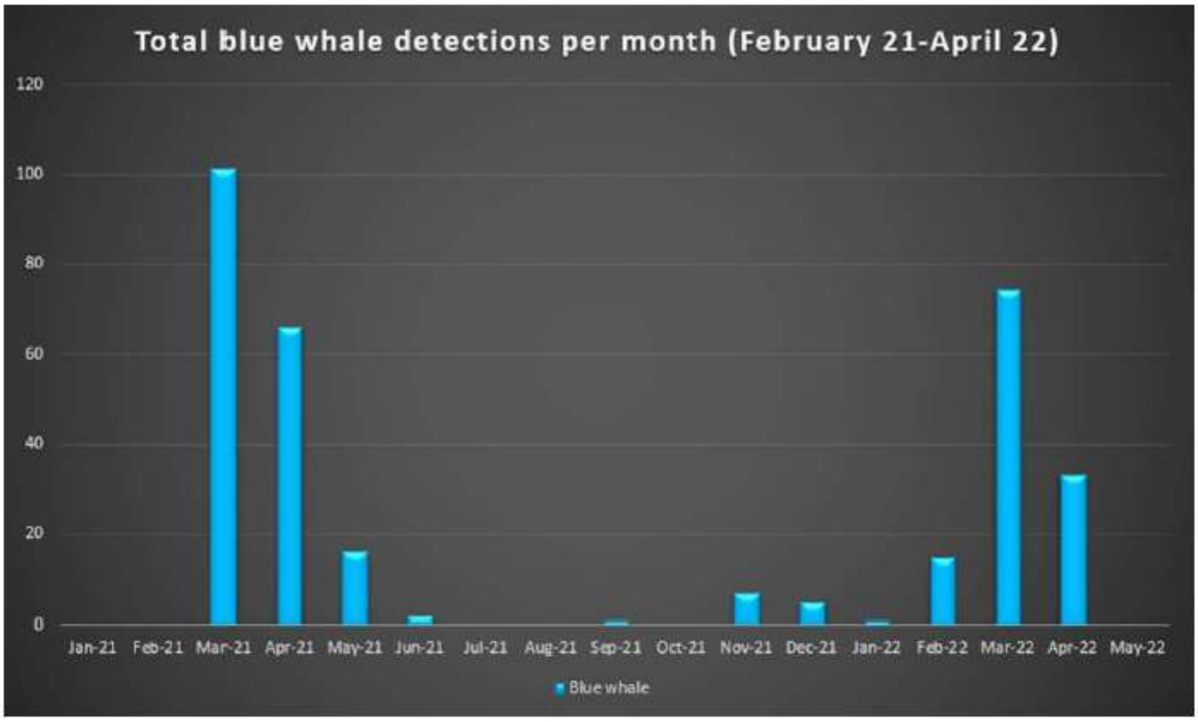


Figure 6-50: Blue Whale Sightings for the Otway Drilling Campaign

Table 6-26: Blue Whale Observations within 3,000 m of the MODU (2 February 2021 and 31 March 2022)

MODU activity	First detection – distance (m) from MODU					Total	Moving towards MODU	Moving away from MODU
	0-500	501-1,500	1,501-2,000	2,001-3,000	>3,000			
Drilling	-	7	3	8	7	**25**	13	12
Resupply	2	3	6	5	9	**25**	16	9
Drilling and Resupply	-	3	3	4	4	**14**	10	4
In Transit	-		1	5	2	**8**	4	4
At Standby	4	13	13	14	11	**55**	27	28
TOTAL	**6**	**26**	**26**	**36**	**33**	**127**	**70**	**57**
Observation area (km^2)	0.76	6.31	5.50	15.70				
Observed whales/km^2	7.1	4.1	4.7	2.3				
	0-1,500		**1,501-3,000**					
TOTAL	32		62					
Area (km^2)	7.07		21.21					
Blue whales/km^2	7.8		2.9					

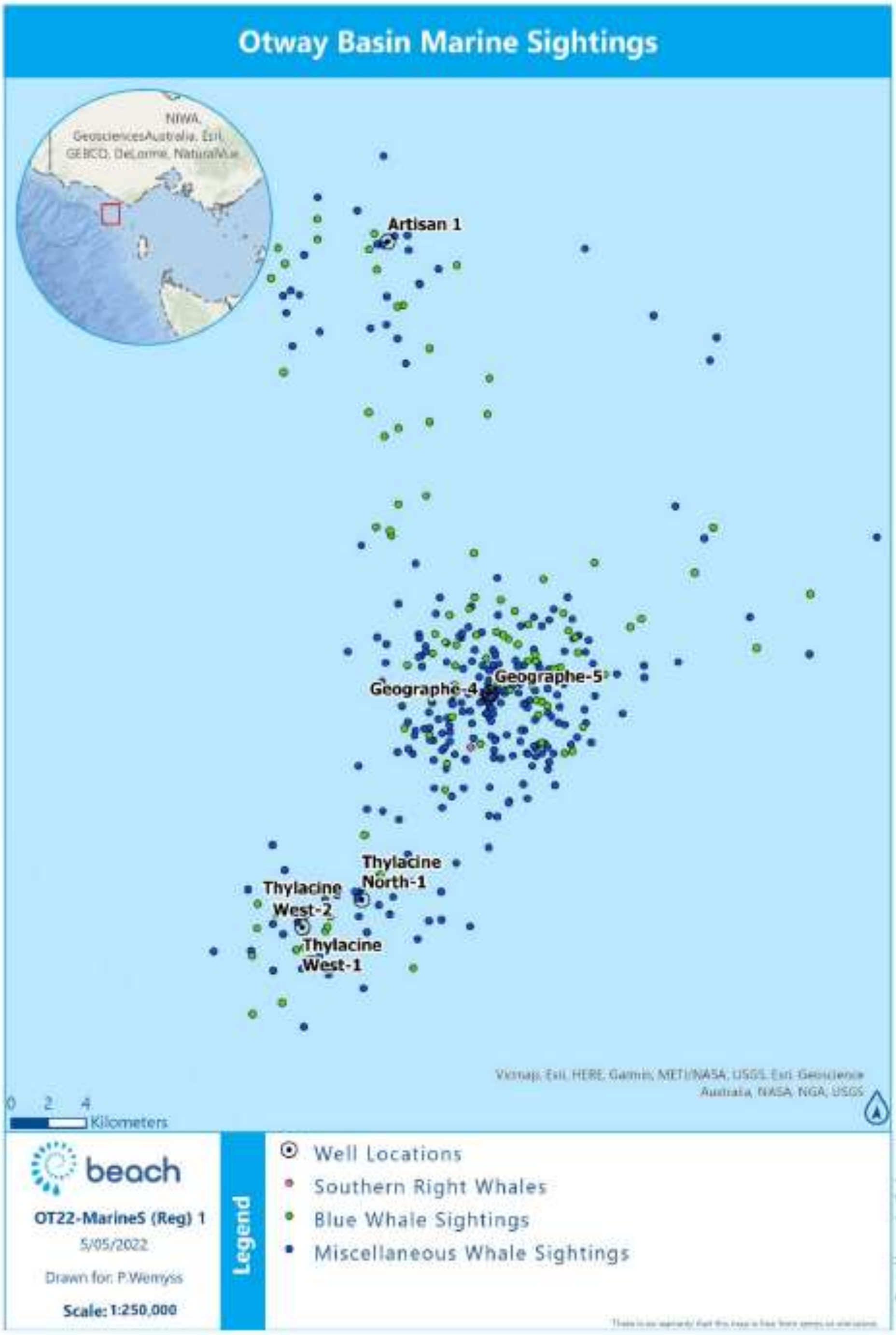


Figure 6-51: Whale Sightings between 2 February 21 – 31 March 2022

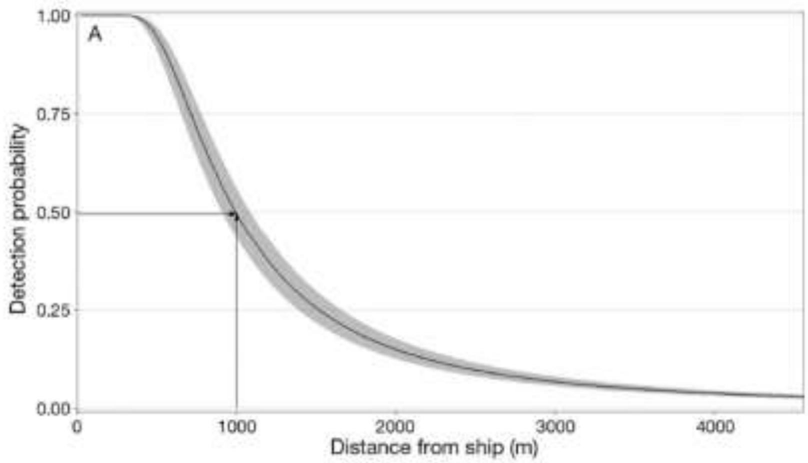


Figure 6-52: Detection Probability as it Varies with Distance between Ships and Whales in and near Glacier Bay National Park from 2008 to 2015 (Williams et al. 2016)

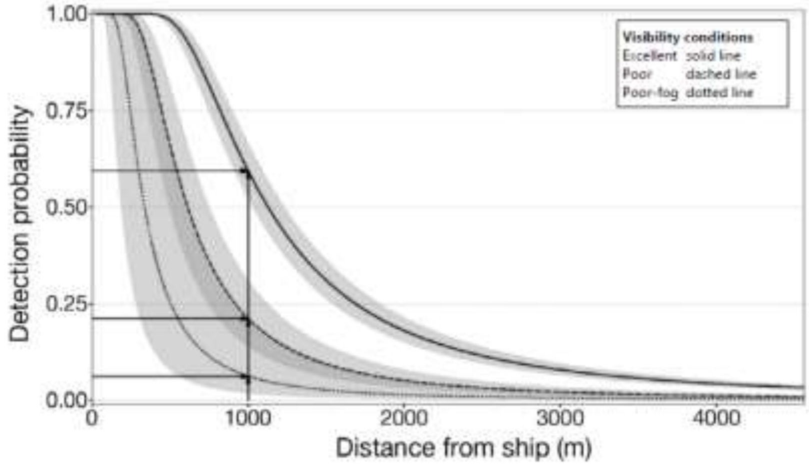


Figure 6-53: Detection Probability of Humpback Whales under Different Visibility Conditions (Williams et al. 2016)

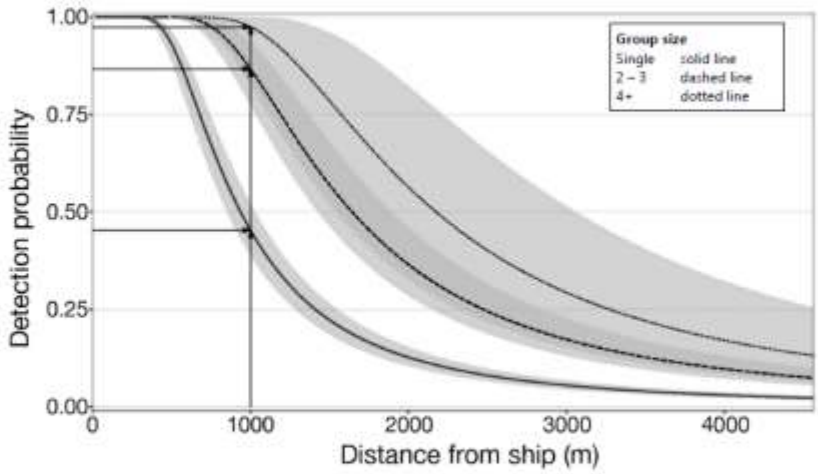


Figure 6-54: Probability of Detecting Whale Groups of Different Sizes of Humpback Whales (Williams et al. 2016)

Table 6-27: Detection Probabilities derived from Williams et al. (2016)

	Derived detection probabilities		
Distance	4+ group size	Excellent visibility	All data
0	1	1	1
500	1	0.98	0.94
1,000	0.97	0.59	0.5
1,500	0.78	0.31	0.25
2,000	0.57	0.18	0.15
2,500	0.4	0.12	0.09
3,000	0.29	0.08	0.07

Table 6-28: Estimated Blue Whale Abundance and Density based on MFO data from 2 Feb. 2021 and 31 Mar. 2022. Note that the reference to Table 5-22 is Table 6-26 in this EP.

	First detection – distance (m) from MODU			
	0-500	501-1,500	1,501-2,000	2,001-3,000
Area (km^2) (a)	0.76	6.31	5.50	15.70
From Table 5-22				
Observed numbers (b)	6	26	26	36
Blue whales/km^2	7.1	4.1	4.7	2.3
Mean detection probability (c)				
4+ group size	1.00	0.92	0.68	0.42
Excellent visibility	0.99	0.63	0.25	0.13
All data	0.97	0.56	0.20	0.10
Expected numbers (b ÷ c)				
4+ group size	6.0	28.4	38.5	85.7
Excellent visibility	6.1	41.5	106.1	284.2
All data	6.2	46.2	130.0	348.4
Expected density (whales/km^2) (b ÷ c ÷ a)				
4+ group size	7.89	4.50	7.00	5.46
Excellent visibility	7.97	6.58	19.29	18.10
All data	8.14	7.31	23.64	22.19

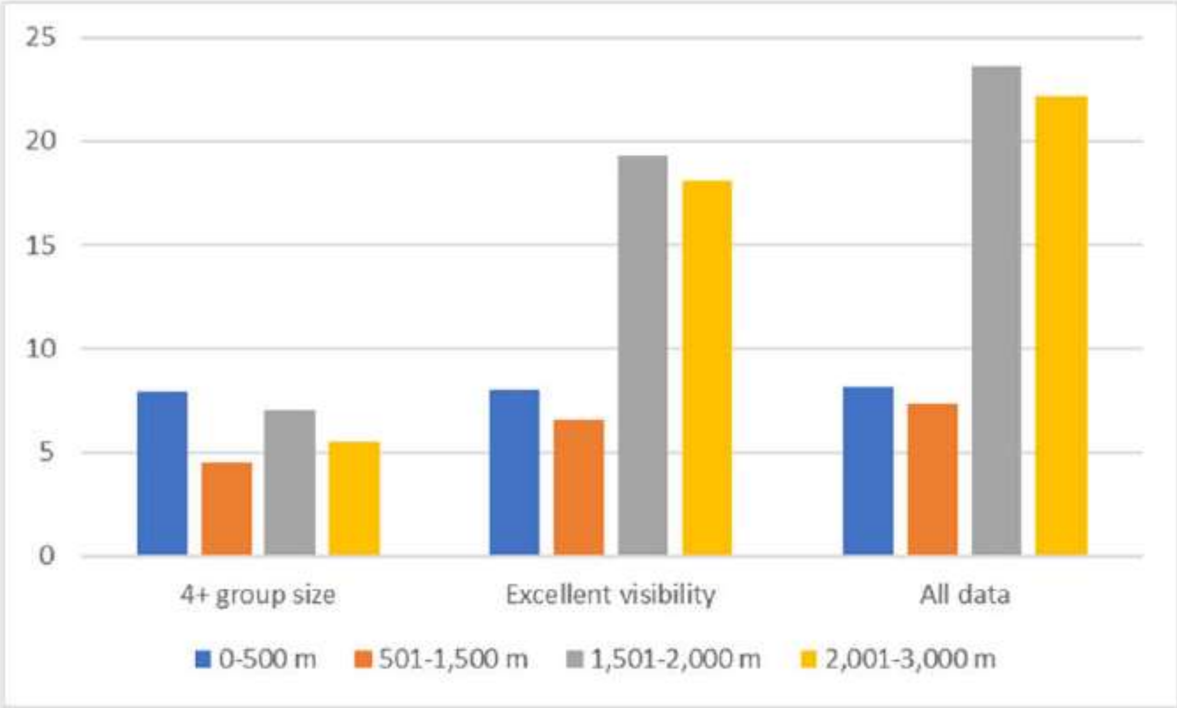


Figure 6-55: Expected Density (blue whales/km^2) for each Management Zone

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 coast upwelling, Victoria, along the continental shelf in summer and autumn months (Gill 2002). Fin whales in the Bonney coast 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 coast 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 Operational or Planning Areas, they are likely to be uncommon visitors.

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 south-east coast of Australia, the northern migration starts in April and May while the southern migration peaks around November and December (DAWE 2022a). 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 (DAWE 2022a). Feeding occurs where there is a high krill density, and during the migration this primarily occurs in Southern Ocean waters south of 55°S (DAWE 2022a).

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.

The nearest BIA to the Project which is important foraging habitat for migrating humpback whales is at Twofold Bay, a resting area off the NSW coast (DAWE 2021a). This BIA overlaps the northern extent of the Bass Planning Area (Figure 6-56). There are no known feeding, resting or calving grounds for humpback whales in the Operational Areas or Otway Planning Area, although feeding may occur opportunistically where sufficient krill density is present (CoA 2015a).

During Origin's Enterprise 3D seismic survey undertaken during early November 2014, 16 humpback whales were sighted (RPS 2014). During Beach's Otway Drilling Campaign in 2021/2022, which includes the Otway Operational Area, 95 humpback whale detections were made, with the highest numbers being during June, September, October and November.

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.

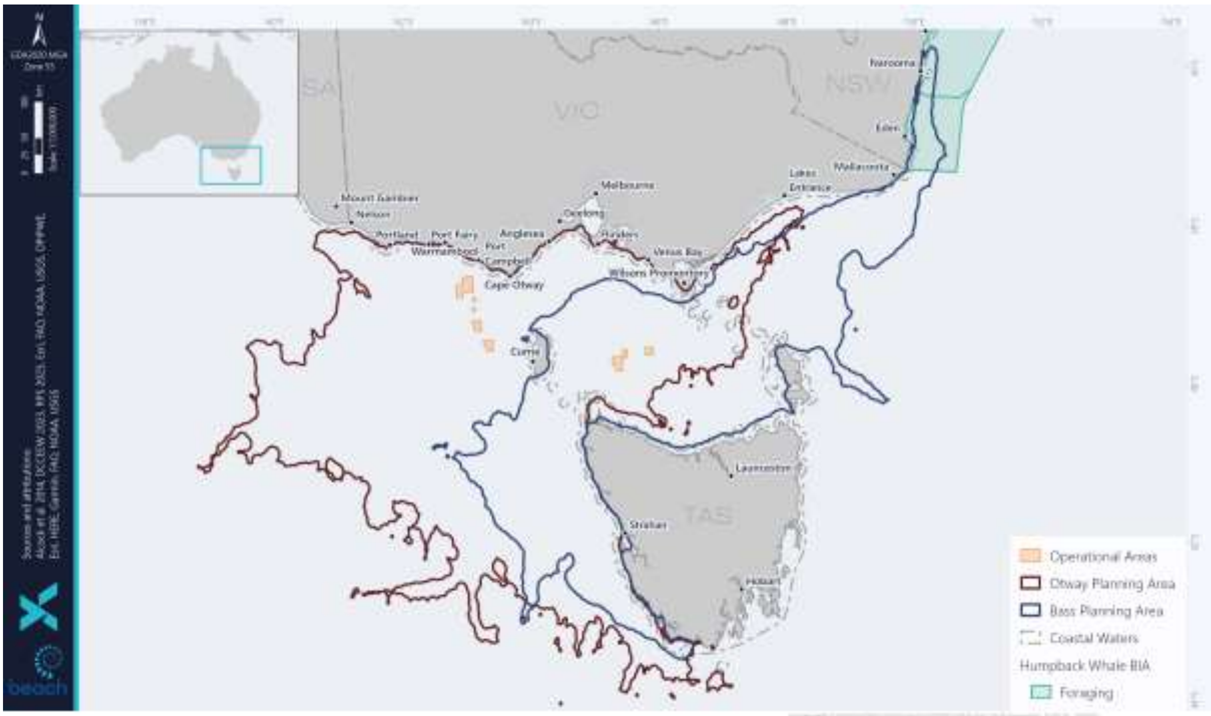


Figure 6-56: Humpback Whale BIAs within the Planning Areas

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 (DoE 2024c).

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 Operational or Planning Areas. One pod of killer whales were detected during Beach's Otway Drilling Campaign in 2021/2022, which includes the Otway Operational Area location. Therefore, it is likely that they would be uncommon visitors in the Operational or Planning Areas.

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 longfinned pilot whales in Australian waters, although some fish are also taken (DoE 2023h). No key localities have been identified in Australia (Bannister et al. 1996) however they are considered reasonably abundant (DoE 2023h).

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 2023h). 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 (DoE 2023h).

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 Operational or Planning Areas. During works undertaken by Origin Energy, long-finned pilot whales have been seen sporadically, such as, a sighting of approximately 30 whales occurred during the 2014 Enterprise MSS. No longfinned pilot whales were detected during Beach's Otway Drilling Campaign in 2021/2022, which included the Otway Operational Area. It is likely that they would be uncommon visitors to the Operational or Planning Areas.

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 coast upwelling. The minke whale has been observed within the region, however, there are no BIAs in the Operational or Planning Areas. During Beach's Otway Drilling Campaign in 2021/2022, which included the Otway Operational Area, three minke whale detections were made during May. Therefore, it is likely that they would be uncommon visitors in the Operational or Planning Areas.

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 Operational or Planning Areas. No pygmy right whales were detected during Beach's Otway Drilling Campaign in 2021/2022, which includes the Otway Operational Area. Therefore, it is likely to be an uncommon visitor in the Operational and Planning Areas.

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 coast 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. No sei whales were detected during Beach's Otway Drilling Campaign in 2021/2022, which includes the Otway Operational Area. Thus, the sei whale is likely to be an uncommon visitor to the Operational and Planning Areas.

Southern Right Whale

The southern right whale (*Eubalaena australis*) is listed as endangered under the EPBC Act in Australia and as endangered on the Victorian Threatened Species Advisory List.

The Draft National Recovery Plan for the Southern Right Whale (DCCEEW 2022a) provides an update to BIAs and emerging aggregation areas. The proposed changes are:

- Reproductive areas - Areas where mating, calving, nursing and/or presence of neonates are known, or likely, to occur. For Victoria this is the nearshore area between Portland and Port Campbell (Figure 6-57).
- Migration areas - Areas southern right whales are known, or likely, to use for movement between regions that support biologically important behaviour (e.g., coastal movement between reproductive areas) (Figure 6-57).

In addition, no 'Critical Habitat' as defined under section 207A of the EPBC Act have been identified, or included, in the Register of Critical Habitat.

The Operational Areas overlap the southern right whale migration BIA, and the Planning Areas overlap the southern right whale reproduction and migration BIAs (Figure 6-57).

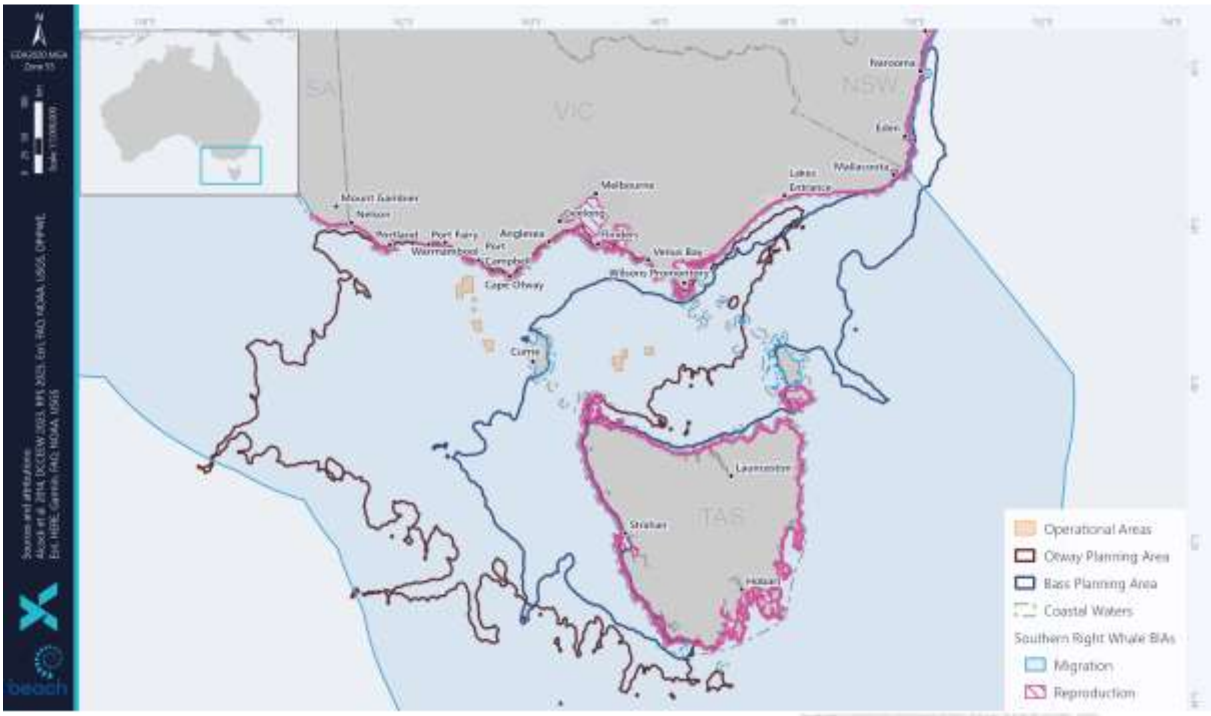


Figure 6-57: Southern Right Whale BIAs within the Planning Area

Population

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 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.

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).

Distribution

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; DCCEEW 2022a). 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).

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). A study conducted by Stamation et al. (2020) shows that despite an increase in breeding females sighted in south-eastern Australian between 1985 and 2017, there is no evidence of an increase in annual numbers of mother-calf pairs.

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). The Victorian and Tasmania coastal waters are known to include migrating habitat and SRW are known to arrive at the south eastern Australian coastline and travel west to established aggregation areas in South Australia such as the Head of the Great Australian Bight (Watson et al. 2021). There is one established calving ground for female and calf pairs in south-eastern Australian at Logans Beach, Warrnambool, Victoria (Watson et al. 2021). 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).

Marine mammal observer data from January 2021 to April 2022 for the drilling program in the Otway Development Area identified three southern right whales (Table 6-25) consisting of a single individual in each month of June, July and August.

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.

Cultural significance
The Draft National Recovery Plan for the Southern Right Whale (DCCEEW 2022a) provides information on the cultural significance of southern right whales to Indigenous Australians. The plan details:

- At the Great Australian Bight in South Australia, the Mirning people are whale people, and the white whale Jeedara is their totem and part of the Dreaming, which tells how the Mirning and Southern Right Whales are connected (Burgoyne 2000).

- In Victoria, *Koontapool* (southern right whales) occur along the coastlines of south-west Victoria in Gunditjmara Sea Country to feed and birth. These *Koontapool Woorrkngan Yakeen* (Whale Birthing Dreaming Sites), are in coastal bay areas from Port Campbell to Portland, including Warrnambool. These places on Gunditjmara Country are known resting and feeding sites for mothers and calves and are directly related to Gunditjmara Neeyn (midwives), explaining why Gunditjmara is a Matrilineal Nation.

Further information on the cultural significance of whales is provided in 6.6.3.4.

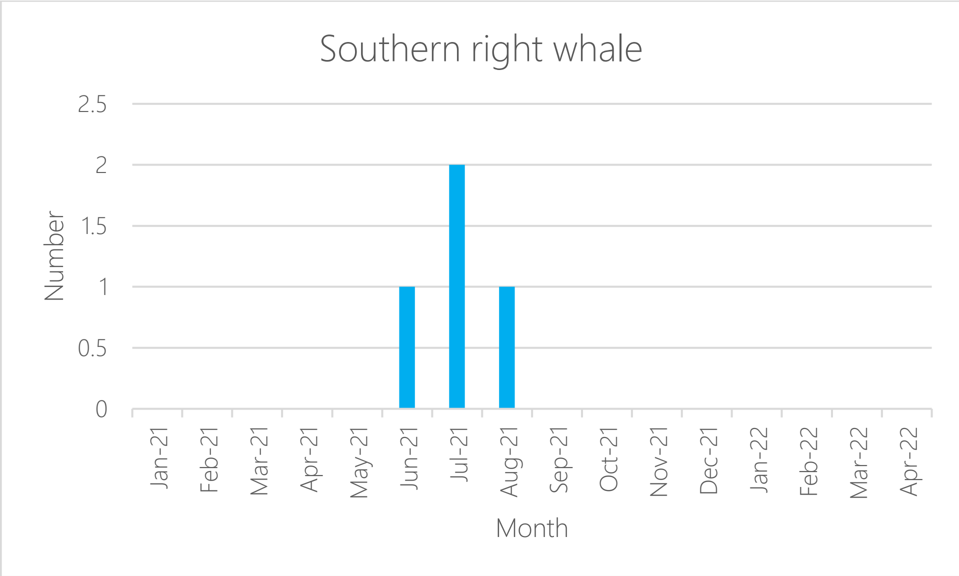


Figure 6-58: Southern Right Whale Sightings for the Otway Drilling Campaign

Sperm Whale

The sperm whale (*Physeter macrocephalus*) has a worldwide distribution and has been recorded in all Australian states. 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 (DoE 2024e). 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) (DoE 2024e). 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 (DoE 2024e).

Females and young males are restricted to warmer waters (i.e., north of 45°S) 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 (DoE 2024e).

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 Operational or Planning Areas.

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 (DoE 2024hj). 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 (DoE 2024h).

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.

During Beach's Otway Drilling Campaign in 2021/2022, which included the Otway Operational Area, 40 bottlenose dolphin detections were made, spread across the year. However, no BIAs for this species have been identified in the Operational or Planning Areas.

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 (DoE 2024i).

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 (DoE 2024i). They are abundant in the Bonney coast upwelling during the upwelling season, and very scarce outside the season.

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 (DoE 2024gi). 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 (DoE 2024g).

No dusky dolphins were detected during Beach's Otway Drilling Campaign in 2021/2022, which included the Otway Operational Area.

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). A breeding BIA for the Indian Ocean bottlenose dolphin overlaps the northern extent of the Bass Planning Area in the coastal waters of NSW (Figure 6-59). No Indian Ocean bottlenose dolphins were detected during Beach's Otway Drilling Campaign in 2021/2022, which included the Otway Operational Area.

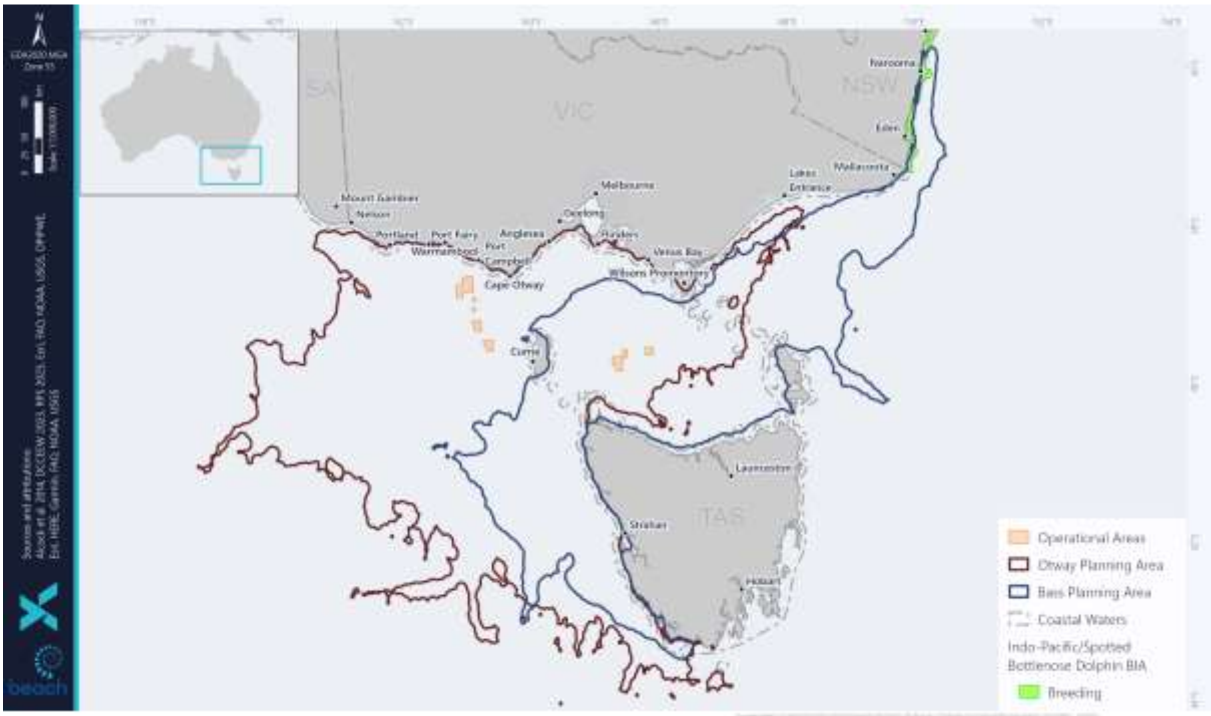


Figure 6-59: Indian Ocean Bottlenose Dolphin BIAs within the Planning Areas

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.

Risso's dolphin has been observed in the region, however no BIAs have been identified in the Operational or Planning Areas. No Risso's dolphins were detected during Beach's Otway Drilling Campaign in 2021/2022, which included the Otway Operational Area. Therefore, it is likely they would be uncommon visitors in the Operational and Planning Areas.

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 (DoE 2024f). No key localities have been identified in Australian waters however preferred water temperatures range from approximately 2-20°C (DoE 2024f). 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 (DoE 2024f). 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 (DoE 2024f).

The southern right whale dolphin has been observed in the region; however, no BIAs have been identified in the Operational or Planning Areas. No southern right whale dolphins were detected during Beach's Otway Drilling Campaign in 2021/2022, which included the Otway Operational Area. Therefore, it is likely they would be uncommon visitors in the Operational and Planning Areas.

6.4.7.7 Pinnipeds

The PMST reports identified four pinniped species that are known to or may occur within the Operational or Planning Areas including breeding known to occur for the Australian fur-seal (Table 6-29) (Appendix E). The Operational and Planning Areas do not overlap any BIAs for pinnipeds.

Table 6-29: Listed Pinniped Species identified in the PMST Reports

Common Name	Scientific Name	EPBC Status			Operational Area		Planning Area	
		Listed Threatened	Listed Migratory	Listed Marine	Bass	Otway	Bass	Otway
Australian Fur-seal, Australo-African Fur-seal	*Arctocephalus pusillus*	-	-	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Breeding known to occur within area	Breeding known to occur within area
Australian Sea-lion, Australian Sea Lion	*Neophoca cinerea*	Endangered	-	Listed	-	-	-	Species or species habitat may occur within area
		Conservation Listing Advice for the *Neophoca cinerea* (Australian sea lion) (TSSC 2020). Recovery Plan for the *Neophoca cinerea* (Australian sea lion) (DSEWPaC 2013b).						
Long-nosed Fur-seal, New Zealand Fur-seal	*Arctocephalus forsteri*	-	-	Listed	Species or species habitat may occur within area	Species or species habitat may occur within area	Breeding known to occur within area	Breeding known to occur within area
Southern Elephant Seal	*Mirounga leonina*	Vulnerable	-	Listed	-	-	Breeding may occur within area	Breeding may occur within area

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 State waters they breed on offshore islands, including Lady Julia Percy Island, Seal Rocks in Western Port Bay, Kanowna and Rag Islands off the coast of Wilson's Promontory and The Skerries off Wingan Inlet in Gippsland (Figure 6-60). 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 Planning Areas it is likely that Australian fur-seals would be present in the Planning Areas. During Beach's Otway Drilling Campaign in 2021/2022, which included the Otway Operational Area, 394 Australian fur-seal detections were made, spread across the year.

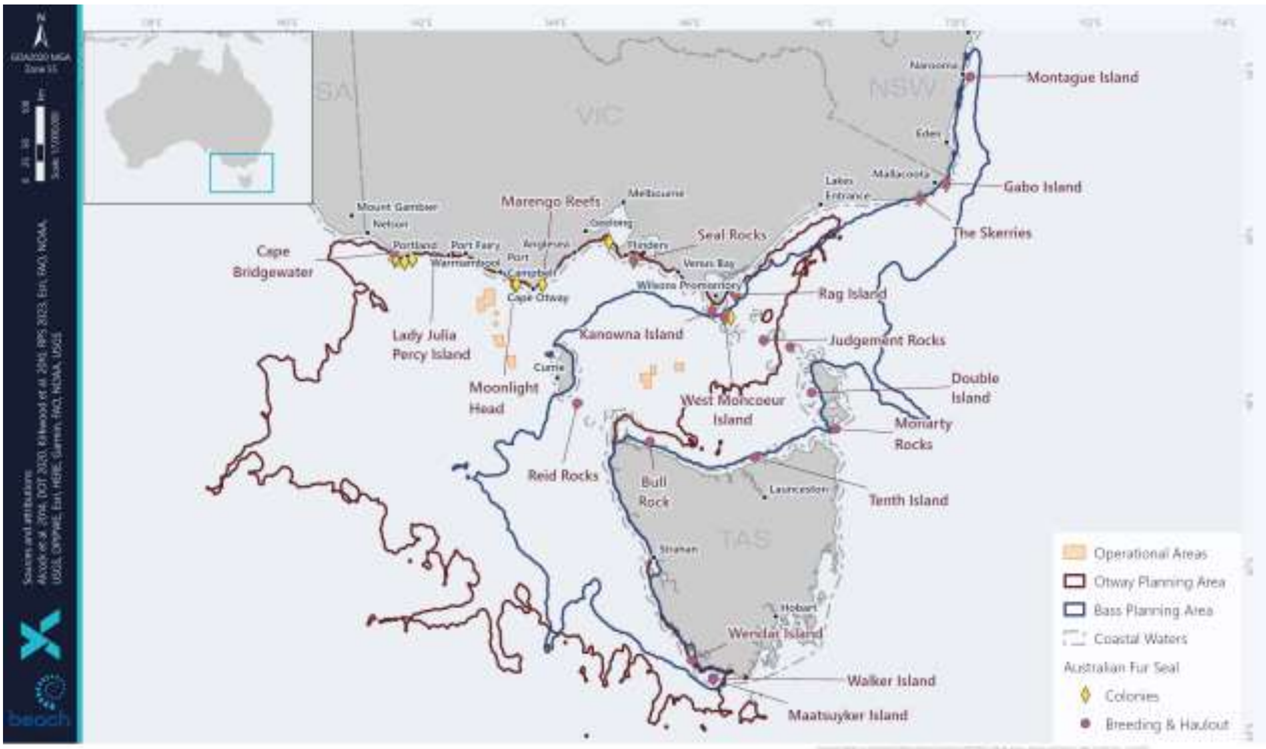


Figure 6-60: Locations of Australian Fur-seal Breeding Colonies and Haul Out Sites (Kirkwood et al. 2010)

Australian Sea Lion

The Australian sea lion is the only endemic, and least abundant, pinniped that breeds in Australia (DSEWPC 2013b). All current breeding populations are outside of the Planning Area 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 Australian sea lion is a specialised benthic forager, i.e. it feeds primarily on the sea floor (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 2013b). They typically feed on a range of prey including fish, cephalopods (squid, cuttlefish and octopus), sharks, rays, rock lobster and penguins (DSEWPC 2013b) 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 and, Kanowna Island (near Wilsons Promontory) and The Skerries in eastern Victoria.

Figure 6-61 displays 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 Planning Areas include Kanowna Island, Kent Group, Lady Julia Percy Island, Maatsuyker Island, Seal Rocks and The Skerries (Figure 6-61).

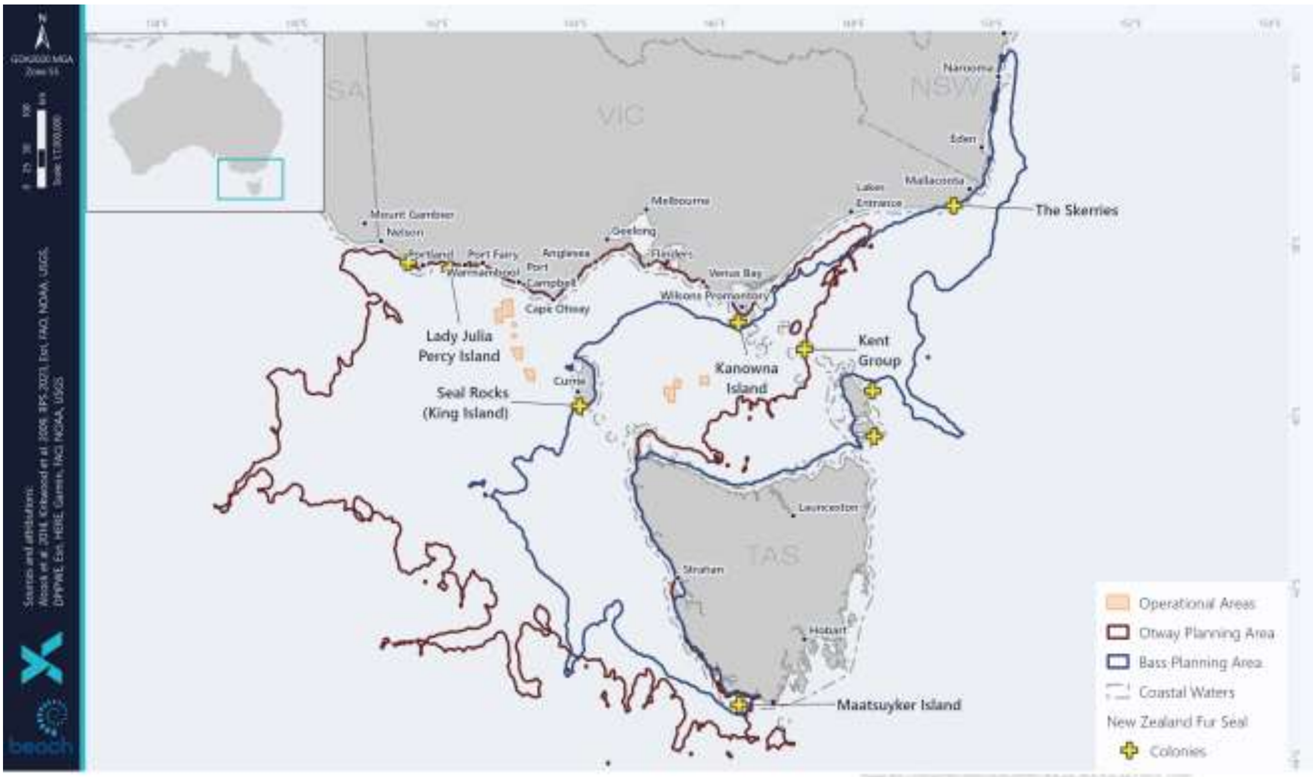


Figure 6-61: Locations of New Zealand Fur-seal Colonies (Kirkwood et al. 2009).

6.4.7.8 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 and 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 2002a). Several introduced species have become pests either by displacing native species, dominating habitats, or causing algal blooms.

Invasive marine species known to occur were identified from 'www.marinepests.gov.au' (DAFF 2024) in ports where the rig and support vessels may mobilise from are detailed in Table 6-30.

Table 6-30: Marine Pests Known to Occur in Ports relevant to the Drilling Program

Marine Pest	Description	Portland	Melbourne
Asian date mussel (*Musculista senhousia*)	Prefers soft sediments in waters up to 20 m deep, forming mats and altering food availability for marine fauna.	✓	✓
Asian shore crab (*Hemigrapsus sanguineus*)	Established in Victoria. Asian shore crabs were detected in Port Phillip Bay in 2020. Generally found hard substrates in intertidal areas, under rocks, shells, debris, or artificial structures. Likely habitats include burrowed up to 30cm deep, hard, and soft surfaces, shallow waters, up to 30m deep.		✓
European fan worms (*Sabella spallanzanii*)	Can form dense colonies and consume vast amounts of food to the detriment of native species. It fouls infrastructure and can increase operating costs for industry. Likely habitats include burrowed up to 30cm deep, hard, and soft surfaces, shallow waters, up to 30m deep.	✓	✓
European shore crab (*Carcinus maenas*)	Prefers intertidal areas, bays, estuaries, mudflats, and subtidal seagrass beds, but occurs in waters up to 60 m deep. It is widespread across Victorian intertidal reef and common in Western Port.		✓
Japanese kelp (*Undaria pinnatifida*)	Occupies cold temperate oceanic waters up to 20 m deep, growing on rock, reef, stones, and artificial structures. It rapidly forms dense forests and overgrows native species. It first established in Port Phillip Bay in the 1980s (Parks Victoria, 2020).		✓
Northern pacific seastar (*Asterias amurensis*)	Prefer soft sediment habitat, but also use artificial structures and rocky reefs, living in water depths usually less than 25 m (but up to 200 m water depths). It is thought to have been introduced through ballast water from Japan.		✓

6.5 Socio-Economic Environment

This section describes the socio-economic environment within the Operational and Planning Areas.

6.5.1 Coastal Settlements

There are no coastal settlements or Local Government Areas (LGAs) within the Operational Areas. LGAs overlapping the Planning Areas are presented below in Table 6-31 and Figure 6-62. Larger settlements within the Planning Areas are described below based on ABS (2021) census data, separated by state.

Table 6-31: LGAs within the Planning Areas

Local Government Area	State	Planning Area	
		Bass	Otway
Bass Coast	Vic	-	✓
Bega Valley	NSW	✓	-
Circular Head	Tas	✓	✓
Colac Otway	Vic	-	✓
Corangamite	Vic	-	✓
East Gippsland	Vic	✓	-
Eurobodalla	NSW	✓	-
Flinders	Tas	✓	✓
Glenelg	Vic	-	✓
Greater Geelong	Vic	-	✓
Huon Valley	Tas	✓	✓
King Island	Tas	✓	✓
Mornington Peninsula	Vic	-	✓
Moyne	Vic	-	✓
Queenscliffe	Vic	-	✓
South Gippsland	Vic	-	✓
Surf Coast	Vic	-	✓
Unincorporated Vic	Vic	✓	✓
Warrnambool	Vic	-	✓
Wellington	Vic	-	✓

West Coast	Tas	✓	✓

The larger New South Wales coastal settlements within the Planning Areas are described below based on ABS (2021) census data:

- Narooma has a population of 2,731 and a median age of 58. Of those in the labour force, 41.5% work full-time and 44.6% work part-time. Technicians/trades workers, community/personal service workers and managers comprise 45.7% of occupations.
- Tathra has a population of 1,527 and a median age of 56. Of those in the labour force, 53.1% work full-time and 37.6% work part-time. Professionals, managers and technicians/trades workers comprise 57.5% of occupations.

The larger Tasmanian coastal settlements within the Planning Areas are described below based on ABS (2021) census data:

- Currie (King Island) has a population of 659 and a median age of 49. Of those in the labour force, 63.0% work full-time and 33.3% work part-time. Dairy and beef cattle farming comprise 34.6% of occupations.
- Stanley has a population of 595 and a median age of 51. Of those in the labour force, 53.1% work full-time and 33.8% work part-time. Managers, labourers, professionals, and technicians/trades workers comprise 64.3% of occupations.
- Strahan has a population of 697 and a median age of 40. Of those in the labour force, 48.7% work full-time and 38% work part-time. Labourers, managers, technicians/trades workers and community/personal service workers comprise 63.1% of occupations. Accommodation is the largest industry of employment, employing 17.1% of the workforce.

The larger Victorian coastal settlements within the Planning Areas are described below based on ABS (2021) census data:

- Apollo Bay has a population of 1,790 people and a median age of 52. Of those in the labour force, 40.05% work full-time and 44.2% work part-time. Labourers and mangers are the highest occupation making up 33.9% of the workforce. Accommodation and supermarket and grocery stores are the biggest industries, making up 21.1% of employment.
- Phillip Island has a population of 13,799 and a median age of 52. Of those in the labour force, 45.1% work full-time and 40.4% work part-time. Professionals, managers, technicians and trades make up 50.3% of occupations with the accommodation, retail, restaurants, hospitals and education the main employers.
- Warrnambool has a population of 35,406 and a median age of 42. Of those in the labour force, 53.3% work full-time and 36.6% work part-time. Hospitals employ 6.6% of the workforce followed by cheese and other dairy product manufacturing, aged care residential services, other social assistance services and supermarket and grocery stores. Professionals, technicians and trade workers and labourers comprise 47.7% of occupations.

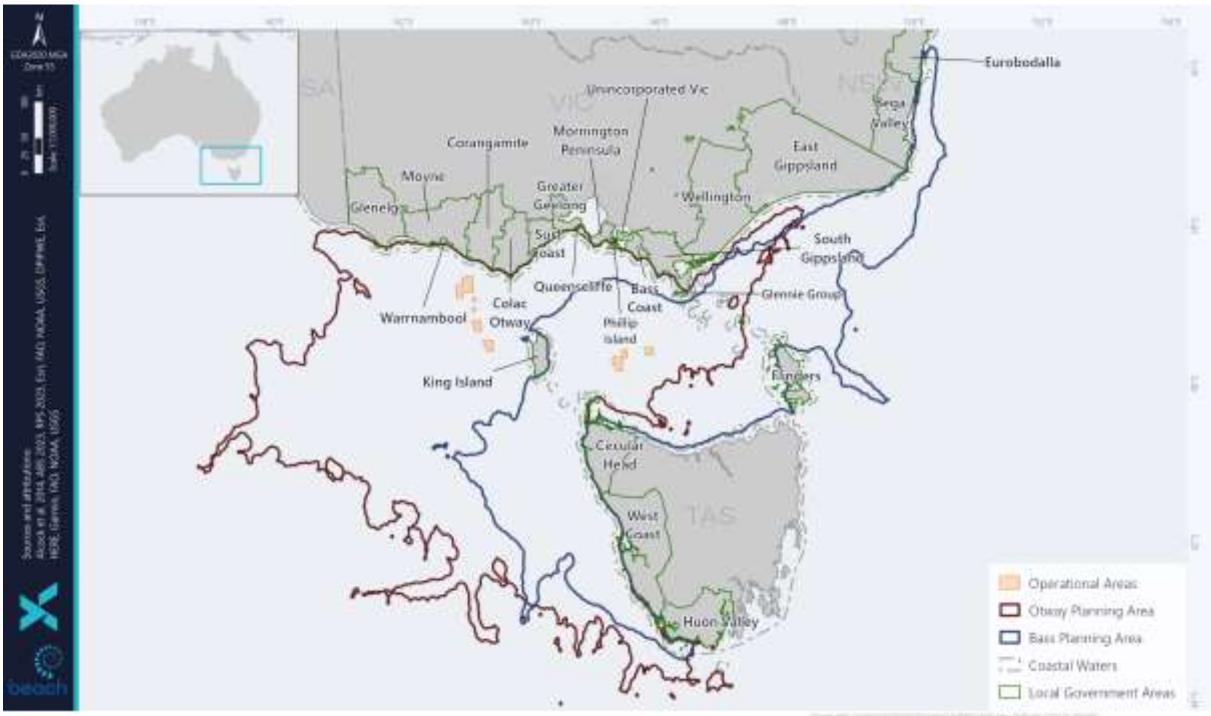


Figure 6-62: Local Government Areas within the Planning Areas

6.5.2 Offshore Petroleum Industry

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. Otway Operational Area overlaps the ConocoPhillips Australia exploration titles (VIC/P79 and T/49P) and is adjacent to the Cooper Energy Casino and Henry gas fields, Casino-Henry pipeline and Minerva gas field and pipeline. There is no non-Beach oil and gas infrastructure within the Bass Operational Area.

The Cooper Energy Casino and Henry gas fields and Casino-Henry pipeline, Minerva gas field and pipeline, Tasmanian Gas pipeline and ConocoPhillips Australia exploration titles are within the Otway Planning Area. The most north-eastern extent of the Otway Planning Area also overlaps Esso Australia infrastructure within the Gippsland Basin including Barracouta, Dolphin, Perch, Snapper and Whiting.

The Bass Planning Area overlaps the Tasmanian Gas pipeline and Pelican gas field in the Bass Strait. Within the Gippsland Basin, the Bass Planning Area overlaps the Liberty Petroleum exploration titles (VIC/P77 and VIC/P78) as well as existing Esso Australia infrastructure including Bream, Cobia, Flounder, Fortescue, Halibut, Kingfish, Mackerel, Marlin, Tuna, West Kingfish and West Tuna.

6.5.3 Other Infrastructure

The Victorian Desalination Plant, located at Wonthaggi, is located 134 km north of the Bass Operational Area and adjacent to the Otway Planning Area. Operation of the plant commenced in December 2012. The seawater intake and outlet structures are connected to the onshore plant via a 1.2 km and 1.5 km underground tunnel, respectively. The two intake structures are 8 m high, 13 m in diameter, situated 50 m apart and located in a water depth of 20 m. They draw in water at very low speeds (the suction effect is not strong enough to draw fish in).

The Superloop Indigo Central telecommunications cable, which connects Perth and Sydney through southern Australia, intersects the Otway Operational Area. There are two Telstra telecommunications cables located in central Bass Strait, Bass Strait-1, and Bass Strait-2, which are located approximately 1 km and 6 km, respectively, from the Bass Operational Area. The Basslink submarine cable is located 88 km east of the Bass Operational Area within the Bass Planning Area. Figure 6-63 details the location of these cables.

Four new cables are planned to be installed in the next 5 years that are within the Planning Areas (Figure 6-63):

- East Coast Cable System between Melbourne, Sydney and Brisbane is being developed by Vocus.
- Hawaiki Nui – Hawaiki Submarine Cable between Melbourne and Sydney being developed by BW Digital.
- Marinus Link undersea electricity and data cable that will connect Tasmania and Victoria. Construction is likely to commence in early 2025.
- Sydney-Melbourne-Adelaide-Perth (SMAP) Cable being developed by SUBCO. Stakeholder (Stakeholder ID: 25165860) confirmed the proposed cable is outside of the Bass Operational Area.

No spatial data is available yet for the East Coast Cable System or Hawaiki Nui – Hawaiki Submarine Cable.

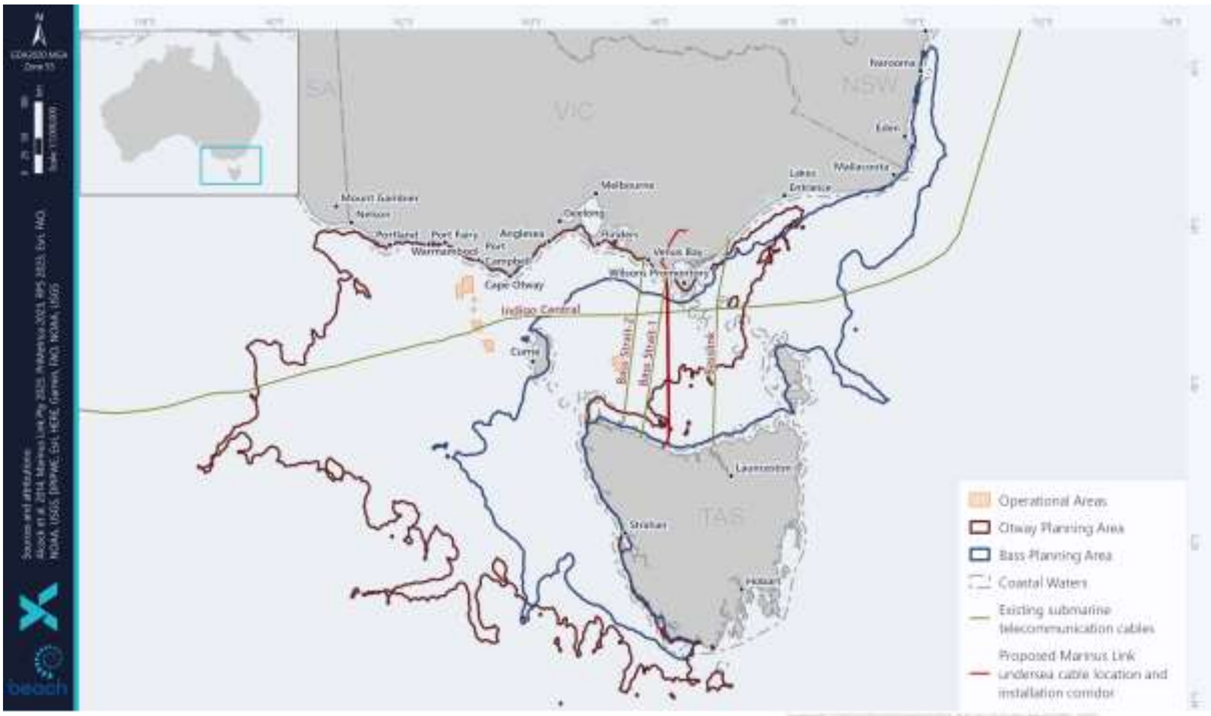


Figure 6-63: Submarine cables within the Operational and Planning Areas

6.5.4 Defence Activities

Consultation with Department of Defence (ID 1521) identified that the Operational Areas are located within restricted airspace, but no other defence areas were identified. The Department of Defence also advised that unexploded ordnance (UXO) may be present on and in the sea floor. UXO is a by-product of past training activities undertaken by the Australian Defence Force or foreign defence forces.

The interactive Department of Defence database (DoD 2023) indicates that the Otway Operational Area overlaps UXO Zone 1052 King Island (Figure 6-64), which is within the 'slight potential' category', meaning there is confirmed history of military activities that may have resulted in numerous residual hazardous munitions, components, or constituents, but where confirmed UXO affected areas cannot be defined (DoD 2022). The site was used during 1954 as an Air-to-Air Firing Range (DoD 2022).

The Otway Operational Area is 14 km east of UXO Zone SDG087 'Sea Dumping – King Island', which is identified as having been used for dumping at sea of ordnance and other items, namely ammunition including cartridges, projectiles, and fuses (DoD 2022). The Otway Operational Area is also located 38 km east of UXO Zone SDC006 'Sea Dumping – King Island', 38 km east of UXO Zone SDG136 'Sea Dumping - Victorian Coast' and 27 km east of UXO zone SDG110 'Sea Dumping – Bass Strait' (Figure 6-64). These zones are also in the sea dumping category which means the area has been identified as having been used for historical sea dumping of waste material that may include explosive ordnance (DoD 2022).

Beach undertook site surveys ahead of the previous Otway Drilling Campaign with no UXO identified. No UXO zones have been identified within the Bass Operational Area (Figure 6-64).

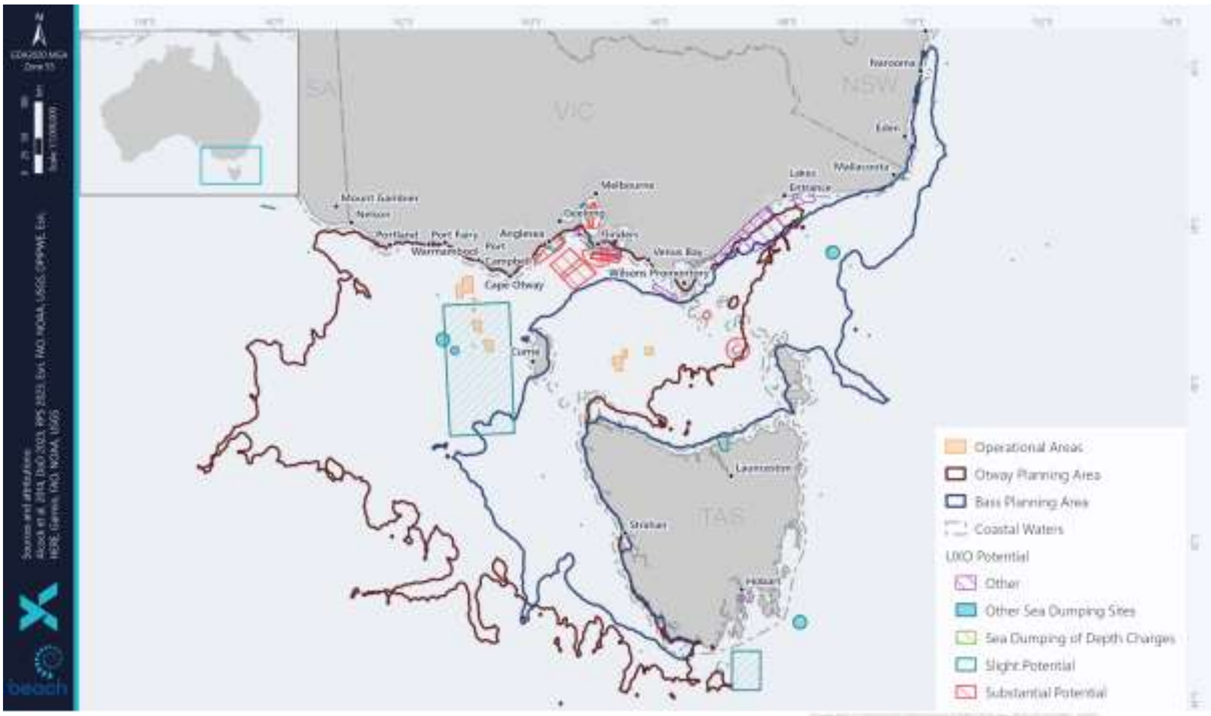


Figure 6-64: UXO within the Operational and Planning Areas

6.5.5 Shipping

The South-east Marine Region is one of the busiest shipping regions in Australia and Bass Strait is one of Australia's busiest shipping routes (Figure 6-65). 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.

Ports Australia (2022) provide statistics for port operations throughout Australia's main commercial ports. Based on the latest information (2021) the majority of commercial shipping traffic transiting to and from Victorian ports were container (3,682), general cargo (2,663, bulk liquid carriers (2,019), dry bulk (1,715), car carrier (1,342), bulk gas (220), other cargo (47) and livestock (9).

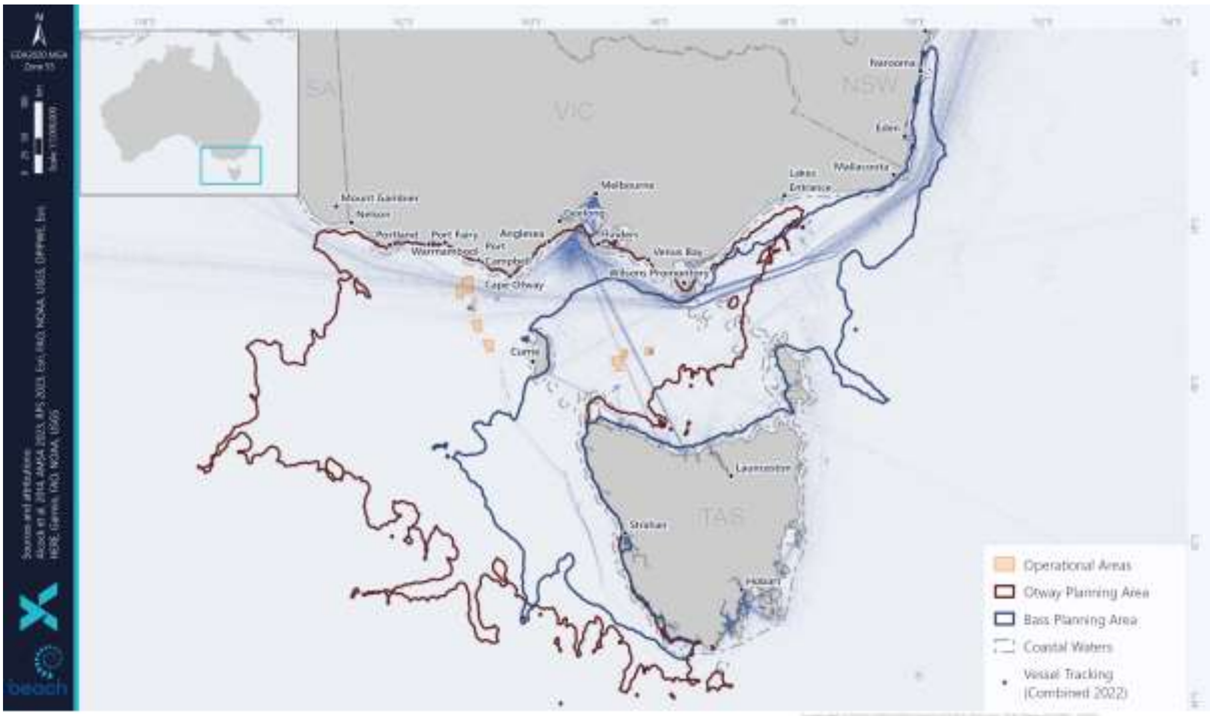


Figure 6-65: Vessel Traffic within the Operational and Planning Areas

6.5.6 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.

Tourism at King Island includes activities such as fishing, surfing, kiteboarding and whale watching. The Ocean Racing Club of Victoria (ORCV) regularly holds ocean yacht races from Victoria to Tasmania each year (ORCV 2023).

6.5.7 Recreational Diving

Recreational diving occurs along the Victorian 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. Open water dives to shipwrecks off the coast of Wilsons Promontory, such as the wreck of the SS Cambridge and the SS Gulf of Carpentaria are also common spots for recreational divers. King Island is also known for several wreck sites and the Waterwitch Reef. A number of operators in the region offer dive charters in the waters of King Island.

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.

6.5.8 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.

Recreational fisheries that occur within the Planning Areas 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 Planning Areas. Recreational scallop and squid fishing primarily occurs within Port Phillip Bay and Western Port and as such fishing for these species is possible within the Otway Planning Area. Pipi harvesting occurs in Venus Bay, within the Otway Planning Area, but due to high levels of toxins in pipis at that location the public is currently advised that they are unsafe for human consumption.

There is the potential for low levels of recreational fishing to occur within the areas of the Otway Operational Area which are nearest to shore.

6.5.9 Commonwealth Managed Fisheries

Commonwealth fisheries are managed by the Australian Fisheries Management Authority (AFMA) under the *Fisheries Management Act* 1991 (Cth). AFMA jurisdiction covers the area of ocean from 3 nm from the coast out to the 200 nm limit (the Australian Fishing Zone (AFZ)). Commonwealth commercial fisheries with jurisdictions to fish within the Planning Areas are:

- 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
- Western Tuna and Billfish Fishery (WTBF)

Information relating to the target species, fishing locations, landed catch, value and other relevant aspects of each fishery is included in Table 6-32. The data in Table 6-32 is from the Commonwealth Fishery Status Report 2022 (Patterson et al. 2022) unless otherwise indicated.

Maps of fishing intensity for 2010–2020 (latest data available from AFMA) are provided where there is an overlap with fishing intensity and the Operational Areas and/or Planning Areas. The maps show the maximum area fished and the fishing intensity. Fishing intensity is mapped to show high, medium, and low intensity. The fishing intensity data has been filtered to exclude catch from areas where fewer than five boats operated during a given year. The maximum area fished shows the area fished by all fishers aggregated by 1-degree (111 km × 111 km) grid cells.

From the review of data in Table 6-32 and associated figures it was identified that the following fisheries have fishing effort within the Planning Areas: Bass Strait CZSF, ETBF, SPF, SBTF, SESSF, Southern Squid Jig Fishery and WTBF. The following fisheries have fishing effort within the Operational Areas: Bass Strait CZSF, ETBF, SESSF and Southern Squid Jig Fishery.

Table 6-32: Commonwealth Managed Fisheries within the Operational and Planning Areas

Fishery	Target species	Description	Fishing Effort Operational Area		Fishing Effort Planning Area	
			Bass	Otway	Bass	Otway
Bass Strait Central Zone Scallop Fishery	Scallops	The Bass Strait Central Zone Scallop Fishery operates in the Bass Strait between the Victorian and Tasmanian and starts at 20 nm from their respective coastlines. Commercial scallops in the Bass Strait Central Zone Scallop Fishery are mainly found at depths of 35-100 m and are caught using a steel dredge that is towed by the vessel along muddy to coarse sand substrates. Fishing effort is concentrated around King and Flinders Islands (Figure 7 59). Currently 10 active boats using towed dredges. Fishing season is 1 April to 31 December. Actual catch in 2021 was 2,344 tonnes. The major landing ports are Beauty Point, Devonport and Stanley (Tasmania); Apollo Bay, Lakes Entrance, Melbourne, Port Welshpool, Queenscliff and San Remo (Victoria) Total fishery value in 2021 was A$4.7 million. Fishing mortality: not subject to overfishing. Biomass: Not over fished. There has been fishing effort in the Bass and Otway Planning Areas based on ABARES data for 2013 – 2021. The Operational Areas overlap the maximum area fished which contains confidential fishing intensity due to less than five vessels operating. Figure 6-67 shows the total area fished with the highest fishing intensity occurring around King Island within the Bass and Otway Planning Areas.	Yes	Yes	Yes	Yes
Eastern Tuna and Billfish Fishery	Albacore tuna Bigeye tuna Yellowfin tuna Swordfish Striped marlin	The Eastern Tuna and Billfish Fishery is 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 152 in 1999 to 35 in 2021. Actual catch in the 2021 season was 5,148 tonnes. Total fishery value in 2021 was A$35.6 million. Fishing mortality: not subject to overfishing. Biomass: Overfished – striped marlin. All other species not overfished. The Bass and Otway Planning Areas and the Otway Operational Area overlap the maximum area fished based on ABARES data for 2013–2021 (Figure 6-68). The maximum area fished contains confidential fishing intensity due to less than five vessels operating. The farthest north-east extent of the Bass Planning Area overlaps areas of low to medium fishing intensity. There has been no fishing effort within the Bass Operational Area based on ABARES data for 2013–2021.	No	Yes	Yes	Yes
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.	No	No	No	No
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 18,878 tonnes in the 2021-22 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 overfished. Figure 6-69 shows the Bass Planning Area and the southern-most extent of the Otway Planning Area overlap the maximum area fished based on ABARES data for 2013 – 2021. The maximum area fished contains confidential fishing intensity due to less than five vessels operating. There has been no fishing effort in the Bass or Otway Operational Areas based on ABARES data 2013 – 2021.	No	No	Yes	Yes
Southern Bluefin Tuna Fishery (SBTF)	Southern bluefin tuna	The SBTF 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 $41.39 million in 2020-21 (actual catch was 5,646 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: Not overfished. Figure 6-70 shows the Bass and Otway Planning Areas overlap the maximum area fished based on ABARES data for 2013 – 2021. The maximum area fished contains confidential fishing intensity due to less than five vessels operating. There has been no fishing effort in the Operational Areas based on ABARES data for 2013 – 2021.	No	No	Yes	Yes

Fishery	Target species	Description	Fishing Effort Operational Area		Fishing Effort Planning Area	
			Bass	Otway	Bass	Otway
Southern and Eastern Scalefish and Shark Fishery (SESSF) Commonwealth Trawl Sector: Danish-seine	Blue-eye trevalla Blue grenadier Eastern school whiting Orange roughy Pink ling Ribaldo Tiger flathead	The Commonwealth Trawl Sector (CTS) is part of the SESSF and extends from Barrenjoey Point in northern New South Wales to Kangaroo Island in South Australia. Management of the CTS is separated into demersal otter-board trawl and Danish-seine fishing methods. Fishing in the CTS is generally concentrated along the 200 m bathymetric contour. Total retained catch of the fishery (combined with otter-board trawl and scalefish hook subsectors) was 19,501 tonnes in the 2021-22 season. In 2020-2021, the fishery value was A$64 million. No value is provided for 2021-22 season. Thirty-two otter-board trawl vessels were active during the 2021-2022 fishing season. Fishing mortality: some species subject to overfishing. Biomass: some species over fished. There has been fishing effort in the Bass and Otway Operational and Planning Areas based on ABARES data for 2013–2021/22. (Figure 6-71). The Planning Areas overlap areas of low to high relative fishing intensity. The Operational Areas overlap the maximum area fished, which contains confidential fishing intensity due to less than five vessels operating.	Yes	Yes	Yes	Yes
Southern and Eastern Scalefish and Shark Fishery (SESSF) Commonwealth Trawl Sector: Otter-board trawl	Blue-eye trevalla Blue grenadier Eastern school whiting Orange roughy Pink ling Ribaldo Tiger flathead	The Commonwealth Trawl Sector (CTS) is part of the SESSF and extends from Barrenjoey Point in northern New South Wales to Kangaroo Island in South Australia. Management of the CTS is separated into demersal otter-board trawl and Danish-seine fishing methods. Fishing in the CTS is generally concentrated along the 200 m bathymetric contour. Total retained catch of the fishery (combined with Danish-seine and scalefish hook subsectors) was 19,501 tonnes in the 2021-22 season. In 2020-2021, the fishery value was A$64 million. No value is provided for 2021-22 season. Nineteen Danish-seine vessels were active during the 2021-2022 fishing season. Fishing mortality: some species subject to overfishing. Biomass: some species over fished. The Otway Operational Area overlaps an area of low relative fishing intensity as well as the maximum area fished based on ABARES data for 2013–2021 (Figure 6-72). The Bass and Otway Planning Areas overlap areas of low to high relative fishing intensity as well as the maximum area fished (Figure 6-72). The maximum area fished contains confidential fishing intensity due to less than five vessels operating. There has been no fishing effort in the Bass Operational Area based on ABARES data for 2013–2021/22 (Figure 6-72).	No	Yes	Yes	Yes
Southern and Eastern Scalefish and Shark Fishery (SESSF) Gillnet, Hook and Trap Sector: Scalefish Hook Sub-Sector	Blue-eye trevalla Blue grenadier Eastern school whiting Orange roughy Pink ling Ribaldo Tiger flathead	The Scalefish Hook Sector (SHS) is primarily in the southeast of Australia with most fishing intensity occurring off the coast of Tasmania. The SHS is managed under the Gillnet, Hook and Trap Sector (GHTS) of the SESSF. The broader SESSF stretches south from Fraser Island in southern Queensland, around Tasmania, to Cape Leeuwin in southern Western Australia. The SHS shares target species with the CTS. Fishing is generally concentrated along the 200 m bathymetric contour. Total retained catch of the fishery (combined with CTS) was 19,501 tonnes in the 2021-22 season. In 2020-2021, the fishery value was A$64 million. No value is provided for 2021-22 season. Twenty-one scalefish hook vessels were active during the 2021-2022 fishing season. Fishing mortality: some species subject to overfishing. Biomass: some species over fished. The Bass and Otway Planning Areas and Otway Operational Areas overlap with the maximum area fished based on ABARES data for 2013 – 2021 (Figure 6-73). The maximum area fished contains confidential fishing intensity due to less than five vessels operating. The Otway Planning Area also overlaps an area of low to high relative fishing intensity off the southern coast of Tasmania (Figure 6-73). No fishing effort occurred within the Bass Operational Area based on ABARES data for 2013–2021 (Figure 6-73).	No	Yes	Yes	Yes

Fishery	Target species	Description	Fishing Effort Operational Area		Fishing Effort Planning Area	
			Bass	Otway	Bass	Otway
Southern and Eastern Scalefish and Shark Fishery (SESSF) Gillnet, Hook and Trap Sector: Shark Gillnet Sector	Gummy shark Elephantfish Sawsharks School shark	The shark gillnet and shark hook sectors (SGSHS) are part of the Gillnet, Hook and Trap Sector (GHTS) of the Southern and Eastern Scalefish and Shark Fishery (SESSF). Most fishing in the SGSHS using nets occurs in the Bass Strait while most fishing using hooks occurs off South Australia. Fishing is generally concentrated east of King Island. During the 2021-22 season, 27 shark gillnet vessels were active which hauled a total of 27,820 km of net. Total retained catch of the target species was 2,150 tonnes in the 2021-22 season. In 2020-21, the fishery value was A$28.84 million. No value is provided for 2021-22 season. Fishing mortality: school shark is uncertain. Biomass: school shark is overfished. There has been fishing effort in the Bass and Otway Planning and Operational Areas based on ABARES data for 2013 – 2021/22 (Figure 6-74). The Operational Areas overlap areas of low to medium relative fishing intensity and the Planning Areas also overlap areas of high relative fishing intensity in the waters between Tasmania and Victoria (Figure 6-74)	Yes	Yes	Yes	Yes
Southern and Eastern Scalefish and Shark Fishery (SESSF) Gillnet, Hook and Trap Sector: Shark Hook Sub-Sector	Gummy shark Sawsharks Elephantfish Sawsharks School shark	The shark gillnet and shark hook sectors (SGSHS) are part of the Gillnet, Hook and Trap Sector (GHTS) of the Southern and Eastern Scalefish and Shark Fishery (SESSF). Most fishing in the SGSHS using nets occurs in the Bass Strait while most fishing using hooks occurs off South Australia. Fishing is generally concentrated off the South Australian coast, but fishing activity also occurs in the waters around Flinders Island, particularly between Flinders Island and Tasmania. During the 2021-22 season, 40 shark hook vessels were active and set a total of 2,493,920 hooks. Total retained catch of the target species was 2,150 tonnes in the 2021-22 season. No value is provided for 2021-22 season. In 2020-21, the fishery value was A$28.84 million. Fishing mortality: school shark is uncertain. Biomass: school shark is over fished. The Bass and Otway Planning Areas overlap small areas of low to high relative fishing intensity at their eastern and western-most extents, respectively, based on ABARES data for 2013 – 2021 (Figure 6-75). A small area of low relative fishing intensity also occurs between King Island and Tasmania within the Planning Areas (Figure 6-75). The Bass and Otway Operational Areas overlap the maximum area fished (Figure 6-75). The maximum area fished contains confidential fishing intensity due to less than five vessels operating.	Yes	Yes	Yes	Yes
Southern Squid Jig Fishery	Gould's squid (arrow squid)	The Southern Squid Jig Fishery is a single species fishery that operates year-round. Portland and Queenscliff are the major Victorian landing ports. Jigging typically occurs midwater at depths between 50 and 100 m at night using large lights that illuminate the waters around a boat. In 2021, the actual catch of 939 tonnes was worth A$3.30 million. In 2021 there were eight active vessels in the fishery with the landing ports being Triabunna (Tasmania); Queenscliff and Apollo Bay (Victoria). Fishing mortality: not subject to overfishing. Biomass: not overfished. The Otway Operational Area overlaps an area of low relative fishing intensity, and the Otway Planning Area overlaps an area of low to high relative fishing intensity west of Cape Otway based on ABARES data for 2013–2021 (Figure 6-76). The Bass Operational and Planning Areas overlap the maximum area fished, which contains confidential fishing intensity due to less than five vessels operating (Figure 6-76). Figure 6-76 shows the total area fished with squid jig in 2021 with the highest fishing intensity occurring near Portland within the Otway Planning Area.	Yes	Yes	Yes	Yes
Western Tuna and Billfish Fishery	Bigeye tuna Yellowfin tuna Broadbill Swordfish Striped marlin	The Western Tuna and Billfish Fishery primarily uses pelagic longline gear with low levels of minor-line fishing. The management area extends west from the eastern border of South Australia to Cape York, including Cocos Keeling Islands and Christmas Island. Fishing effort in recent years has been mostly concentrated in south-west Western Australia with occasional activity off South Australia. The value of the fishery is confidential but the total annual catch of the fishery in 2021 was 252 tonnes. Less than five vessels have been active in the fishery every year since 2005. Fishing mortality: striped marlin, albacore, bigeye tuna and yellowfin tuna subject to overfishing. Biomass: striped marlin overfished. The Otway Planning Area overlaps the maximum area fished which contains confidential fishing intensity due to less than 5 vessels operating (Figure 6-77). No fishing effort was identified in the Operational Areas or Bass Planning Area.	No	No	No	Yes

Data/information sources: Australian Fisheries Management Authority (www.afma.gov.au), ABARES Fishery Status Reports 2014 to 2022.

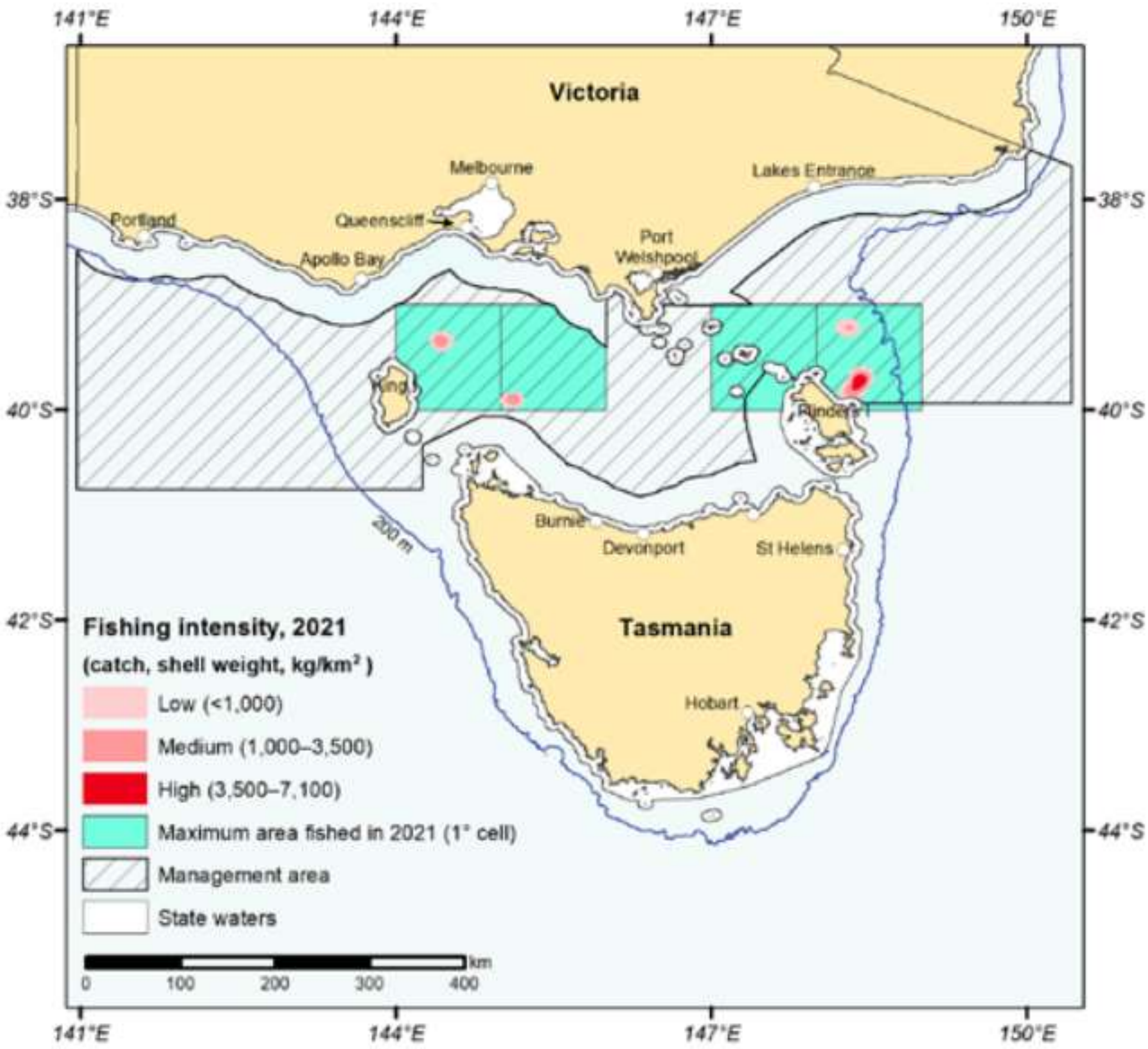


Figure 6-66: Jurisdiction of and Fishing Intensity of the Bass Strait Central Zone Scallop Fishery

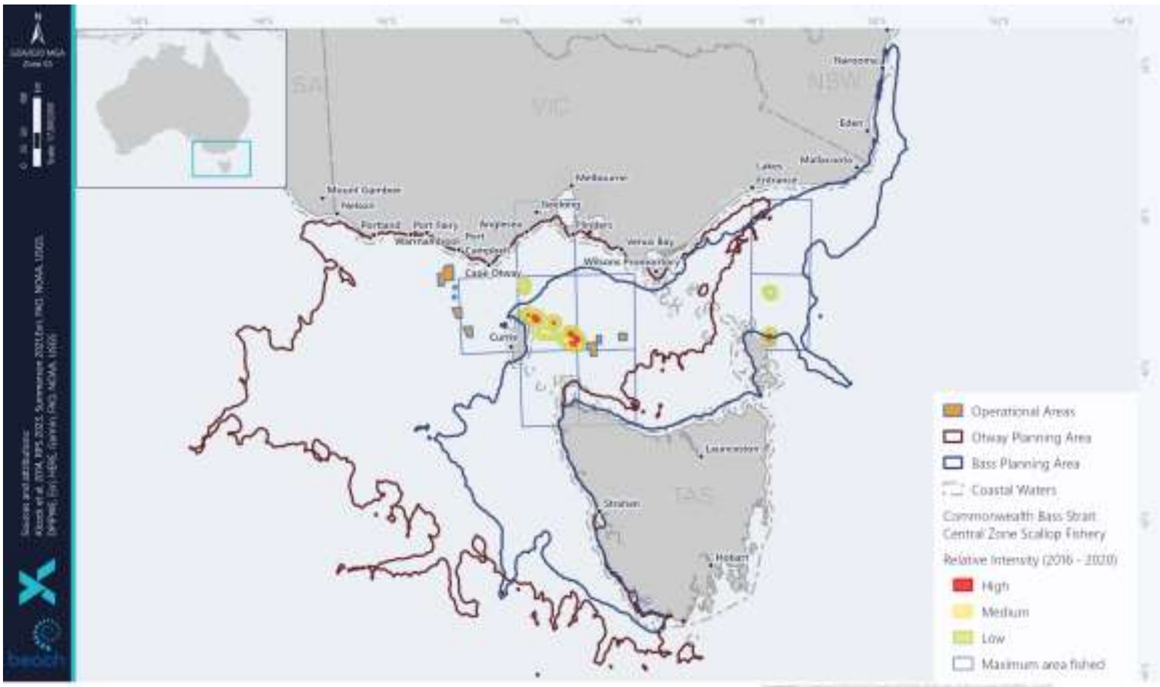


Figure 6-67: Commonwealth Bass Strait Central Zone Scallop Fishery Fishing Intensity (effort, net length, m/km^2) and Maximum Area Fished

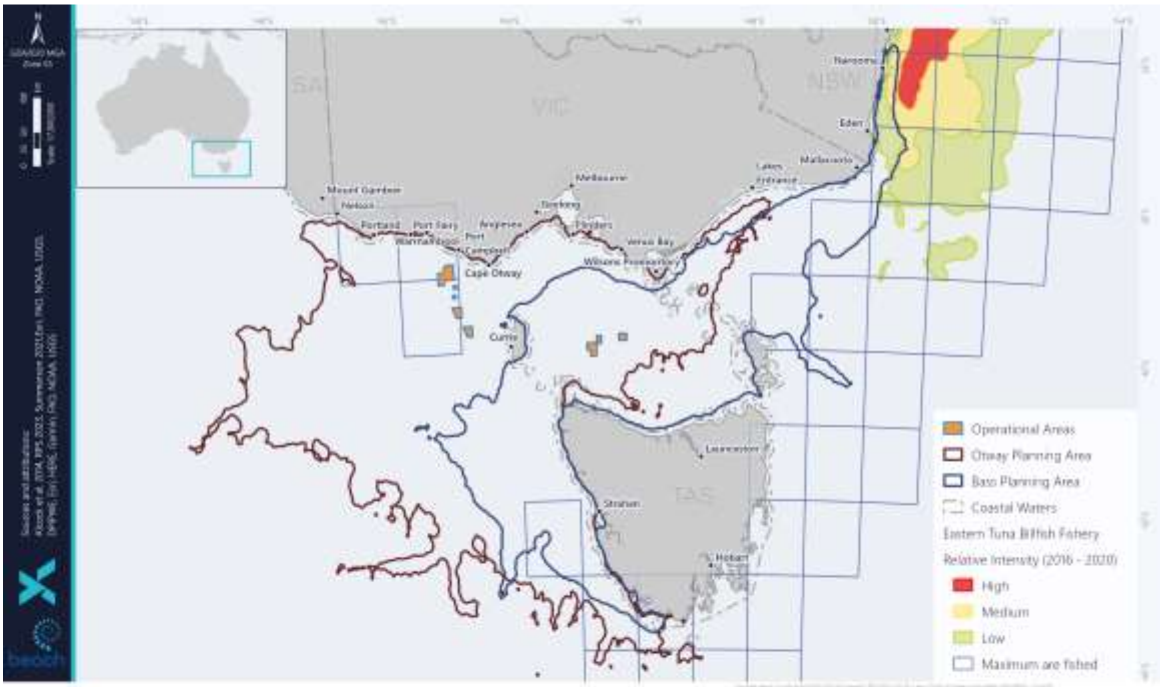


Figure 6-68: Commonwealth Eastern Tuna and Billfish Fishery Fishing Intensity (effort, net length, m/km^2) and Maximum Area Fished

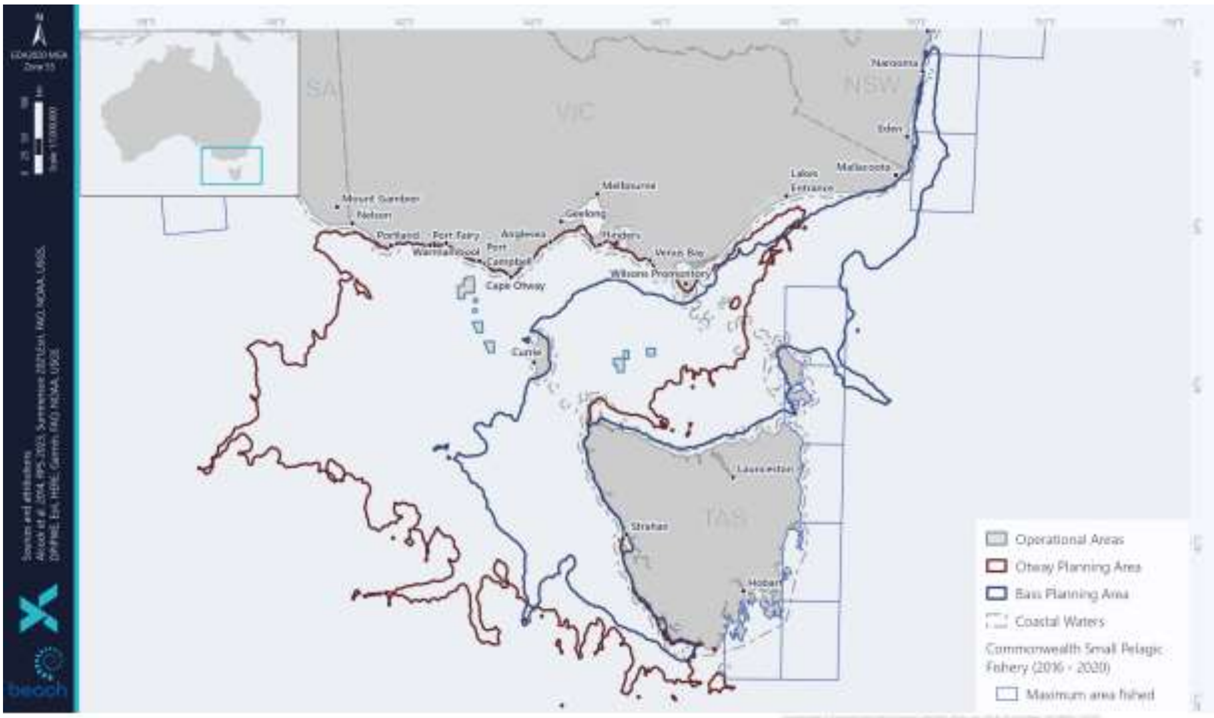


Figure 6-69: Commonwealth Small Pelagic Fishery Fishing Intensity (effort, net length, m/km^2) and Maximum Area Fished

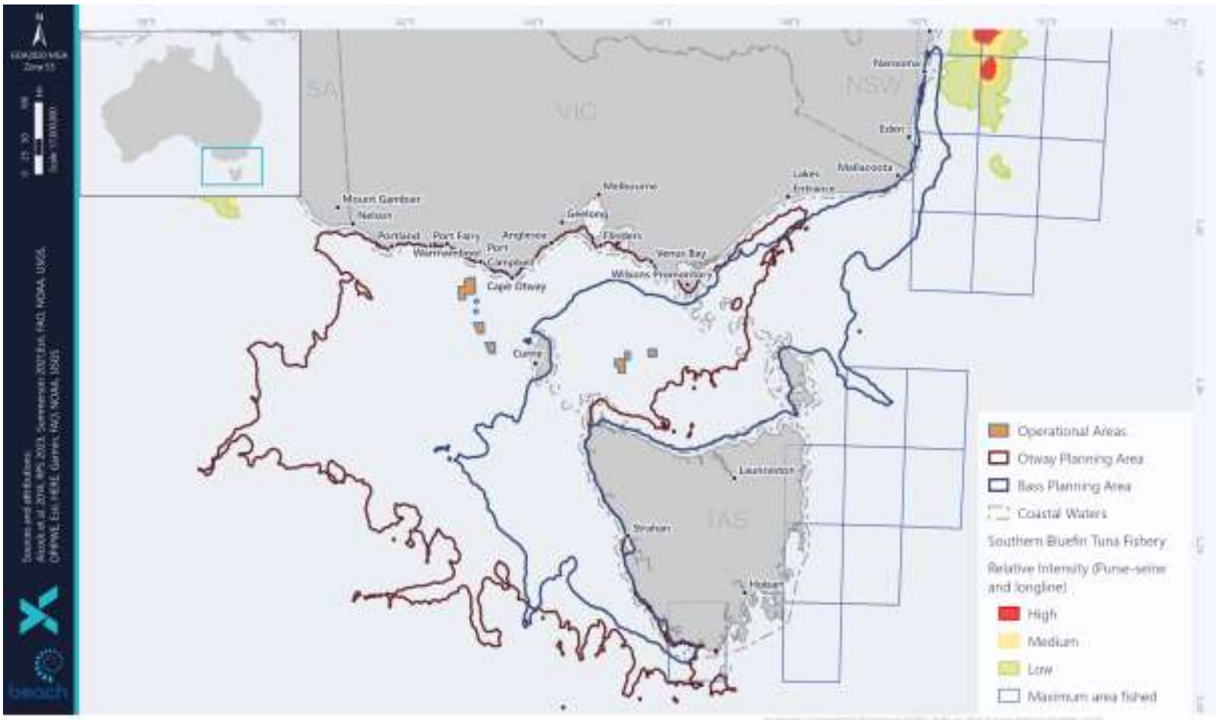


Figure 6-70: Southern Bluefin Tuna Fishery Fishing Intensity (effort, net length, m/km^2) and Maximum Area Fished

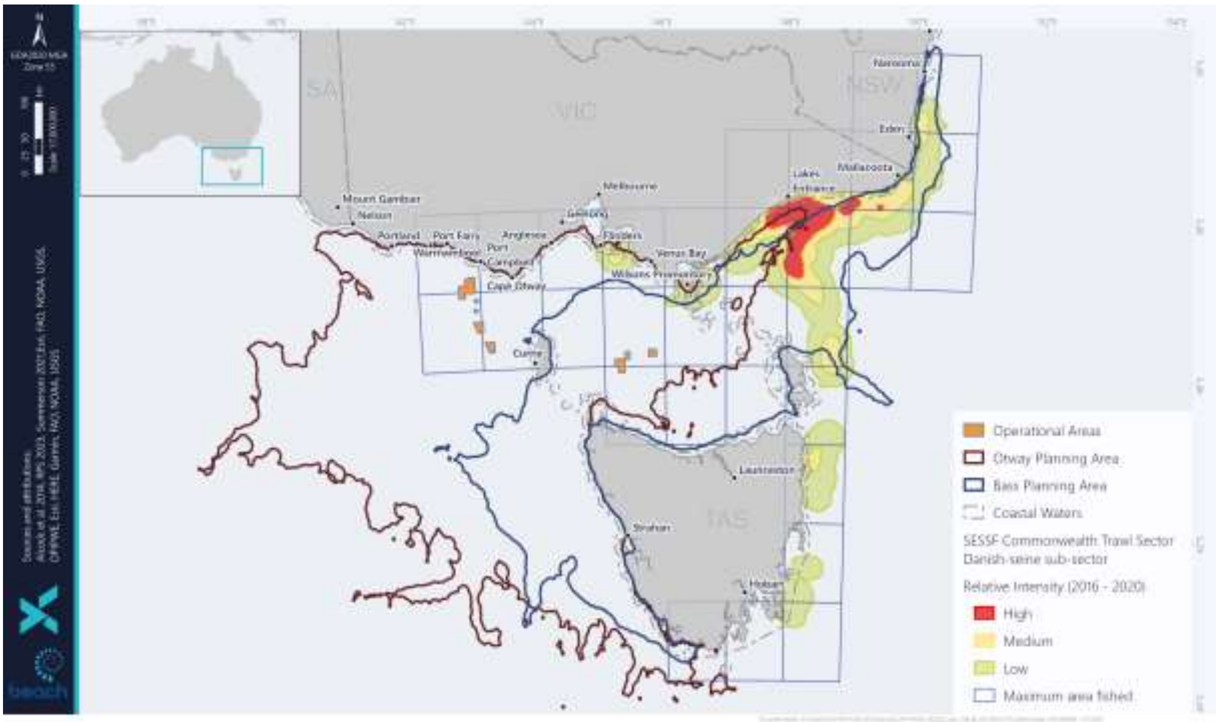


Figure 6-71: Southern and Eastern Scalefish and Shark Fishery (Commonwealth Trawl Sector) Danish-seine Fishing Intensity (effort, net length, m/km^2) and Maximum Area Fished

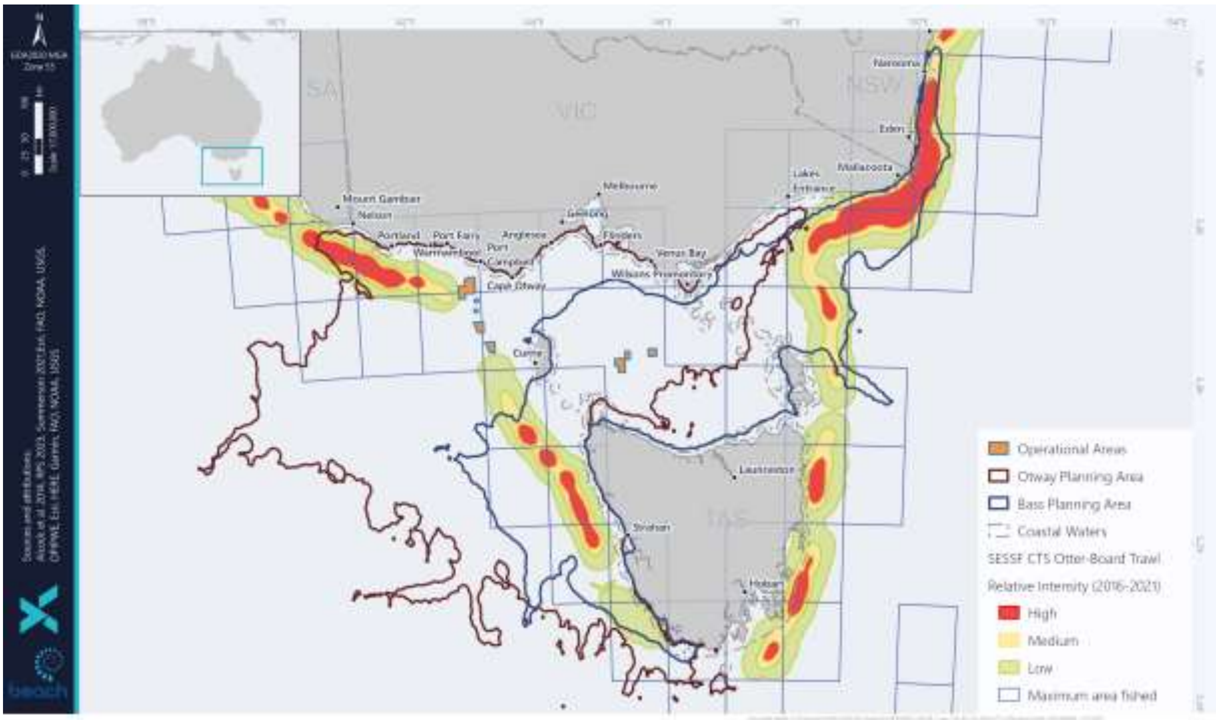


Figure 6-72: Southern and Eastern Scalefish and Shark Fishery (Commonwealth Trawl Sector) Otter Board Trawl Fishing Intensity (effort, net length, m/km^2) and Maximum Area Fished

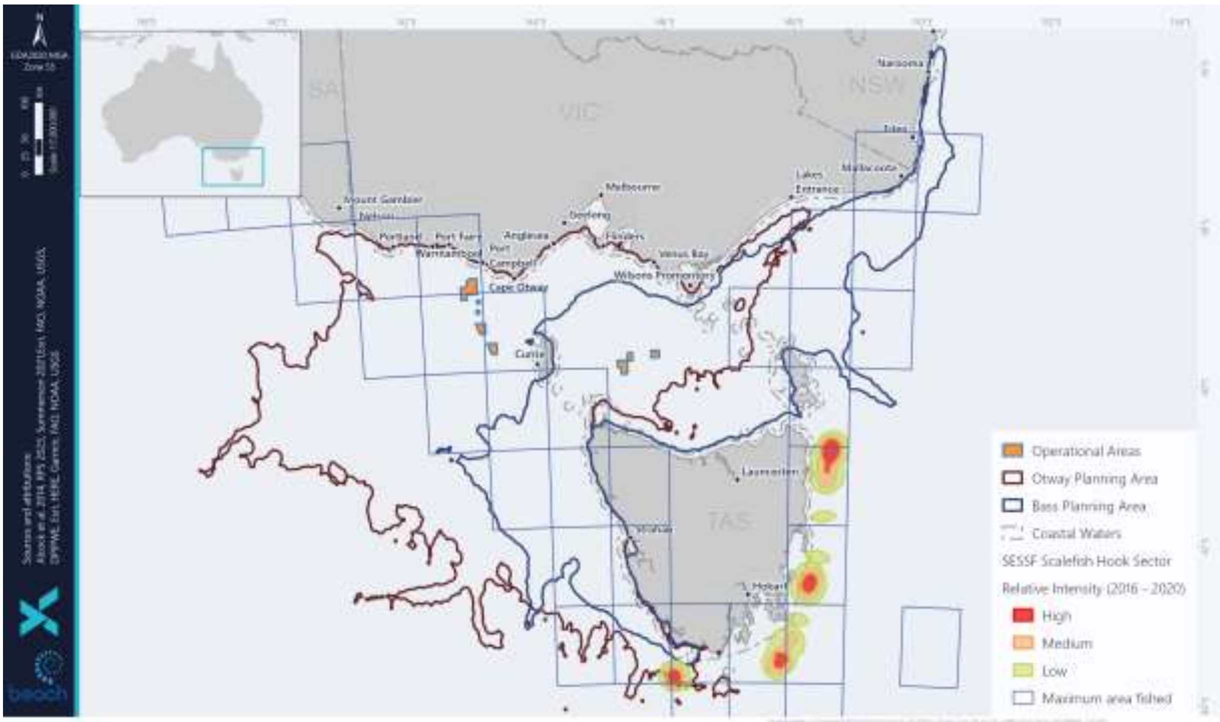


Figure 6-73: Southern and Eastern Scalefish and Shark Fishery (Gillnet Hook and Trap Sector) Scalefish Hook Fishing Intensity (effort, net length, m/km^2) and Maximum Area Fished

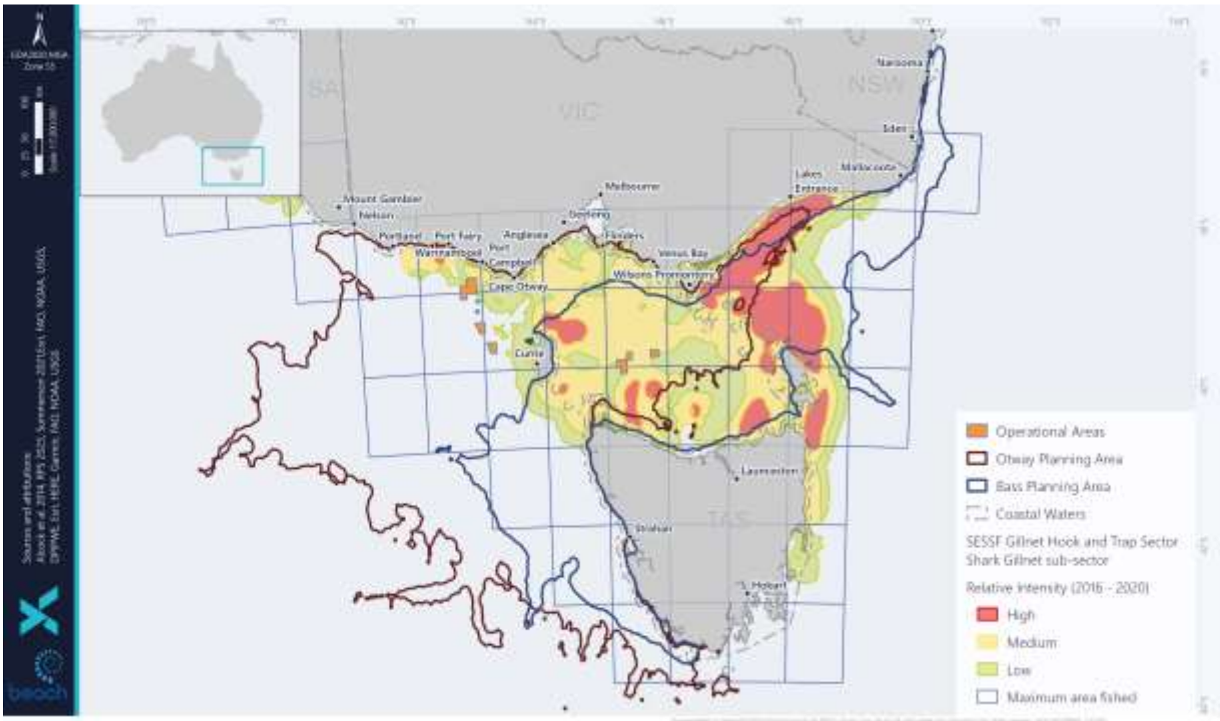


Figure 6-74: Southern and Eastern Scalefish and Shark Fishery (Gillnet Hook and Trap Sector) Shark Gillnet Fishing Intensity (effort, net length, m/km^2) and Maximum Area Fished

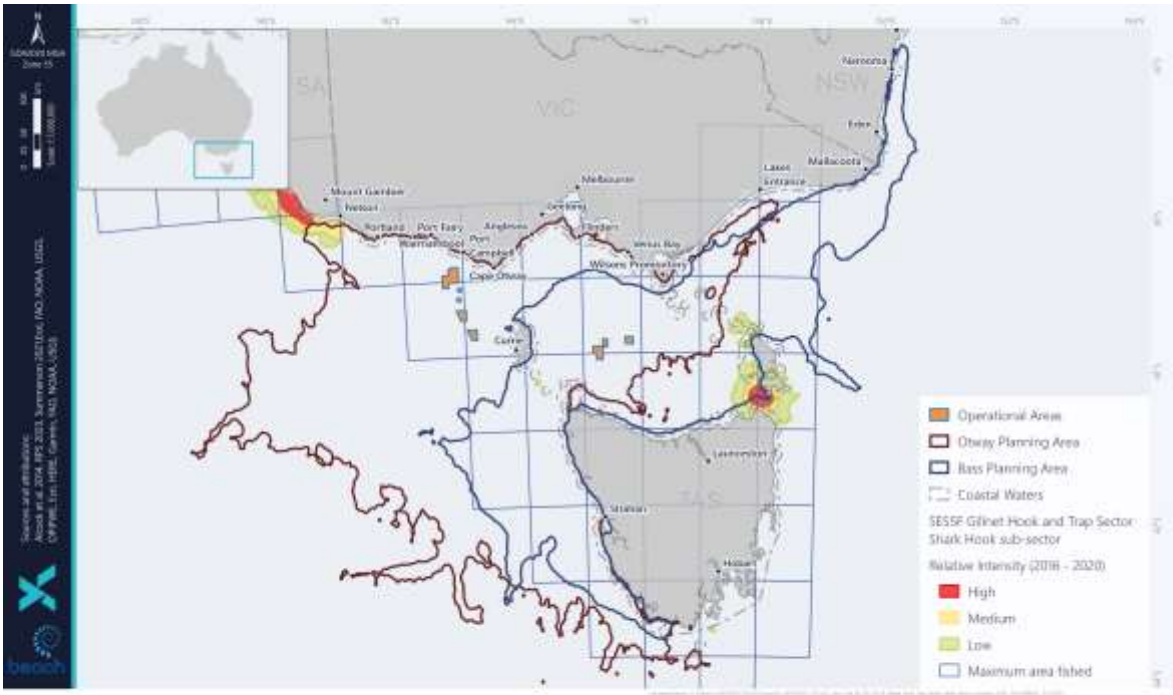


Figure 6-75: Southern and Eastern Scalefish and Shark Fishery (Shark Hook Sector) Fishing Intensity (effort, net length, m/km^2)

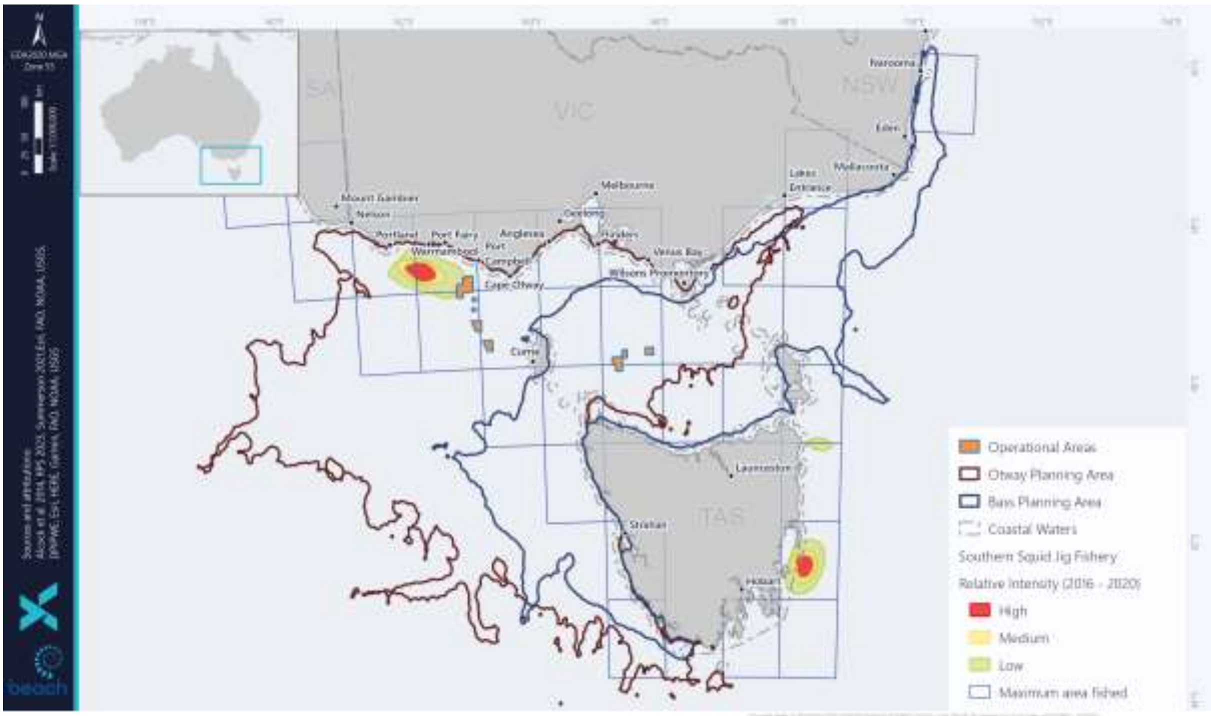


Figure 6-76: Southern Squid Jig Fishery Fishing Intensity (effort, net length, m/km^2)

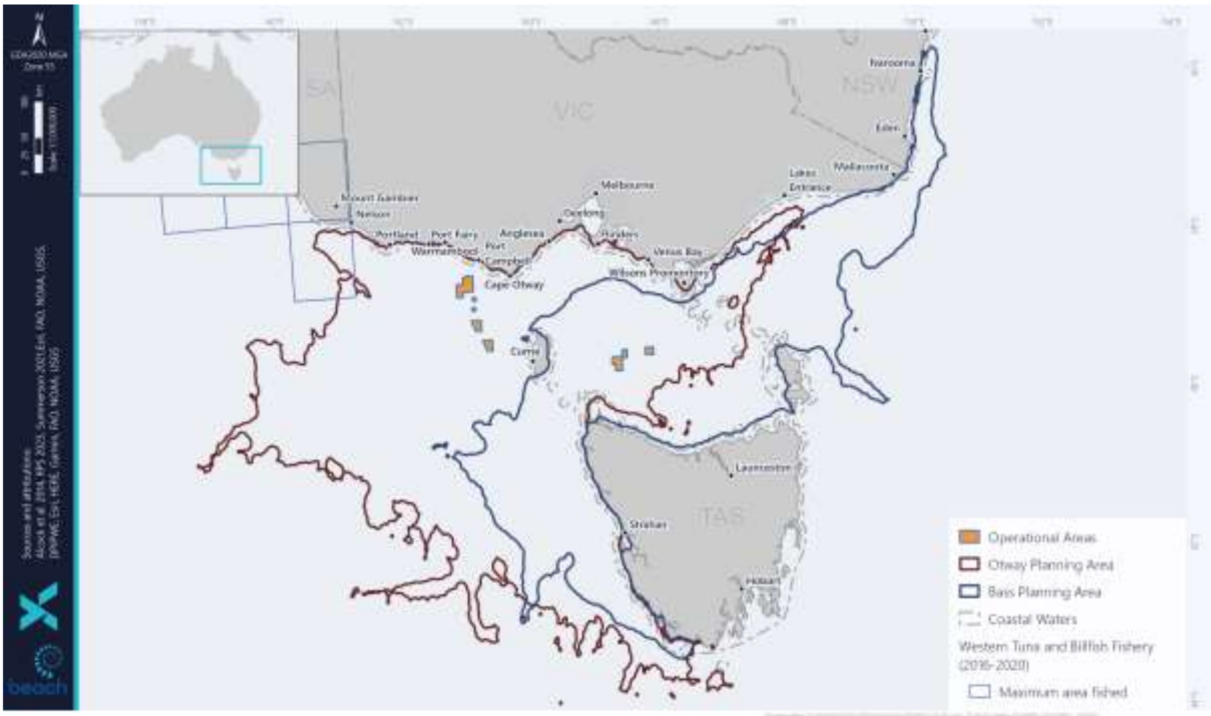


Figure 6-77: Western Tuna and Billfish Fishery Fishing Intensity (effort, net length, m/km^2)

6.5.10 New South Wales Managed Fisheries

NSW state fisheries are managed by the Department of Primary Industries (DPI) under the *Fisheries Management Act 1994*. DPI jurisdiction covers all waters that are within the limits of the state with additional offshore constitutional settlements for specific fisheries beyond state boundaries into Commonwealth waters. NSW-managed commercial fisheries with access licences that authorise harvest in the Planning Areas are detailed below. Though certain fisheries possess jurisdiction to fish within the area, analysis of publicly available and requested catch data indicates that not all fisheries have recently actively fished within the Planning Areas. NSW managed fisheries active within the Planning Areas include:

- Abalone
- Developmental Commercial
- Estuary General
- Inland Restricted
- Lobster
- Ocean Hauling
- Ocean Trap and Line
- Southern Fish Trawl
- Ocean Trawl
- Sea Urchin and Turban Shell Restricted Fishery
- s37 Permit

Information relating to the target species, fishing locations, landed catch, value and other relevant aspects of each fishery is included in Table 6-33.

Table 6-33: New South Wales Managed Fisheries in the Planning Area

Fishery	Target species	Description	Fishing Effort Operational Area		Fishing Effort Planning Area	
			Bass	Otway	Bass	Otway
Abalone	Blacklip abalone	This fishery extends along the NSW coastline between the Queensland and Victorian borders. Most commercial abalone fishing takes place on the south coast of NSW, primarily from Jervis Bay to the Victorian border, with most abalone found close to the shore. Abalone are harvested by divers and occurs year-round. Recent catch for 2019 was 83 t (valued at $3.6 million) with 3-11 active vessels recorded between 2016-2021 in the Bass Planning Area (Figure 6-78). The water depths are fished close to shore within the Bass Planning Area. No fishing effort was identified in the Operational Area. (DPI 2022b, DPI 2019a, DPI 2018).	No	No	Yes	No
Development Commercial		The Development Commercial fishery was established to allow for exploration of new fishery options. There have been instances where individuals or groups have expressed an interest in exploring opportunities to harvest marine resources, they perceive to be under-utilised in NSW waters, or use unique fishing methods not currently authorised. The State may allow for an application to be logged with the NSW Department of Primary Industries where the department may determine if a particular developmental fishery is likely to bring considerable benefit to the State and whether it warrants the investment of resources (DPI 2019c). Currently there are 5 applications being assessed undertake developmental commercial fishing activities by the department and no new applications are being accepted (DPI 2019c).	No	No	Yes	No
Estuary General	Sea mullet Luderick Yellowfin bream School prawn Blue swimmer crab Dusky flathead Sand whiting Pipi	The Estuary General Fishery is a diverse multi-species multi-method fishery operating throughout 76 of NSW's estuarine systems. It is the most diverse commercial fishery in NSW and comprises approximately 600 fishing businesses authorised to utilise 17 types of fishing gear (DPI 2019c). During the 2019-2020 season 2,784 t was caught and valued at $23 million (DPI 2022b). The fishery is divided geographically into 7 regions along the NSW coastline. The primary management control is enforcing a limit on the number of fishers who are authorised to operate. The Bass Planning Area overlaps with the Lower South Coast region which had 14 active businesses in the 2019-2020 season, however	No	No	Yes	No

Fishery	Target species	Description	Fishing Effort Operational Area		Fishing Effort Planning Area	
			Bass	Otway	Bass	Otway
	Mud crab Silver biddy	there was no reported catch within the Planning Area between 2016-2021 (DPI 2022b)				
Estuary Prawn Trawl	School prawn Eastern king prawns	This fishery uses otter trawl nets to target prawn species in three estuaries in NSW (the Clarence, Hawkesbury and Hunter Rivers). The fishery typically operates for defined seasons which are generally October to May (with the exception of Hawkesbury River) (DPI 2023a). The majority off catch effort for this fishery occurs outside of the Planning Area	No	No	No	No
Inland Restricted	Carp Yabbies	This fishery is a small fishery that primarily operates in the inland waters of the Murray-Darling. Carp is currently targeted as a pest species and averages between $2.00-$2.50 per kg in Sydney and Melbourne markets. Commercial fishing for yabbies commenced in 1974/1975. Commercial fishers targeting yabbies use baited trap methods and have access to all waters of the Newell Highway. Carp targeted fisheries utilise nets and traps fishing methods and have access to all NSW inland waters (DPI 2022b)	No	No	Yes	No
Lobster	Eastern rock lobster	A highly valuable fishery (valued at $10.9 million in 2019). Lobster are caught using baited traps (pots). The NSW Lobster Fishery extends from the Queensland border to the Victorian border and includes all waters under jurisdiction of NSW to around 80 miles from the coast. Fishing season occurs between 1 August and 3 May with monthly landings are typically highest in December and January. The fishery is primarily managed by total allowable commercial catch and individual quota allocation with additional input controls such as a prohibition on taking berried females and minimum/maximum size limits. Recent catch data for 2019 was 178 t. There are between 3-11 vessels operational in the Bass Planning Area (Figure 6-79) (DPI 2019b, DPI 2022b).	No	No	Yes	No
Ocean Hauling	Pilchards Sea mullet Australian salmon Blue mackerel Yellowtail Scad	The Ocean Hauling fishery targets approximately 20 finfish species using commercial hauling and purse seine nets from sea beaches and in ocean waters within 3 nautical miles of the NSW coast. The ocean hauling fishery became a restricted fishery in 1995 and moved to a share management fishery in 2007. Fishing occurs year-round. Recent catch data recorded 3,886 t valued at $10 million in 2019. There are between 4-9 operational licences within the Bass Planning Area between 2016-2021 (Figure 6-80) (DPI 2022b, DPI 2019c).	No	No	Yes	No

Fishery	Target species	Description	Fishing Effort Operational Area		Fishing Effort Planning Area	
			Bass	Otway	Bass	Otway
	Yellowfin Bream					
Ocean Trap and Line	Snapper Yellowtail kingfish Leatherjackets Bonito Silver trevally Rubberlip (grey) morwong Blue-eye trevalla Sharks Bar cod Yellowfin bream Spanner crabs	The Ocean Trap and Line fishery is a multi-method, multi species fishery targeting demersal and pelagic fish along the entire NSW coast, in continental shelf and slope waters. It is a share managed fishery with 6 endorsements which determine the location and methods used by fishers. Fishing occurs year-round. Recent catch data for 2019 showed a catch of 1,352 t values at $13 million. The majority of stock within the management area are classified as sustainable. However, the grey morwong stock, silver trevally stock, and school shark stock are classified as depleted. There are between 5-40 operational vessels recorded within the Bass Planning Area between 2016-2021 (Figure 6-81) (DPI 2022b, DPI 2021, DPI 2006).	No	No	Yes	No
Southern Fish Trawl		The NSW Southern Fish Trawl Fishery was located within the coastal waters of NSW and spanned between Sydney and the Victoria-NSW border. This restricted fishery once fell under the jurisdiction of the Ocean Trawl Fishery and was managed under the fish trawl sector. In 2019 the Southern Fish Trawl Fishery was integrated into the Commonwealth Southern and Eastern Scalefish and Shark Fishery (SESSF) due to the substantial overlap between the two fisheries (DPI 2018b). This change was implemented in hopes that that joint management of fish stocks would removing duplication and administrative burden for operators currently operating across the two fisheries. Between 2016-2021 a total of 1,160.7 t was landed within the Bass Planning Area (Figure 6-82) (DPI 2022b).	No	No	Yes	No
Ocean Trawl	Stout whiting Red spot whiting Eastern king prawn Eastern school prawn	There are 2 sectors to the NSW Ocean Trawl Fishery; the prawn trawl sector and the fish trawl sector which operate along the entire NSW coast, in continental shelf and slope waters. Fishing occurs year-round, with both sectors use similar gear, the otter trawl net, and many of the fishers endorsed for fish trawling are also endorsed for prawn trawling. It is a share managed fishery with endorsements outlining fishing methods and location the holder can use and	No	No	Yes	No

Fishery	Target species	Description	Fishing Effort Operational Area		Fishing Effort Planning Area	
			Bass	Otway	Bass	Otway
	Royal red prawn Tiger flathead Silver trevally Various species of sharks and rays, squid and octopus.	fish within. Recent catch data for 2016 was 2,672 t valued at $26.2 million. Operational vessel data for this industry is confidential (Figure 6-83) (DPI 2022b, DPI 2021).				
Sea Urchin and Turban Shell Restricted Fishery	Sea Urchin Turban Shell	The NSW Sea Urchin and Turban Shell restricted fishery is relatively small with few divers participating and 37 fishing businesses holding endorsements. All harvesting is done manually, and most commercial fishers will dive for species using surface supplied compressed air (hookah). Harvesting occurs throughout the year however restrictions and closures may apply for individual species. During the 2019-2020 season 126 t was caught and valued at $0.5 million (DPI 2022b). The fishery is managed by regional catch limits which were set at 30 t total for the 2023 fishing period (DPI 2019c). The EMBA overlaps with 3 of the 5 sea urchin and turban shell regions. Indicators for the Sea Urchin and Turban Shell fishery are reported at the state level only due to the small number of active fishers. Between 2016-2021 a total of 543.1 t was landed within the Bass Planning Area (Figure 6-84) (DPI 2022b).	No	No	Yes	No
s37 Permit	Marine vegetation collection, aquarium collection, imports, scientific collection and oyster collection	In NSW miscellaneous permits are managed under Section 37 which includes permits like marine vegetation collection, aquarium collection, imports, scientific collection and oyster collection. These section permits are required for any activity that involves taking or possessing fish or marine vegetation that would otherwise be unlawful under the Fisheries Management Act 1994 (DPI 2017). Applications require an environmental assessment and the inclusion of the appropriate fee. Between 2016-2021 a total of 572.7 t was landed within the Bass Planning Area (Figure 6-85) (DPI 2022b).	No	No	Yes	No

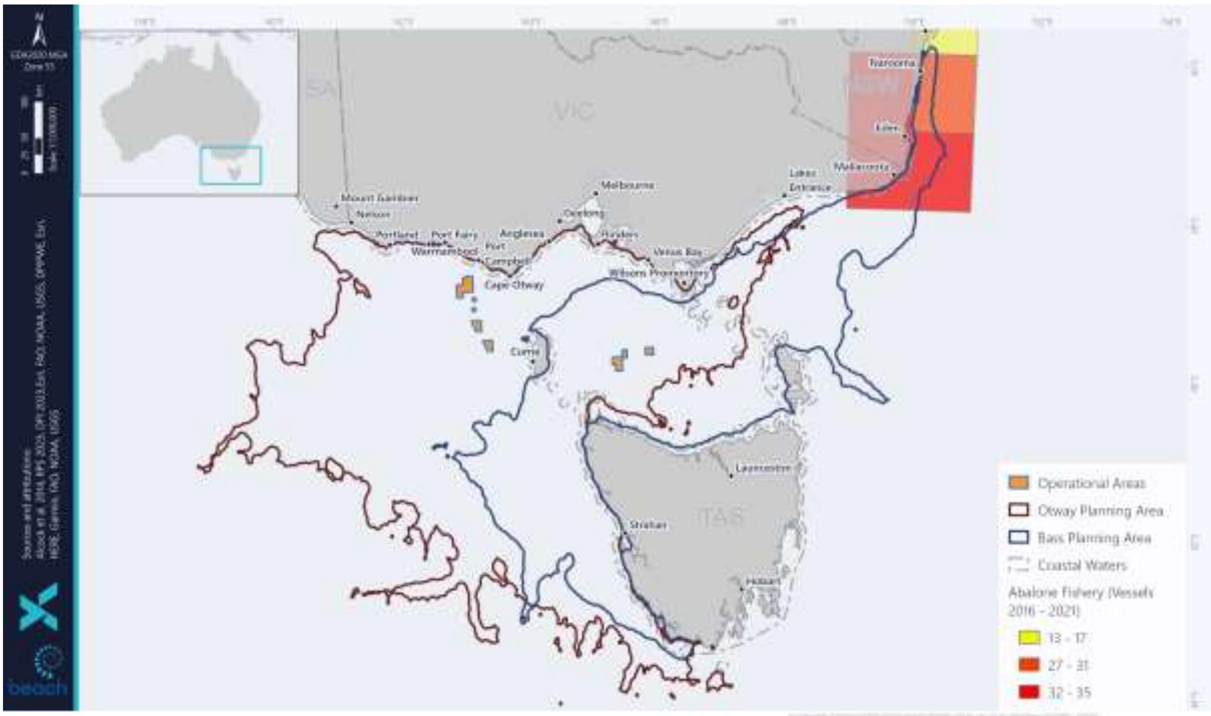


Figure 6-78: NSW Abalone Fishery Number of Vessels from 2016-2021. Data obtained from DPI 2023.

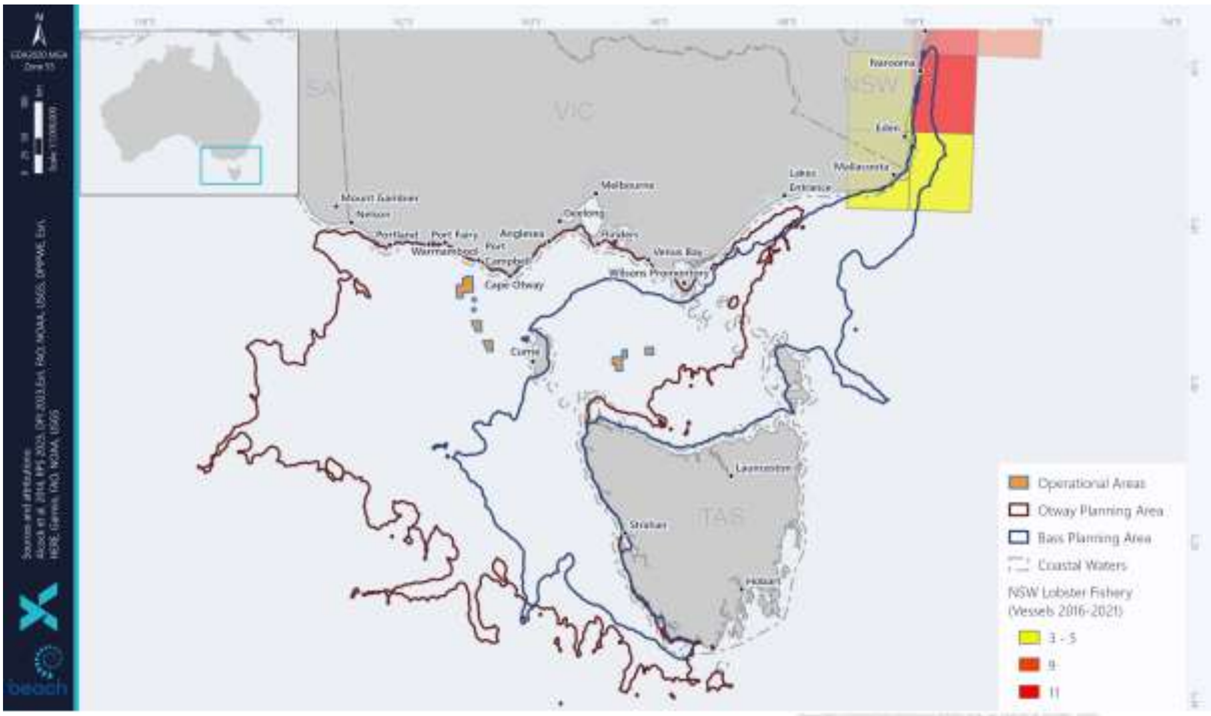


Figure 6-79: NSW Lobster Fishery Number of Vessels from 2016-2021. Data obtained from DPI 2023.

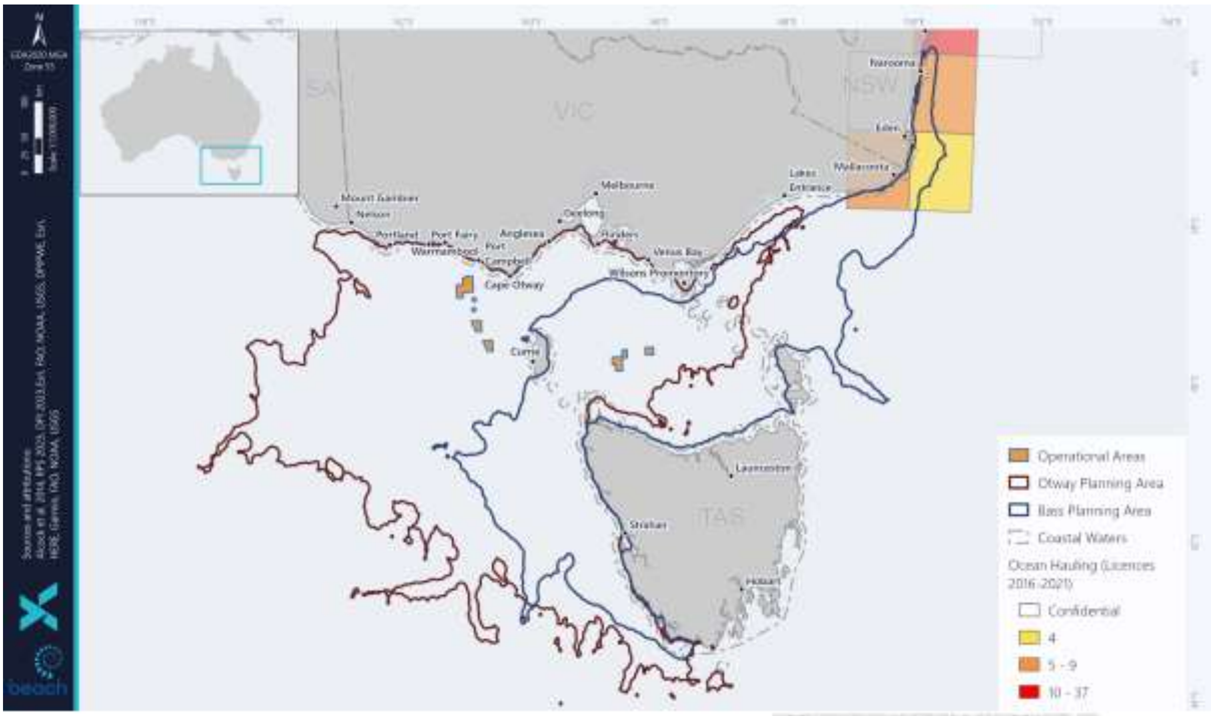


Figure 6-80: NSW Ocean Hauling Fishery Number of Licences from 2016-2021. Data obtained from DPI 2023.

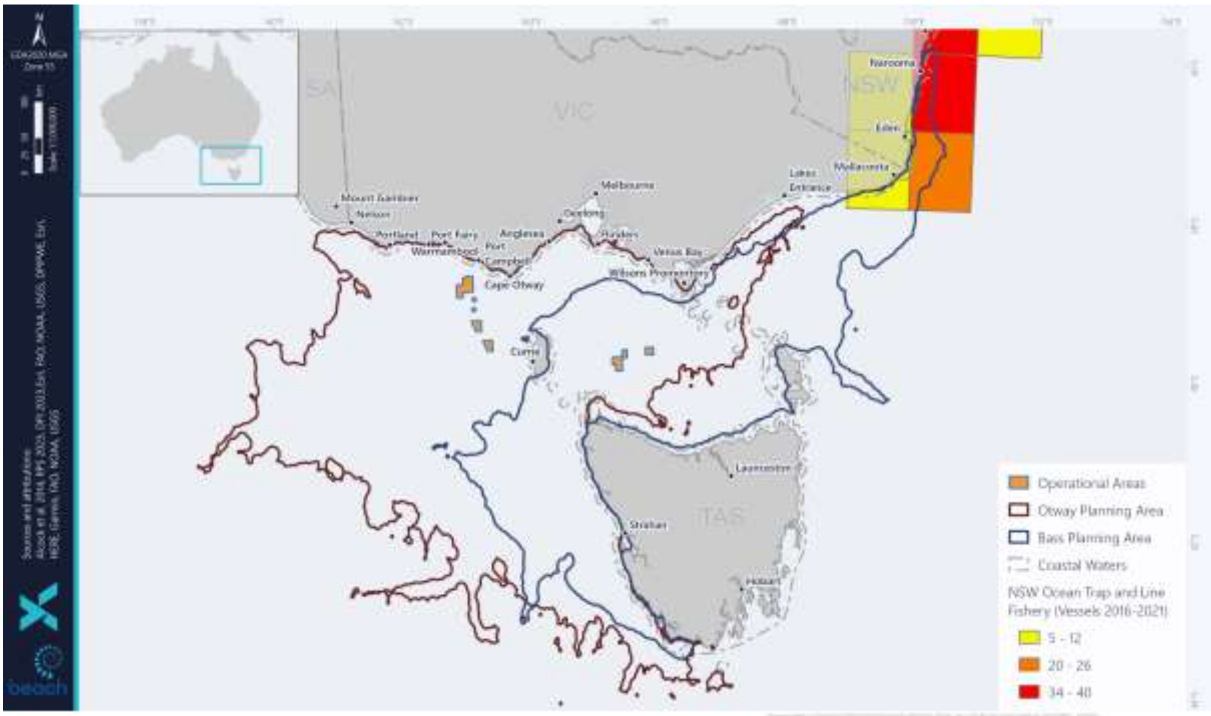


Figure 6-81: NSW Ocean Trap and Line Fishery Number of Vessels from 2016-2021. Data obtained from DPI 2023.

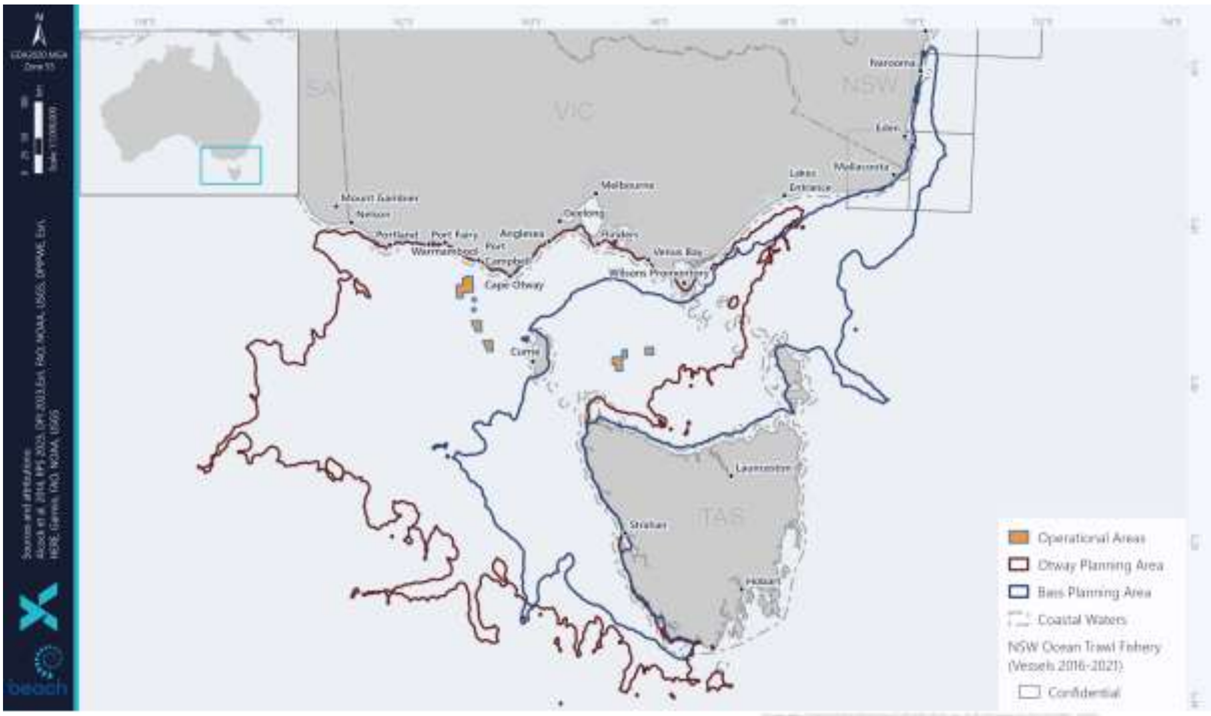


Figure 6-82: NSW Southern Fish Trawl Fishery Number of Vessels from 2016-2021. Data obtained from DPI 2023.

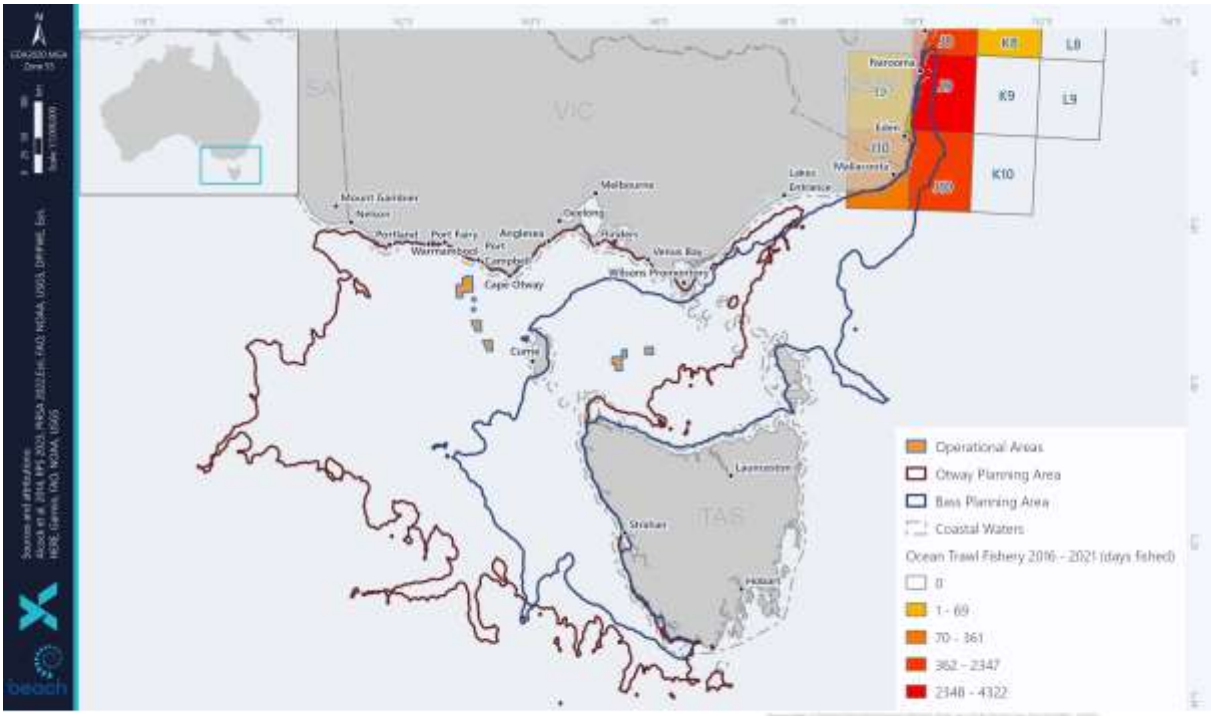


Figure 6-83: NSW Ocean Trawl Fishery Days Fished from 2016-2021. Data obtained from DPI 2023.

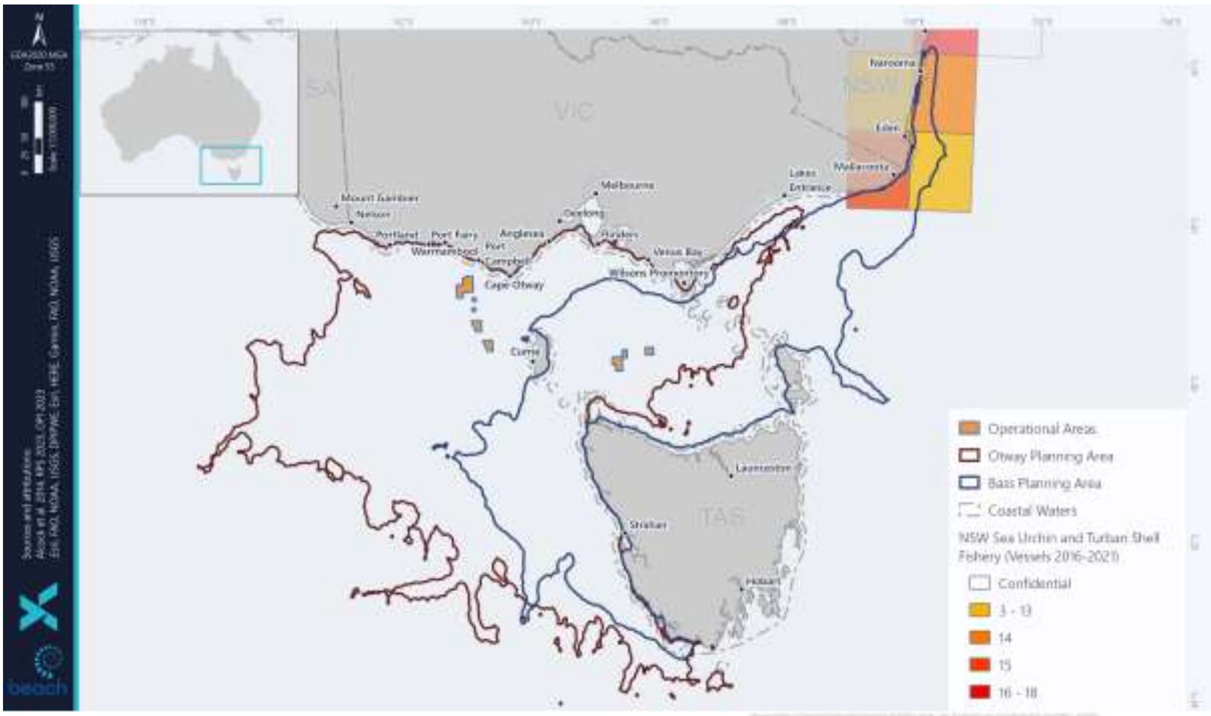


Figure 6-84: NSW Sea Urchin and Turban Shell Fishery Number of Vessels from 2016-2021. Data obtained from DPI 2023.

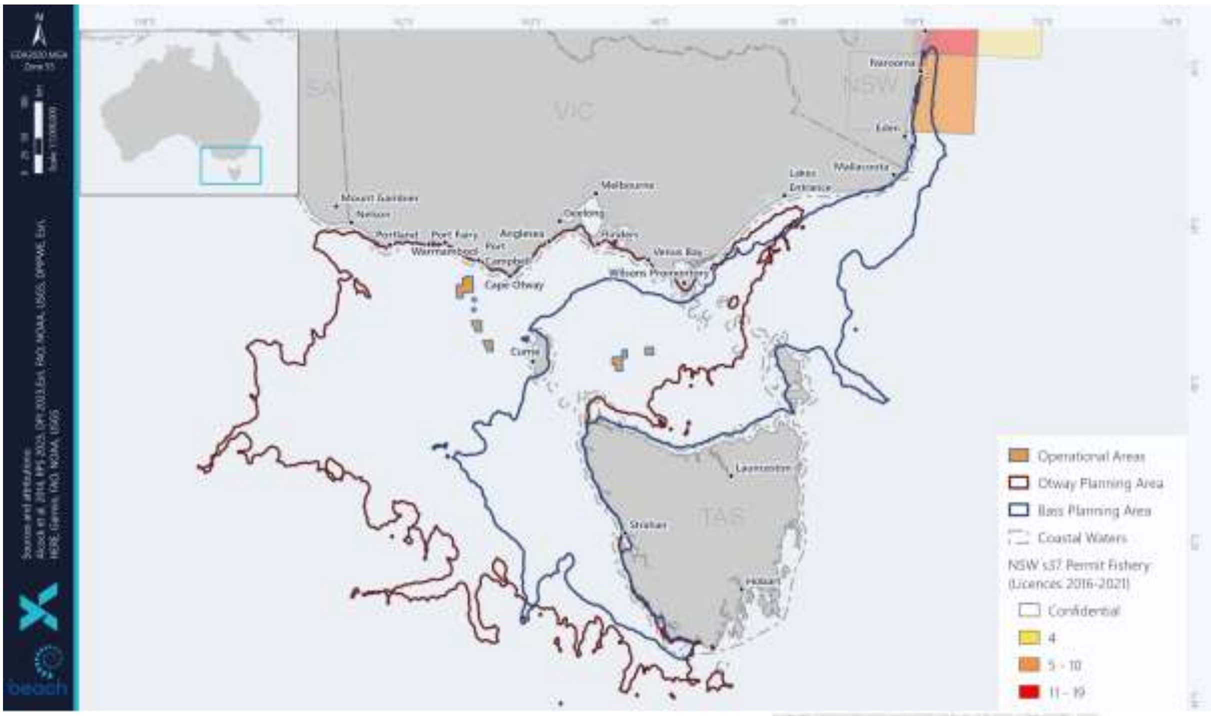


Figure 6-85: NSW s37 Fishery Number of Licences from 2016-2021. Data obtained from DPI 2023.

6.5.11 South Australian Managed Fisheries

South Australian state fisheries are managed by the Department of Primary Industries and Regions (DPIR) under the *Fisheries Management Act 2007*. DPIR jurisdiction covers all waters that are within the limits of the state with additional offshore constitutional settlements for specific fisheries beyond state boundaries into Commonwealth waters. South Australian-managed commercial fisheries with access licences that authorise harvest in the Planning Areas are detailed below. Though certain fisheries possess jurisdiction to fish within the EMBA, analysis of publicly available and requested catch data indicates that not all fisheries have recently actively fished within the Planning Areas. Only fisheries with active fishing occurring in the Planning Areas in the last 10 years will be assessed further. South Australian managed fisheries active within the Planning Areas include:

- Charter Boat
- Giant Crab
- Marine Scalefish
- Rock Lobster

Information relating to the target species, fishing locations, landed catch, value and other relevant aspects of each fishery is included in Table 6-34.

Table 6-34: South Australia Managed Fisheries Commonwealth Managed Fisheries within the Planning Areas

Fishery	Target species	Description	Fishing Effort Operational Area		Fishing Effort Planning Area	
			Bass	Otway	Bass	Otway
Charter Boat Fishery	Various	The Charter Boat Fishery is a limited entry fishery with 82 licence holders of which 47 were active in 2020/2021. Fishing in inshore regions where water depths are <50 m is the most frequent activity. Peak periods are between December and April (summer) and October (Figure 6-86).	No	No	Yes	Yes
Giant Crab Fishery	Giant Crab	Information from in this section is from McLeay (2022) Giant Crab (*Pseudocarcinus gigas*), also known as King Crab, is endemic to southern Australian waters and distributed from southern Western Australia to central New South Wales. While they occur at depths ranging from 20 to 600 m, the highest population densities are found at the edge of the continental shelf at depths of approximately 140 to 270 m. Fishers use a maximum of 100 steel-framed pots that must comply with pot dimension specifications. Commercial access to the Giant Crab resource is limited to licence holders in the Miscellaneous Fishery and Rock Lobster Fishery. Total allowable catch in the fishery is 22.1 t per year, consisting of 13.4 t in the Northern Zone and 8.7 t in the Southern Zone, with total catch ranging from 15.4 t in 202/21 to 18.4 t in 2017/218. The Giant Crab fishing season in between 1 October 31 May, with the fishing season in the Southern Zone between 1 October and 30 April, and in the Northern Zone between 1 November and 31 May. The Otway Planning Area overlaps the southern zone of the fishery, however, DPIR could not provide data specific to the area as all data for the Giant Crab Fishery is confidential (Figure 6-87).	No	No	No	Yes
Marine Scalefish Fishery	King George Whiting	Information from in this section is from Smart et al. (2022). The Marine Scalefish Fishery is a multi-species and multi-gear fishery. Commercial fishing can be undertaken for more than 60 species of scalefish using a range of gear types. The Sardine Fishery is a part of the Marine Scalefish Fishery. The Marine Scalefish Fishery operates in all coastal waters of South Australia between the Western Australian and Victorian border. For some species the Offshore	No	No	No	Yes

Fishery	Target species	Description	Fishing Effort Operational Area		Fishing Effort Planning Area	
			Bass	Otway	Bass	Otway
		Constitutional Settlement extends the fishery area out 200 nm to the Australian Exclusive Economic Zone miles. The fishing area includes gulfs, bays and estuaries, excluding the Coorong. The main species taken are: • King George Whiting • Southern Garfish • Southern Calamari. Those 4 species make up: • 60% of the total fishery production weight • 70% of the total fishery value. Not all species taken by this fishery are scalefish. Other species include squid, worms, sharks. In 2020 there were >300 licences in the fishery. Total annual catches of primary species decline from 2,089 t in 2001 to 807 t in 2020. The Otway Planning Area overlaps the fishery where there have been 27 active licences issued between 2012/21 (Figure 6-88).				
Rock Lobster Fishery	Southern Rock Lobster	The information below is from Linnane et. al (2022). The Rock Lobster Fishery is based on the capture of Southern Rock Lobster (*Jasus edwardsii*). Other species are permitted to be landed and sold, including Giant Crabs and octopus. Rock lobsters are commercially harvested with pots that are set overnight. Rock lobster licence holders may also harvest marine scalefish as endorsed on their licence. The Otway Planning Area overlaps the fishery where there have been 92 active licences issued between 2012/21 and which is closed from 31 May to 1 October (Figure 6-89). The total reported 2020 logbook catch was 1,275.5 t (99% of TACC). The annual catch within the Planning Area ranged from 331 t to 420 t from 2012 to 2022. During this period licence holders ranged from 43 to 71.	No	No	No	Yes

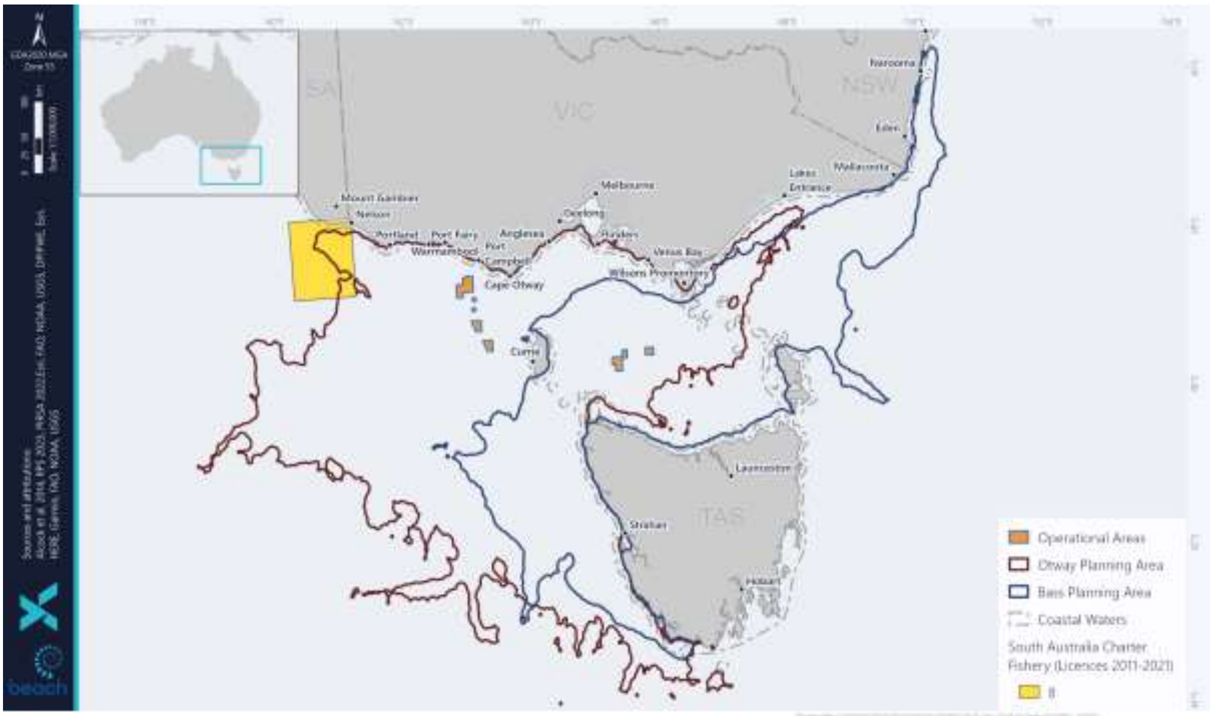


Figure 6-86: SA Charter Fishery Number of Licences from 2011-2021. Data obtained from PIRSA 2022.

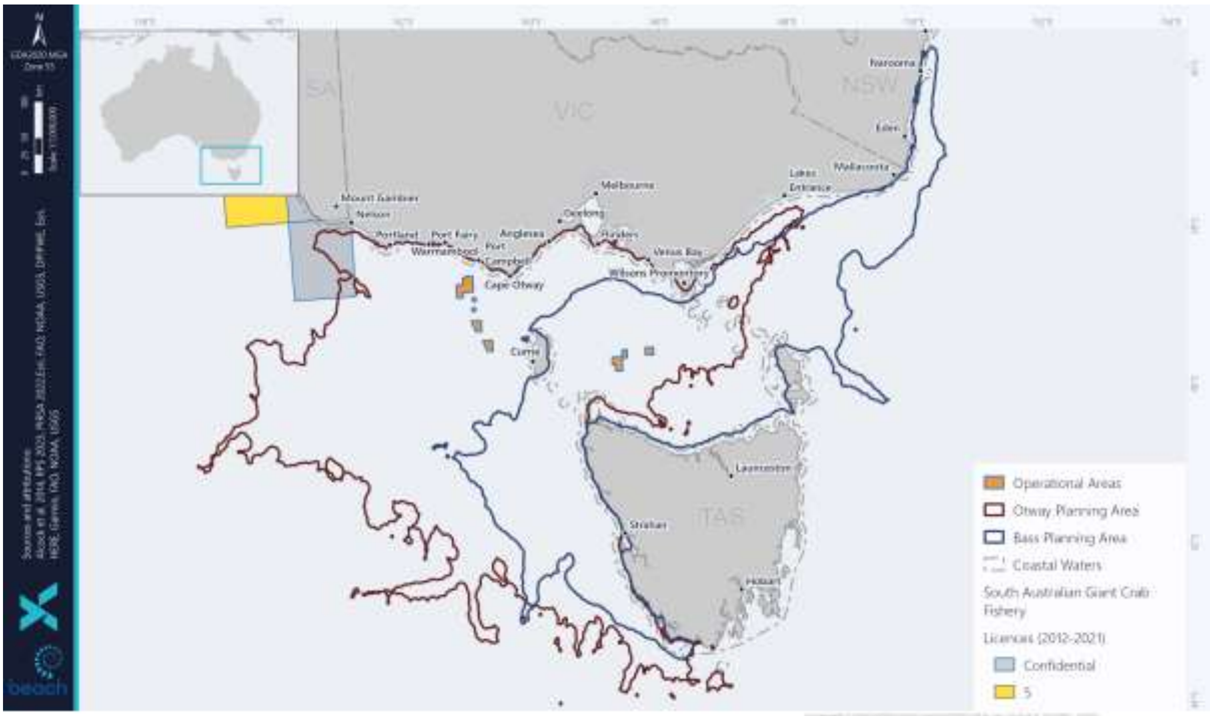


Figure 6-87: SA Giant Crab Fishery Number of Licences from 2012-2021. Data obtained from PIRSA 2022.

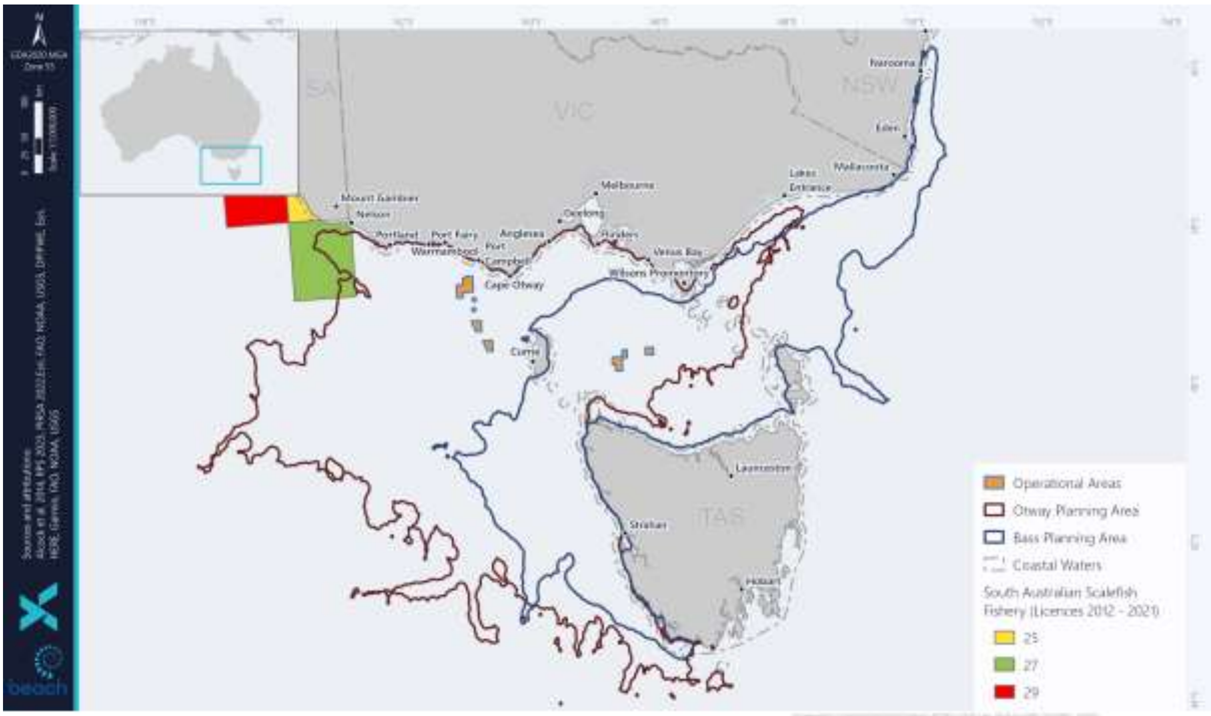


Figure 6-88: SA Scalefish Fishery Number of Licences from 2012-2021. Data obtained from PIRSA 2022.

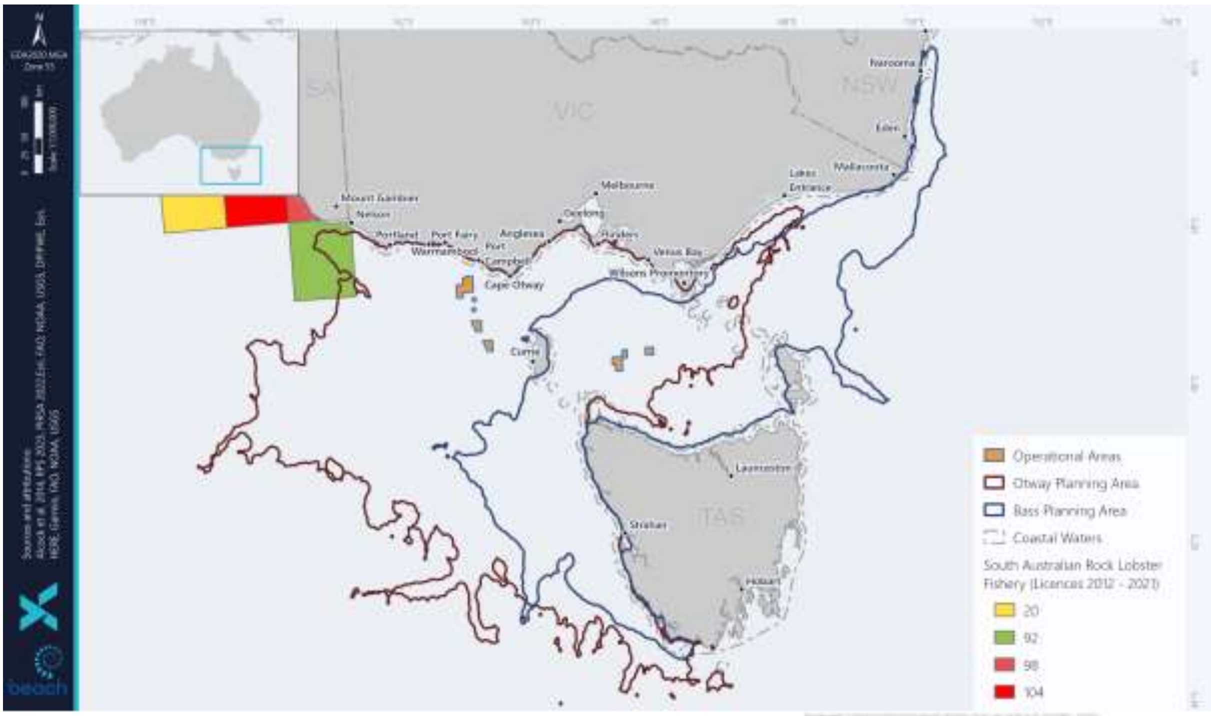


Figure 6-89: SA Southern Rock Lobster Fishery Number of Licences from 2012-2021. Data obtained from PIRSA 2022.

6.5.12 Tasmanian Managed Fisheries

Fishing Tasmania manages Tasmania's commercial fisheries under the Living Marine Resources Management Act 1995.

All fisheries except for the Giant Crab Fishery and the Rock Lobster Fishery operate within Tasmanian waters. The Giant Crab Fishery and the Rock Lobster Fishery also operate in Commonwealth waters under an Offshore Constitutional Settlement (OCS) between the Australian Government and the Government of Tasmania.

No Tasmanian fisheries occur within the Operational Areas.

There are eight Tasmanian state managed commercial fisheries that potentially occur within the Planning Areas:

- Abalone Fishery
- Commercial Dive Fishery
- Giant Crab Fishery
- Marine Plant Fishery
- Rock Lobster Fishery
- Scalefish Fishery
- Scallop Fishery
- Shellfish Fishery

Information relating to the target species, fishing locations, landed catch, value and other relevant aspects of each fishery is detailed in Table 6-35. Data and information sources are Department of Natural Resources and Environment Tasmania (DNRET 2022), Department of Primary Industries, Water and Environment (DPIPWE 2021), Australian fisheries and aquaculture statistics 2014-15 (Patterson et al. 2022).

Maps are also provided showing where the number of vessels reported in a Tasmanian Fishery grid between 2011 – 2021 in relation to the Operational and/or Planning Areas. Fishing effort data is confidential if a grid has five or less active vessels. No data on the Abalone Fishery locations was available from Fishing Tasmania due to the confidential nature of the data.

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 Planning Areas. Commercial Dive, Giant Crab, Scalefish, Scallop, Seaweed and Shellfish Fisheries are also likely to be active within the Planning Areas to varying degrees.

Table 6-35: Tasmanian Managed Fisheries in the Planning Area

Fishery	Target species	Description	Fishing Effort Operational Area		Fishing Effort Planning Area	
			Bass	Otway	Bass	Otway
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. In 2020/21, the gross value of production of the fishery was around $50 million from a total catch of approximately 1,000 tonnes. The jurisdictional area of the Abalone Fishery is Tasmanian State waters. The Bass and Otway Planning Areas intersect the Northern Zone (waters around King Island), Bass Strait Zone (waters in the Northern Bass Strait Region) and Western Zone (waters along the western Tasmanian coast) of the Abalone Fishery (Figure 6-90).	No	No	Yes	Yes
Commercial Dive Fishery (Northern Zone)	Shortspined sea urchin (*Heliocidaris erythrogramma*) Wavy periwinkles (*Lunella undulata*) Longspined sea urchin (*Centrostephanus rodgersii*)	Dive capture fishery that targets several different species; the main species collected being sea urchins and periwinkles. In 2020-2021 approximately 180 t of sea urchins and 2.07 t of periwinkles were harvested. 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 Bass and Otway Planning Areas overlap the Northern Zone of the Commercial Dive Fishery at King Island and in the northern Bass Strait and the Western Zone along the western Tasmanian coast (Figure 6-90). 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). The Western Zone of the fishery is defined as the area of Tasmanian State waters on the west coast bounded in the south by Whale Head near South East Cape and bounded in the north by Bluff Point.	No	No	Yes	Yes
Giant Crab Fishery	Giant crab (*Pseudocarcinus gigas*)	The giant crab fishery is a comparatively small fishery with the annual harvest set at 20.7 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 39º12 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 2019/120 and 2021/2022 to address the issue. Figure 6-91 shows the Bass and Otway Planning Areas overlap where giant crabs are fished, particularly along the continental slope. The Operational Areas do not overlap reported areas of fishing for giant crabs.	No	No	Yes	Yes
Marine Plant Fishery	Bull kelp (*Durvillea Pototorum*) Japanese kelp (*Undaria pinnatifida*)	Marine plants include kelp, seaweed, seagrasses, and algae which are food and habitat for other marine species. To protect Tasmanian marine ecosystems, no marine plants may be harvested directly from the water, except in the Undaria fishery. 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 Planning Areas overlap where bull kelp is potentially collected from the King Island area and the North West area.	No	No	Yes	Yes
Rock Lobster Fishery	Southern rock lobster (*Jasus edwardsii*)	Southern rock lobster are the other major wild-caught Tasmanian fishery. For 2022-23 the Total Allowable Catch remains at 1050.7 t. 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. The fishery is a limited entry with 312 licences. The Bass and Otway Planning Areas overlap fishing effort for the Rock Lobster Fishery (Figure 6-92). Figure 6-92 shows some overlap with grids with fishing effort for the Rock Lobster Fishery for the Otway and Bass Operational Areas, however, further analysis did not identify any fishing effort within these areas (SETFIA 2023).	No	No	Yes	Yes
Scalefish Fishery (northwest coast)	Multi-species and multi-gear fishery	Complex multi-species fishery harvesting a range of scalefish, shark and cephalopod species. Fourteen different fishing methods are used. Highest commercial catches in 2019/20 were reported for Southern Calamari (85.8 t), Wrasse (52.4 t), and Eastern School Whiting (43.7 t). Due to the fishery being under caught by 26.7% in the previous season 2020/21, the Total Allowable Catch for the 2021/22 season has increased to 30 kg quota unit. The Planning Areas overlap the Scalefish Fishery management area (Figure 6-93).	No	No	Yes	Yes

Fishery	Target species	Description	Fishing Effort Operational Area		Fishing Effort Planning Area	
			Bass	Otway	Bass	Otway
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 Planning Area), 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 Planning Areas could potentially overlap areas where Pacific oysters are collected. Data for this fishery is confidential.	No	No	Yes	Yes

Data/information sources: Department of Primary Industries, Water and Environment (DPIPWE, 2021), Australian fisheries and aquaculture statistics 2014-15 (Patterson et al, 2022), Department of the Environment and Energy (DoEE, 2017c), Fish Research and Development Corporation (FRDC, 2017), Fishing Tasmania Website 2023.

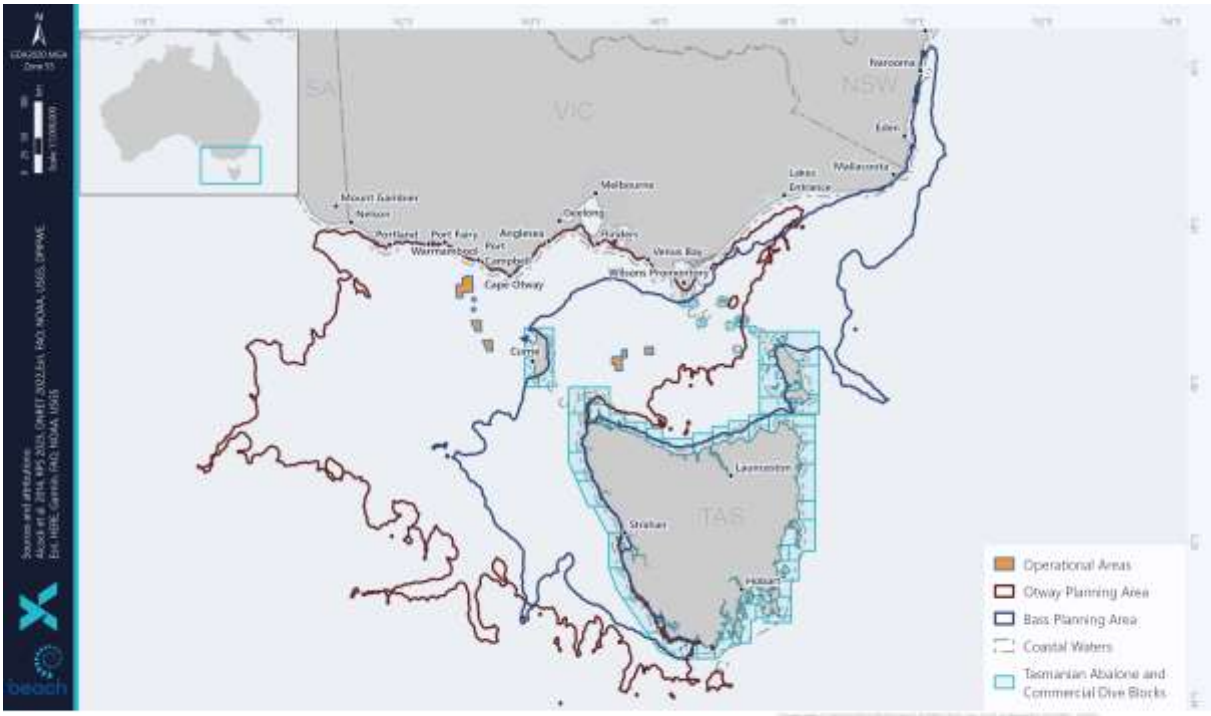


Figure 6-90: Tasmanian Abalone and Commercial Dive Blocks. Data obtained from DNRET 2022.

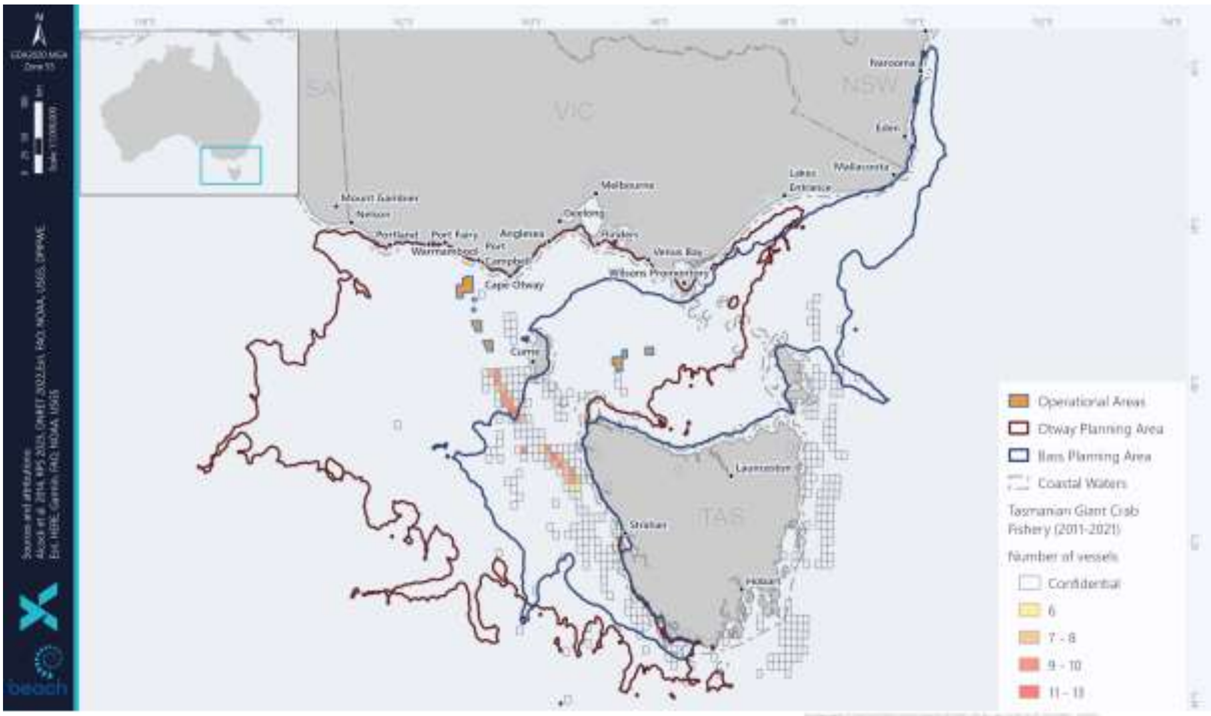


Figure 6-91: Tasmanian Giant Crab Fishery Number of Vessels from 2011 to 2021. Data obtained from DNRET 2022.

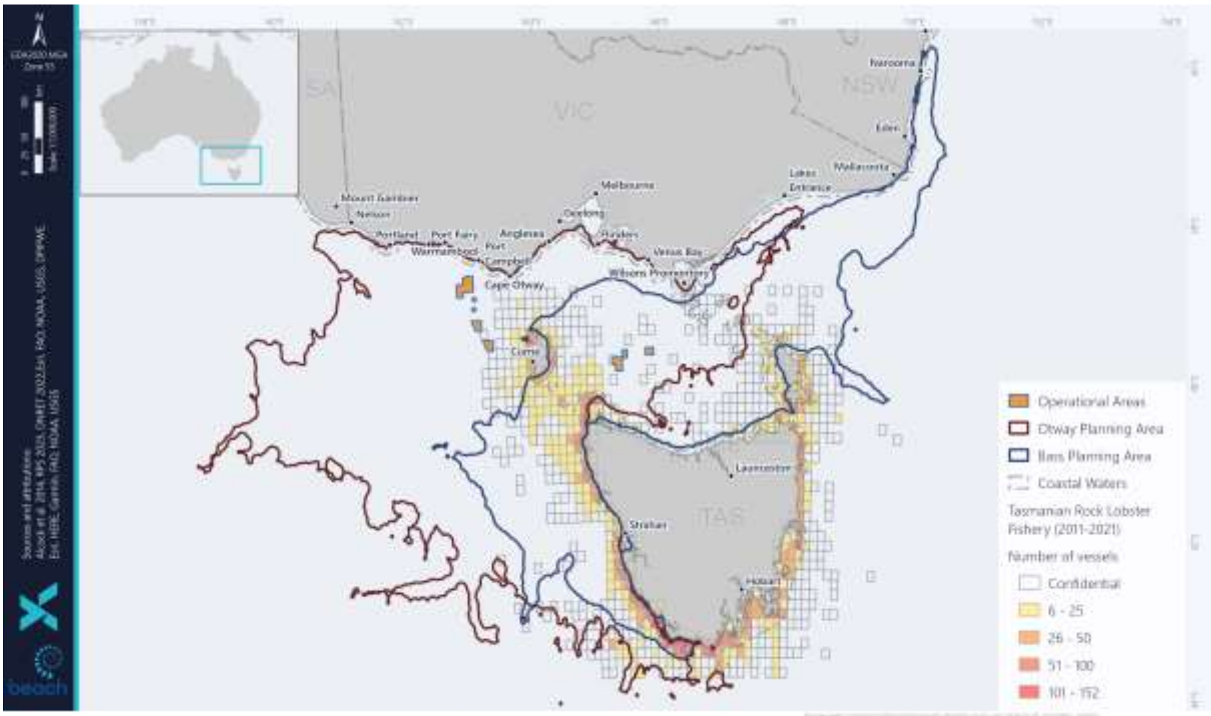


Figure 6-92: Tasmanian Rock Lobster Fishery Number of Vessels from 2011 to 2021. Data obtained from DNRET 2022.

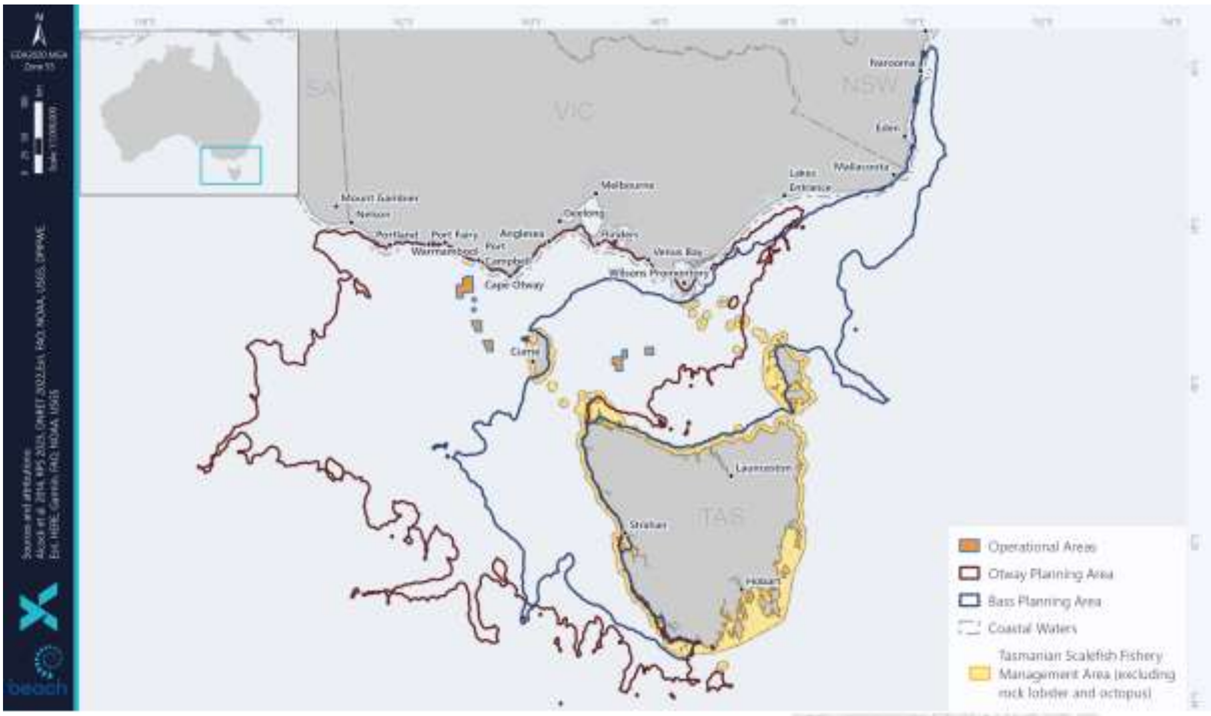


Figure 6-93: Tasmanian Scalefish Fishery Management Area. Data obtained from DNRET 2022.

6.5.13 Victorian Managed Fisheries

Victorian fisheries are managed by the Victorian Fisheries Authority (VFA) under the Fisheries Act 1995 (Cth). VFA has regulatory responsibility for the management of fisheries in Victorian State Waters out to 3 nm and Commonwealth waters where the VFA manage fisheries on behalf of the Commonwealth under the Offshore Constitutional Settlement (OCS) arrangements. OCS arrangements are joint management arrangements of particular marine living resources that are found in waters subject to both Commonwealth and State control. Such arrangements allow for the management of the resources by State authorities, even in waters outside the State 3 nm territorial sea boundary. In Victoria, such arrangements are in place out to 20 nm for key species such as scallop and rock lobster.

There are six Victorian state-managed fisheries that overlap the Operational and/or Planning Areas:

- Abalone Fishery
- Giant Crab Fishery
- Multi-species Ocean Fisheries
- Octopus Fishery
- Pipi Fishery
- Rock Lobster Fishery
- Scallop (Ocean) Fishery
- Wrasse (Ocean) Fishery

Information relating to the target species, fishing locations, landed catch, value and other relevant aspects of each fishery is provided in Table 6-36. Maps are also provided showing where the number of vessels reported in a VFA grid between 2011–2021 in relation to the Operational and/or Planning Areas. Fishing effort data is confidential if a grid has less than five active vessels. No data on the Abalone Fishery locations was available from VFA due to the confidential nature of the data.

Data sources are from the Victorian Fisheries Authority Commercial Fish Production Information Bulletin July 2020 to June 2021 (VFA 2021) and VFA website (VFA 2023a) unless indicated.

Table 6-36: Victorian Managed Fisheries in the Planning Area

Fishery	Target species	Description	Fishing Effort Operational Area		Fishing Effort Planning Area	
			Bass	Otway	Bass	Otway
Abalone Fishery (western zone)	Blacklip abalone Greenlip abalone	A highly valuable fishery (A$16.8 million in 2020-21) 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 2019-20 season, 73.2 tonnes compared with 294.5 and 34.5 tonnes, respectively). There are 14 licences in the western zone and 34 licences in the central zone. The water depths where abalone are fished are close to shore within the Planning Areas. No fishing effort was identified in the Operational Areas.	No	No	Yes	Yes
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. Data for 2020/21 is not available due to insufficient data to report because there are less than five licence holders (policy requirement to protect commercial confidentiality of data. Figure 6-94 shows overlap of giant crab fished areas with the Otway Operational and Planning Areas. The Otway Operational Area contains areas with up to 15 vessels fishing. The Bass Operational and Planning Areas do not overlap giant crab fished areas. Catch effort data is considered confidential if there are less than five vessels present.	No	Yes	No	Yes
Multispecies Ocean Fisheries – Inshore Trawl	Eastern king prawn School prawn Shovelnose lobster/Balmain bug Minor bycatch of school whiting	The fishery operates along the entire Victorian coastline, excluding marine reserves, bays and inlets. Most operators are based at Lakes Entrance. Otter-board trawls with no more than a maximum head- line length of 33 m, or single mesh nets are used. As of June 2019, there were 54 fishery access licences, with only about 15 active to various degrees. Figure 6-95 shows the Bass and Otway Planning Areas overlap areas with up to 10 vessels fishing. No fishing was identified within the Operational Areas. Catch effort data is considered confidential if there are less than five vessels present.	No	No	Yes	Yes
Multispecies Ocean Fisheries – Ocean General Fishery	Gummy shark School shark Australian salmon Snapper Small flathead bycatch	The wrasse, inshore trawl, southern rock lobster and giant crab fisheries are able to catch gummy shark and school sharks as part of their fishery. 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 2020/21, 45 tonnes were landed but a values could not be provided as there is insufficient data to report because there are less than five licence holders (policy requirement to protect commercial confidentiality of data). Figure 6-96 shows both Bass and Otway Planning Areas overlap areas fished, with some areas containing up to 88 vessels fishing. Catch effort data is considered confidential if there are less than five vessels present. No fishing effort was reported within the Operational Areas.	No	No	Yes	Yes
Octopus Fishery	Pale octopus Maori octopus Gloomy octopus	The octopus fishery (Eastern Zone) is a new fishery harvesting mainly pale octopus (*Octopus pallidus*) in East Gippsland. The fishery may also catch Maori octopus (*Macroctopus maorum*) and gloomy octopus (*Octopus tetricus*). Octopus are caught using purpose-built unbaited traps. The fishery commenced on 1st August 2020. Three fishery locations have been established for this new fishery; Eastern, Central and Western octopus zones. The Eastern zone is where the majority of commercial octopus takes place with the Central and Western zones are less established but are being managed by VFA through exploratory, temporary permits. Figure 6-97 shows that octopus fishing effort overlaps both Bass and Otway Planning Areas, with some areas containing up to 10 vessels fishing. Catch effort data is considered confidential if there are less than five vessels present. No fishing effort was reported within the Operational Areas.	No	No	Yes	Yes
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. Figure 6-98 shows that the Otway Planning Area overlaps a small area where pipi fishing occurs where catch effort data is considered confidential due to less than five vessels being present. No fishing effort was reported within the Operational Areas or Bass Planning Area.	No	No	No	Yes
Rock Lobster Fishery (western and eastern zone)	Southern rock lobster	Victoria's second most valuable fishery with a production value of A$13.6 million in 2020/21. 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. Figure 6-99 shows the Otway Operational Areas and both Bass and Otway Planning Areas overlap the southern rock lobster fished areas. The Otway Operational Area overlap areas with up to 24 vessels fishing while the Otway Planning Area contains areas with as many as 117 vessels fishing. The Bass Planning Area overlaps only small areas with up to 24 vessels fishing. No fishing was reported within the Bass Operational Area.	No	Yes	Yes	Yes

Fishery	Target species	Description	Fishing Effort Operational Area		Fishing Effort Planning Area	
			Bass	Otway	Bass	Otway
Scallop (Ocean) Fishery	Scallop	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. Figure 6-100 shows no overlap of the fished areas within the Operational Areas and a small overlap of the Bass and Otway Planning Areas along Gippsland. The Bass Planning Area overlaps small areas where catch effort data is considered confidential due to less than five vessels being present and one area with up to six vessels fishing. The Otway Planning Area overlaps an area with up to 14 vessels fishing.	No	No	Yes	Yes
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 catch in 2019/20 was 21.5 tonnes. Figure 6-101 shows overlap of fished areas with the Bass and Otway Planning Areas. Fishing intensity for areas with less than five active vessels is considered confidential. No fishing effort was reported within the Operational Areas.	No	No	Yes	Yes

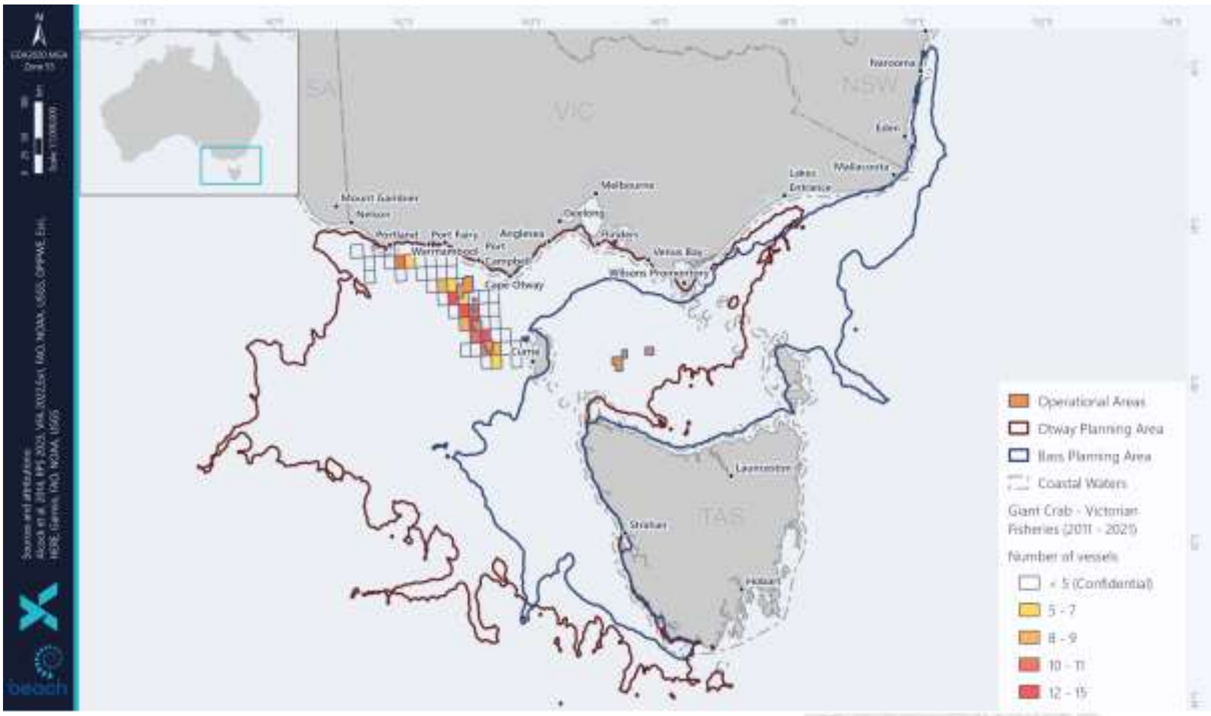


Figure 6-94: Victorian Giant Crab Fishery Number of Vessels from 2011-2021. Data obtained from VFA 2022.

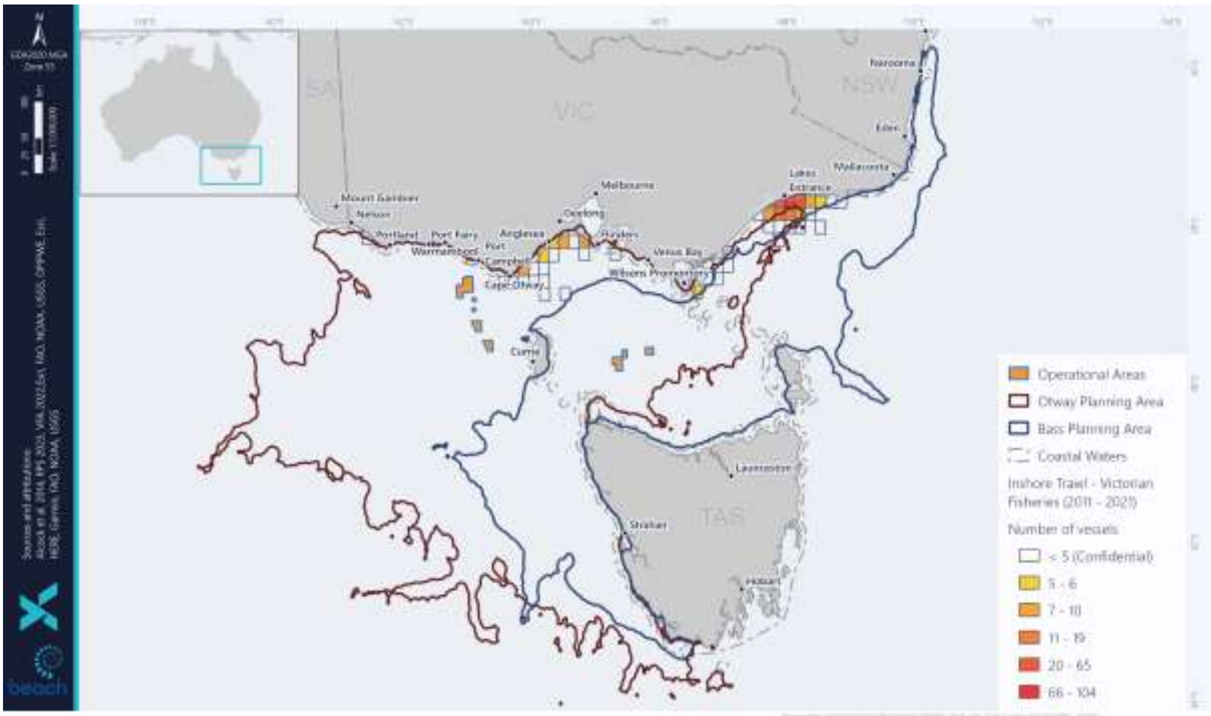


Figure 6-95: Victorian Multispecies Ocean Fisheries – Inshore Trawl Fishery Number of Vessels from 2011-2021. Data obtained from VFA 2022.

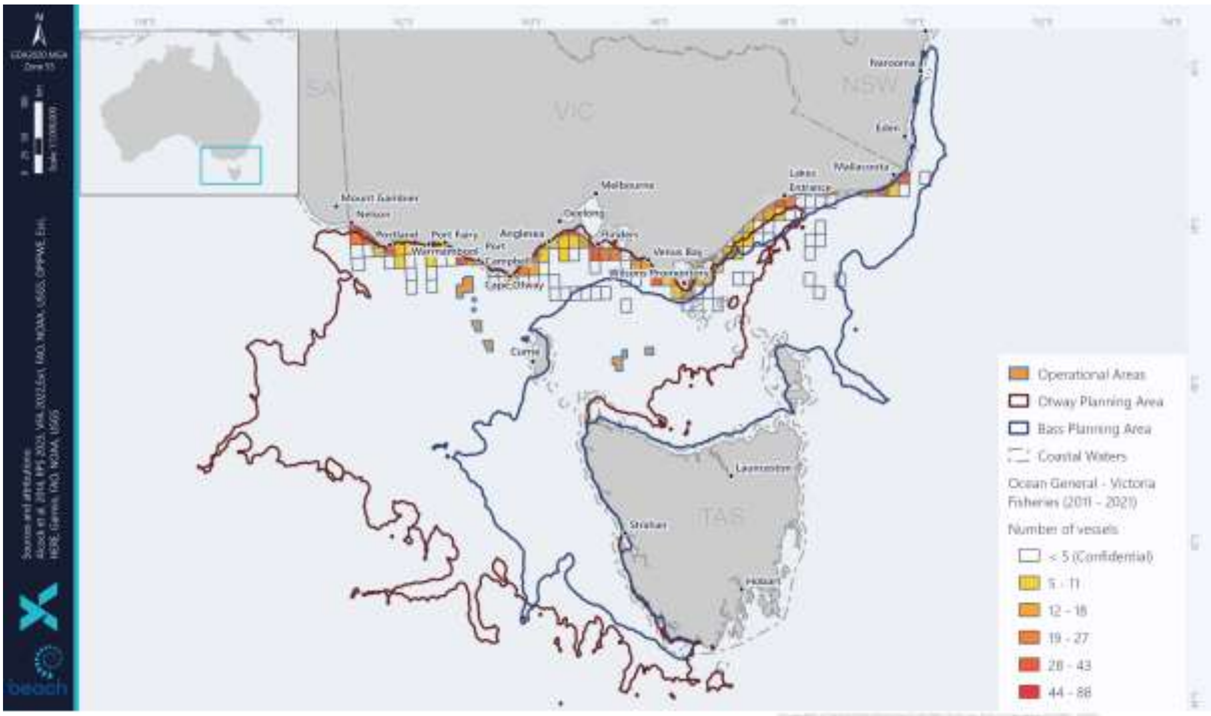


Figure 6-96: Victorian Multispecies Ocean Fisheries- Ocean General Fishery Number of Vessels from 2011-2021. Data obtained from VFA 2022.

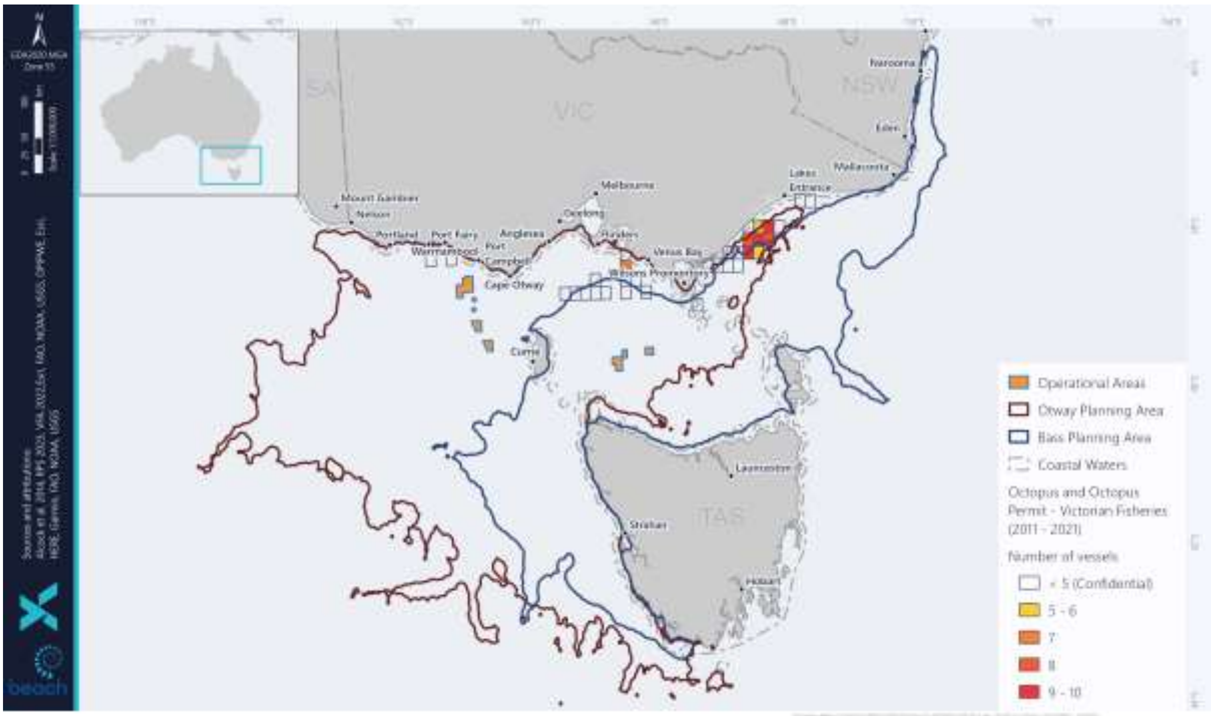


Figure 6-97: Victorian Octopus and Octopus Permit Fishery Number of Vessels from 2011-2021. Data obtained from VFA 2022.

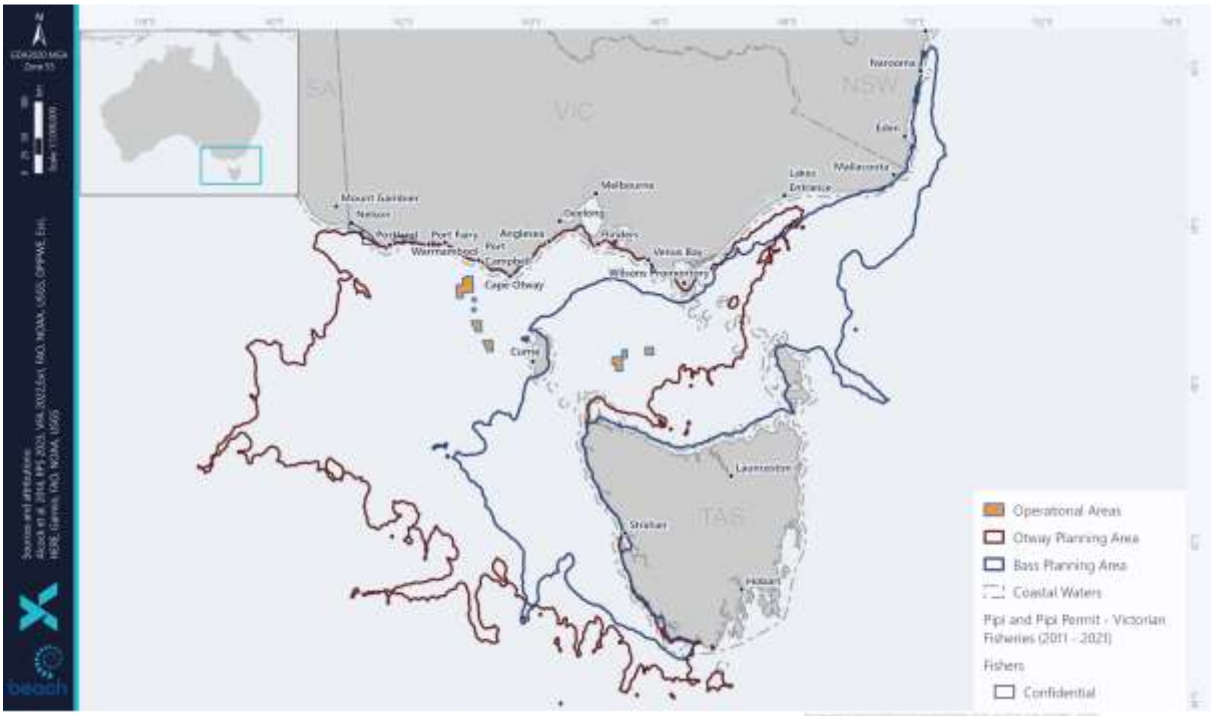


Figure 6-98: Victorian Pipi Fishery Number of Vessels from 2011-2021. Data obtained from VFA 2022.

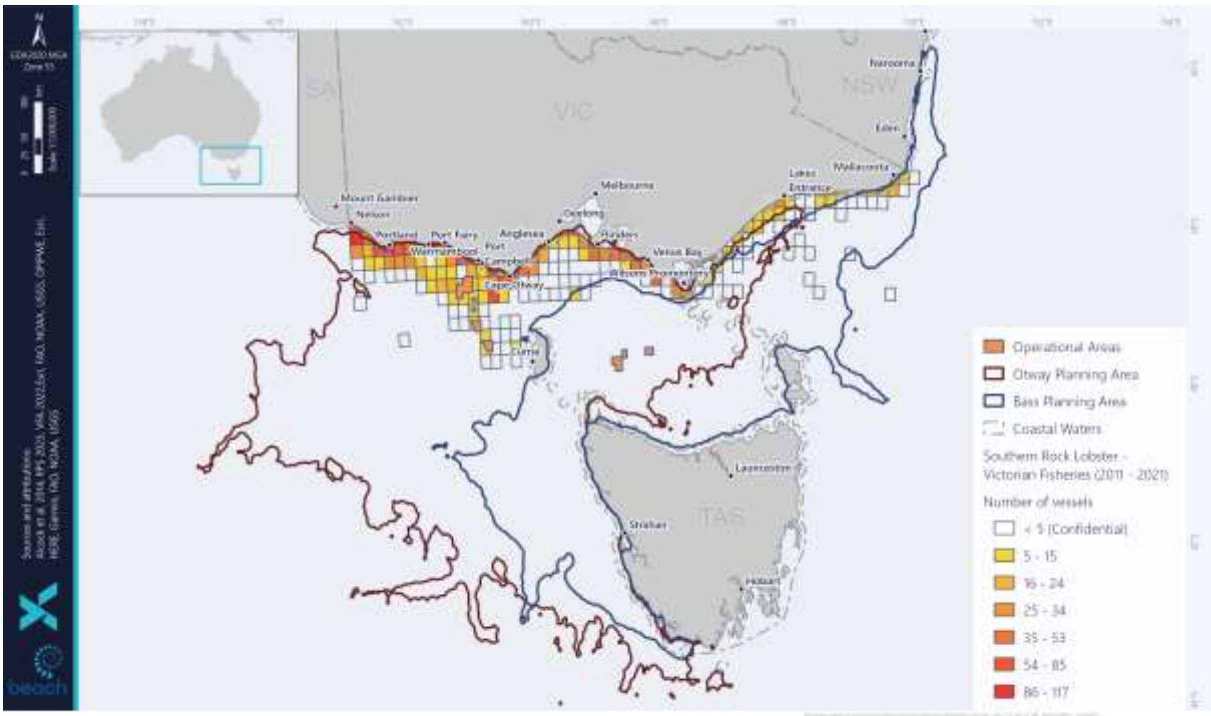


Figure 6-99: Victorian Southern Rock Lobster Fishery Number of Vessels from 2011-2021. Data obtained from VFA 2022.

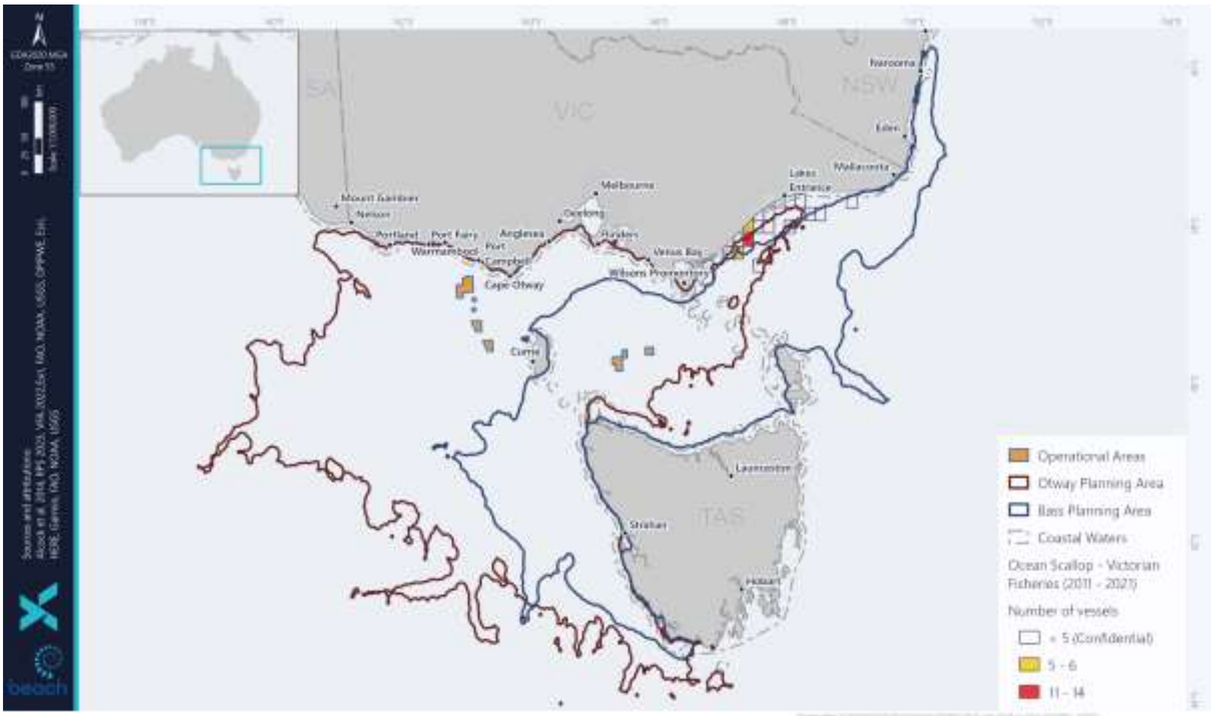


Figure 6-100: Victorian Scallop (Ocean) Fishery Number of Vessels from 2011-2021. Data obtained from VFA 2022.

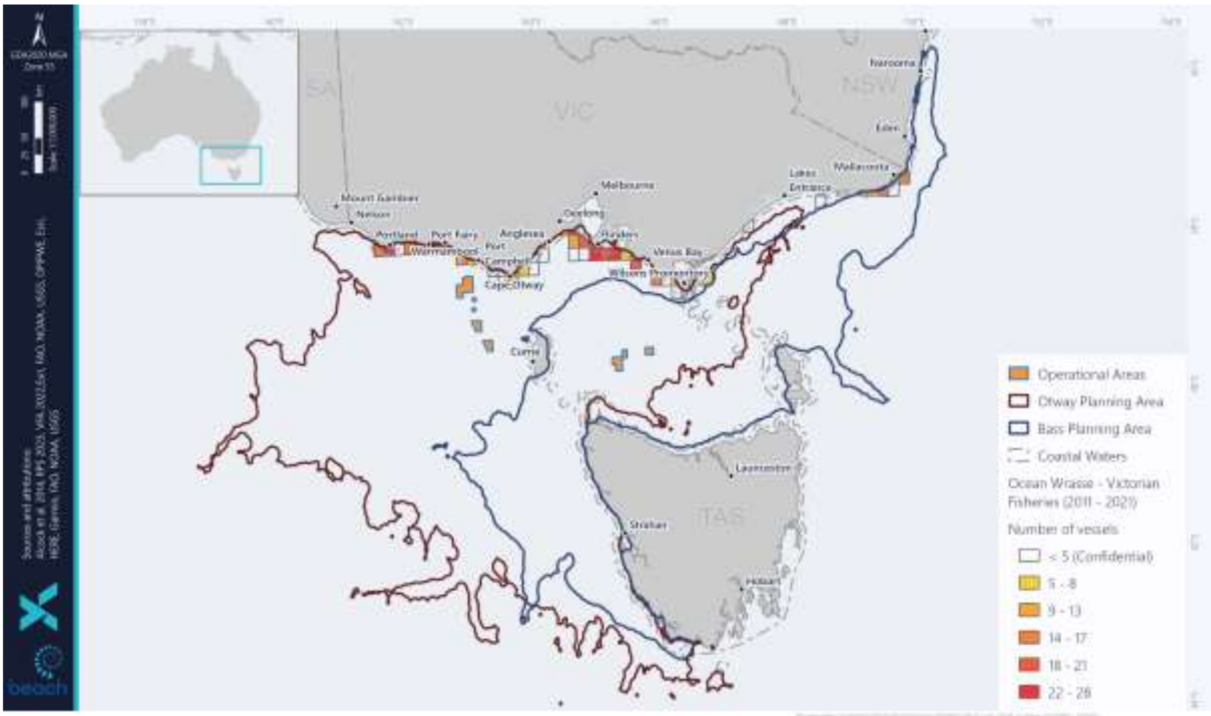


Figure 6-101: Victorian Wrasse (Ocean) Fishery Number of Vessels from 2011-2021. Data obtained from VFA 2022.

6.5.14 Seaweed Industry

The Australian seaweed industry is small: currently valued at an estimated gross value of product (GVP) of AUD $3 million. Of this, the majority is from one company, Kelp Industries Pty Ltd on King Island in Tasmania, who hand collect plants cast bull kelp (*Durvillea pototorum*) on the beaches from predominantly the west coast of the island, predominantly for export to a large alginate manufacturer and for use in biofertiliser products (Australian Seaweed Institute 2023). Australia Bureau of Statistics (ABS) data shows seaweed exports from Australia are valued at $1.5 million for non-human consumption and it is assumed that this is almost entirely from Kelp Industries exports.

Besides Kelp Industries, other seaweed collectors in Tasmania include Kelpomix and TasKelp. There are also licenses for wild harvest of the invasive species of Undaria in Tasmania (KaiHo Ocean Treasure) and some in Victoria (Australian Seaweed Institute 2023).

The harvesting of native seaweed in Victorian marine waters is prohibited without a permit (s. 112(2) Fisheries Act 1995) and licences enabling seaweed aquaculture are not currently available in Victoria (VFA 2023a).

While there are numerous research projects taking place or being planned, currently there are two projects in Tasmania (Australian Seaweed Institute 2023). The first, is a CRC-P project involving collaboration with Tassal, Spring Bay Seafoods and University of Tasmania (UTAS). This project aims to demonstrate the benefits of Kelps as part of an integrated multitrophic aquaculture approach. The second is a research collaboration between UTAS and Huon Aquaculture in Storm Bay that will also yield its first harvest in late 2020.

6.6 First Nations

6.6.1 Methodology to Identify Cultural Values and Sensitivities

The definition of environment in the OPGGS(E)R includes the people and communities, heritage value of places, and their social, economic, and cultural features. Specifically for First Nations peoples, this includes cultural heritage and sea country values which, in accordance with Indigenous tradition, may be a spiritual and cultural connections that may be affected by the activity.

Beach recognises First Nations Groups and their deep spiritual and cultural connection to the environment. The cultural values and features within the Operational and Planning Areas are addressed in this section.[1]

The description of the environment for cultural features and values was developed through:

- Consultation with First Nations groups with connection to Sea Country in the Operational and Planning Areas (Figure 6-103).
- Review of available publications by First Nations Groups relating to Sea Country.
- Engagement of Extent Heritage Pty Ltd (Extent), a specialist archaeological consulting firm, to undertake a literature review and review of Beach's assessment.

Through this processes, and in particular, consultation with First Nations Groups, Beach is confident we have identified the cultural heritage values, and cultural features and sensitivities of First Nations groups identified within the Operational and Planning Areas.

6.6.2 Recognition of First Nations Groups

First Nation Groups and Traditional Owners and connection to Country is recognised through contemporary laws such as the Commonwealth *Native Title Act (1993)*, as well as various State laws and agreement making (e.g. *Traditional Owner Settlement Act 2010* (Vic) and Aboriginal Heritage Acts).

While connection to Country for some First Nations Groups has been formally recognised through native title, other First Nations Groups and their connection and rights to land and sea is recognised through relevant State legislation.

A review of the statutory laws, rights and recognition conferred to First Nations Peoples within the Planning Areas is summarised in the below sections.

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[1] In Australia, using 'Aboriginal and Torres Strait Islander peoples' is considered best practice and other terms such as 'First Nations' or 'First Peoples' are also acceptable language. The term Indigenous is sometimes used for formal programs, job titles or policies.
Throughout this document an effort has been made to keep terminology and First Nations group names consistent, however due to reference material including policies, legislations, and historical reports, at times terminology or names appear different, however all efforts have been made to ensure this is easy to follow.

6.6.2.1 Native Title

The Commonwealth *Native Title Act 1993* is an Australia-wide native title scheme with the following key objectives:

- Providing for the recognition and protection of native title.
- Establishing a mechanism for determining claims to native title.
- Establishing ways in which future dealings affecting native title (future acts) may proceed.

Native Title is the formal recognition that Aboriginal and Torres Strait Islander people have rights and interests to land and waters according to their traditional law and customs.

A key principle for native title determination is for First Nation's people to establish and prove that Indigenous people have an unbroken and current connection to their lands and waters and in practicing their culture from the time of European settlement.

Native title can be granted with non-exclusive or exclusive rights to lands and waters. Non-exclusive native title can include, for example, the right to live and camp on an area, and hunt and fish, and can co-exist with the rights of other land users. In sea areas, only non-exclusive native title can be recognised as exclusive native title is considered inconsistent with other common law rights regarding marine access and navigation (Native title 2010).

The Federal Court of Australia fist recognised native title over the sea for the Traditional Owners of Croker Island in Arnhem Land in 1998 (Tribunal File No. DCD 1998/001). Since the Crooker Islands Seas native title determination, (non-exclusive) native title in sea country has been recognised along Australia's coastline through numerous claims and determinations under the Native Title Act 1993.

A search of the National Native Title Tribunal (the Tribunal) database identified the following native titles claims and consent determinations within the Planning Areas.

Victoria

<u>Eastern Maar People</u>

The Eastern Maar People made application to the Federal Court of Australia for a native title claim which was accepted and registered on 20 March 2013 (Tribunal File No. VC2012/001). A consent determination by the Federal Court of Australia recognising the native title rights for the Eastern Maar Peoples was registered on 28 March 2023 (Tribunal File No. VCD2023/001). The native title area is located in south-western Victoria (Figure 6-102) near Port Fairy along the Great Ocean Road, up to Ararat in the north, and to Colac in the East and extends seaward 100 m from the mean low-water mark of the coastline (NNTT 2016).

The determination recognises Eastern Maar's non-exclusive right to access, use, and protect public land in accordance with their traditional law and custom. The Eastern Maar First Nations Corporation (EMAC) is the registered native title body corporate under the *Corporations (First Nations and Torres Strait Islander) Act 2006* and manages the native title rights for the Eastern Maar Peoples.

Gunditjmara - Part A

A consent determination recognising the native title rights of the Gunditjmara People was registered on 30 March 2007 (Tribunal File No. VCD2007/001) over 140,000 hectares in South-west Victoria (Figure 6-102). The determination recognises Gunditjmara People's native title rights and interests in traditional lands and waters and provides non-exclusive rights to access, use, and protect public land in accordance with their traditional law and custom. The Gunditj Mirring Traditional Owners Aboriginal Corporation (GMTOAC) is the registered native title body corporate under the *Corporations (First Nations and Torres Strait Islander) Act 2006* and manages the native title rights for the Gunditjmara Peoples.

Gunditjmara and Eastern Maar

On 27 July 2011, the Federal Court of Australia determined (Tribunal File No. VCD2011/001) that both the Traditional Owners represented by GMTOAC and the EMAC are the native title holders for the land and waters between the Shaw and Eumeralla Rivers from Deen Maar (including Yambuk) to Lake Linlithgow (Figure 6-102). The native title includes Deen Maar (Lady Julia Percy Island) which holds deep and significant cultural association for Traditional Owners (See Section 6.6.3).

Wadawurrung People

A native title claim application was registered for the Wadawurrung People on 24 July 2023 (Tribunal File No. VC2022/002). The claim area covers land and waters covering about 12,510 km^2 on the southern coast of Victoria (Figure 6-102). The application area is located southeast of Ararat and extends towards the coast around Sugarloaf, Geelong, and Port Phillip Bay.

The following native titles claims and determinations exist outside but adjacent to the Planning Areas.

Gunaikurnai People.

A determination by the Federal Court of Australia recognising the native title rights of the Gunaikurnai People over parts of the determination area was registered on 22 October 2010 (Tribunal File No. VCD2010/001). The area covers the land and waters, including sea country, from Wilsons promontory to Newmerella, and includes the culturally significant Nooramunga Marine & Coastal Park and Lakes Entrance and connected wetlands. The Gunaikurnai Land & Waters Aboriginal Corporation is the registered native title body corporate under the *Corporations (Aboriginal and Torres Strait Islander) Act 2006* and manages the native title rights for the Gunaikurnai People.

There are no registered claims or consent determinations in the area between north-east of the Gunaikurnai claim area and NSW border (search of the National Native Title Tribunal Register as of December 2023).

New South Wales

South Coast People

A native title claim application was registered for the South Coast People (which includes the Yuin People) on 31 January 2018 (Tribunal File No. NC2017/003). The area covers land and waters in New South Wales between Port Hacking in the north, the Towamba River in the south, the coast region between those rivers, and the eastern edge of the Southern Highlands (Figure 6-102).

Tasmania

There are no native title areas in Tasmania, however, there are five Indigenous Protected Areas on the islands of the Furneaux Group in Bass Strait (DPMC 2019).

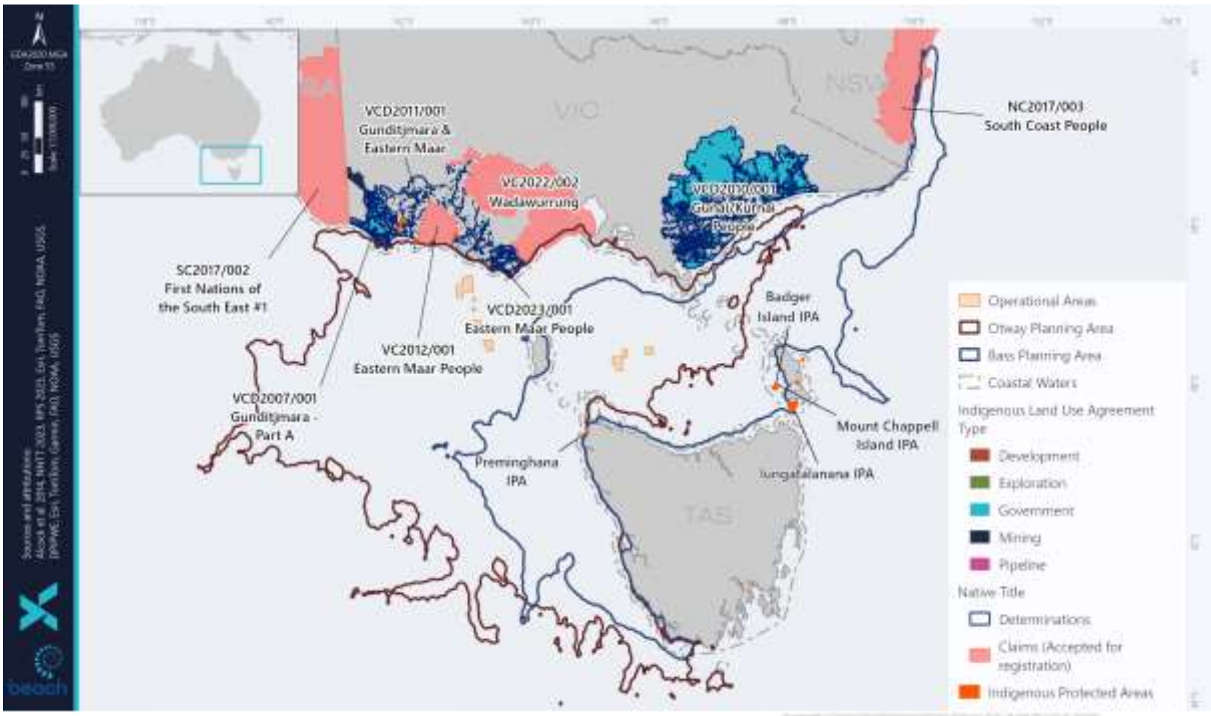

Figure 6-102: Native Title, Indigenous Protected Areas, and Indigenous Land Use Agreements within the Planning Areas

6.6.2.2 Registered Aboriginal Parties

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

The following groups are recognised RAPs within the Planning Areas described in this EP:

- Eastern Maar Aboriginal Corporation
- Gunaikurnai Land and Waters Aboriginal Corporation
- Gunditj Mirring Traditional Owners Aboriginal Corporation
- Wadawurrung Traditional Owners Aboriginal Corporation

Figure 6-103 details the location of these Registered Aboriginal Parties.

There is no recognised RAP for the area between Gunaikurnai and New South Wales (Figure 6-103).

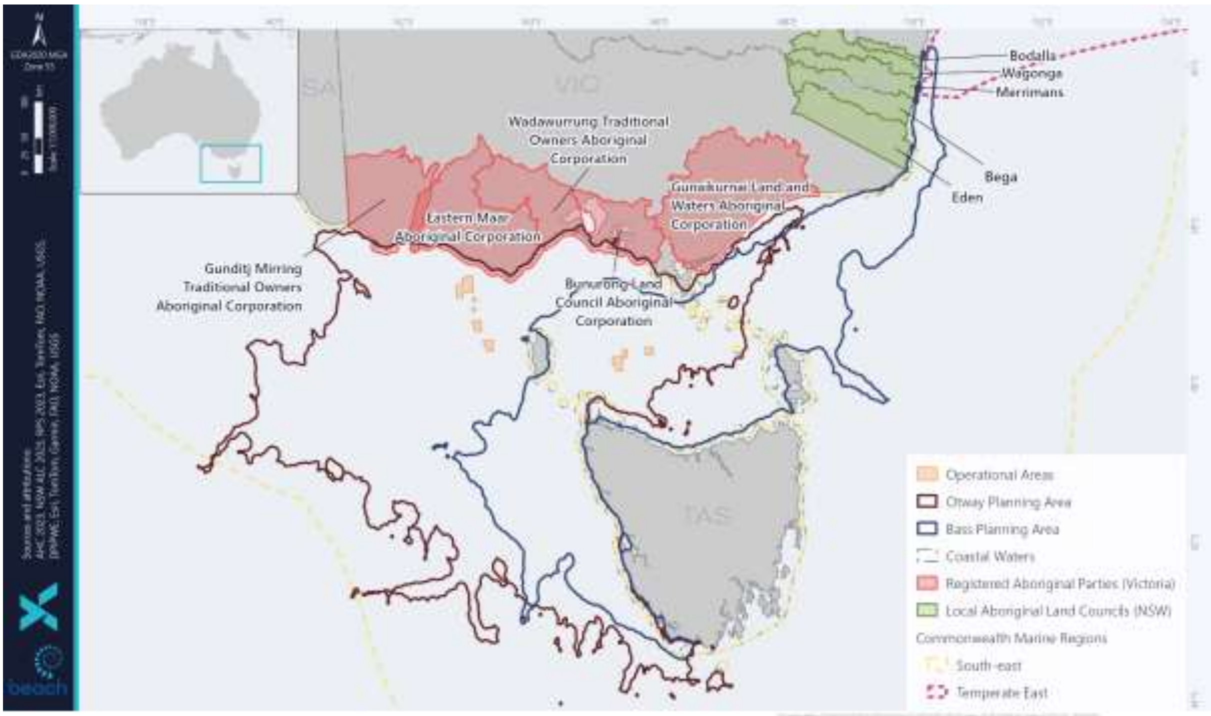

Figure 6-103: Victorian Registered Aboriginal Parties and NSW Local Aboriginal Land Councils within the Planning Areas

6.6.2.3 Indigenous Land Use Agreements

An Indigenous land use agreement (ILUAs) is a voluntary agreement between a native title group and other parties on the use and management of land and waters. ILUAs are established by the *Native Title Act 1993*.

No registered ILUAs were identified within the Operational Area. The following ILUAs have been identified in the Planning Areas.

- VI2006/004: Gunditj Mirring and State of Victoria.
- VI2010/001: Gunditj Mirring Non-Extinguishment Principle ILUA.
- VI2015/002: Gunditjmara – SEAGAS Port Campbell VIC to Torrens Island SA Pipeline ILUA.
- VIA1999/001: BHPP – Minerva.
- VIA2000/004: Blairgowrie.

ILUA locations are shown in Figure 6-102.

6.6.2.4 Land Rights

Most states and territory have legislation which sets out land rights arrangements with First Nations and Torres Strait Islander peoples within their jurisdiction. In most cases the statutory land rights legislation do not extend to marine areas. An exception is under the *Traditional Owner Settlement Act 2010* (Vic) which provides the possibility of agreements to extend to marine areas.

Victoria

In Victoria, the *Traditional Owner Settlement Act 2010 (Vic)* was developed as an alternative approach to the native title process that recognises traditional owners' relationship to land and provides certain rights on Crown land.

The Gunaikurnai People entered into an agreement with the State of Victoria under the *Traditional Owner Settlement Act 2010* (Vic). An agreement to commence negotiate a recognition and settlement agreement between the Eastern Maar and the Victorian Government under the *Traditional Owner Settlement Act 2010* was announced in 2017 (Justice and Community Safety (Vic), 2023).

In Victoria, the *Aboriginal Nations Heritage Act 2006 (Vic)* recognises a Registered Aboriginal Party as the Traditional Owner to manage and protect First Nations cultural heritage over their Country including coastal and onshore waters.

South Australia

In South Australia, the *Aboriginal Land Trust Act 2013 (SA)* is land rights legislation that provides for land to be acquired, held, and managed by the Aboriginal Lands Trust. No land rights have been granted or agreed under the relevant SA legislation within the Operational or Planning Areas.

Tasmania

Tasmania does not have a First Nations land rights legislative regime. Rather, under the *Aboriginal Act 1995* (Tas), grants of land parcels of historic or cultural significance 'to promote reconciliation with the Tasmanian Aboriginal community' may be made and vested in the Aboriginal Land Council of Tasmania. Some islands in the Bass Strait and within the Planning Areas, such as Badger Island and Clarke Island, were returned to the Tasmanian First Nations community under the *Aboriginal Lands Act 1995*.

New South Wales

The *Aboriginal Land Rights Act 1983* (NSW) establishes Aboriginal Land Councils to acquire and manage lands, and to perform other functions. The following Local Aboriginal Land Councils (LALC) are adjacent to the Bass Planning Area in New South Wales:

- Eden
- Bega
- Merrimans
- Wagonga
- Bodalla

6.6.2.5 Indigenous Protected Areas

Indigenous Protected Areas (IPAs) are areas of land and sea managed by First Nations groups through their custodianship and stewardship obligations for Country. IPAs deliver biodiversity conservation outcomes for the benefit of all Australians, through voluntary agreements the Traditional Owners of land or sea and the Australian Government. The IPA program has a dual purpose of achieving conservation obligations and providing sustainable uses to deliver social, cultural, and economic benefits for local Indigenous communities. Indigenous People are active participants in the management of IPAs through land and sea ranger programs and other custodian and management activities.

No IPAs were identified in the Operational Areas. There are several IPAs that overlap with the Planning Areas (Figure 6-102) and are described below.

Badger and Mount Chappell Islands IPA

To the west of Flinders Island in the Bass Strait, Badger Island and its surrounding resources previously supported a community of Tasmanian First Nations people. No longer inhabited, the 1,244 ha island was dedicated as an IPA in 2000 (NIAA 2023). The First Nations history of, and connection to, Badger Island is rich and has stood for a very long time. From significant and ancient occupation evidence such as hearths and midden deposits dating back 20,000 years, to the development of Badger as a hub of a First Nations community and culture encompassing many islands in the Furneaux group in the mid-1800s, the First Nations people's connection to Badger Island continues (TAC 2020). Badger Island was returned to the Tasmanian First Nations community under the First Nations Lands Act 1995.

Badger Island is flat, with the highest point being 38 m above sea level and the remainder between 10 and 20 m above sea level. The landscape has been altered so that it is dominated by poa grasslands to accommodate sheep grazing on the island (TAC 2020).

To the west of Flinders Island, Mount Chappell Island was dedicated as an IPA in 2000. The 327 ha island also has important links to the Tasmanian First Nations community (NIAA 2023c). Managed by the Tasmanian First Nations Centre Rangers, work continues to protect the island's mutton bird rookeries and to maintain existing buildings on the island so that community members have a place to stay. The rangers are also revegetating the island with native plants and controlling weeds such as boxthorn, mirror bush and sea spurge. Mount Chappell Island's mutton bird chicks help feed the largest tiger snakes in Australia (NIAA 2023c).

The declaration of Badger Island and Mount Chappell Island IPAs was made under World Conservation Union (IUCN) Category V – Protected Landscape/Seascape: Protected Area managed mainly for landscape/seascape conservation and recreation.

lungatalanana IPA

To the south of Cape Barren Island is lungatalanana (Clarke Island) at 8,159 ha is the third largest of the Furneaux islands. The island has strong links to the Tasmanian First Nations community and was dedicated as an IPA in 2009 (NIAA 2023a). In May 2005 that the Tasmanian Government returned ownership of lungatalanana to the First Nations community. The Aboriginal Land Council of Tasmania now hold the title for lungatalanana on behalf of all Tasmanian First Nations peoples.

Preminghana IPA

Bordering Tasmania and the Southern Ocean, Preminghana was dedicated an IPA in 1999. Covering 524 ha of land in the north-west, it protects historic First Nations engraving sites and the endangered Preminghana daisy (NIAA 2023b). Preminghana is a property of great significance to the Tasmanian First Nations community. The significance of Preminghana for the First Nations community reaches back to the dawn of time, and community ownership and management was only briefly interrupted by recent colonisation (TAC 2015). Prior to its return to the First Nations community the land was used for sheep and cattle grazing, and large areas were damaged and had become overgrown with weeds. There was also damage to middens and sand dunes (TAC 2015).

Nevertheless, Preminghana retained its significant natural and cultural values. It is also home to a number of threatened plant and animal species. In addition to the engravings a further 53 sites have been recorded at Preminghana including middens, artefacts scatters and quarries where stone tool materials were sourced (TAC 2015), though these engravings and artefacts are not within the Planning Area.

The indigenous community of Preminghana published a Healthy Country Plan 2015 (TAC 2015). Preminghana contains a number of fauna species considered to be important to the First Nations community, including the Orange-bellied parrot which migrates as a whole through the site twice annually, most likely feeding in the coastal saltmarsh, grasslands, heath and moorlands.

Future Sea Country IPAs

The Australian Government, through DCCEEW, is expanding the IPA program. In 2021-22 the Australian Government announced a program to expand the IPA network to include coastal and marine areas (the Sea Country IPA Program). Through the Sea Country IPA Program, the Australian Government is seeking to strengthen the conservation and protection of the marine and coastal environments, while creating employment and economic opportunities for Indigenous People (DCCEEW 2024).

Of the ten future Sea Country IPA consultation projects announced in 2022, three are located within the Planning Areas (DCCEEW 2024).

Gunditjmara Sea Country IPA, Victoria (Gunditj Mirring Traditional Owners First Nations Corporation with Eastern Maar First Nations Corporation)

The IPA consultation area is located in south-west Victoria from the Convincing Ground north-east of Portland to Yambuk Lakes in the east. The area includes volcanic plains, rivers, coast, estuaries, and coastal wetlands, and is an important breeding place and nursery for fish, eels, and birds, including nationally listed species. The area’s waters encompass sites of national geological and geomorphological importance, and habitat for threatened marine animal species. The area also incorporates important cultural sites such as Deen Maar Island, which has a central role in the creation story of Gunditjmara Country. Whilst Budj Bim is located outside of the Operational and Planning Areas, the Sea Country IPA Program will allow Traditional Owners to further protect the Budj Bim Cultural Landscape with activities including implementation of on land/sea management activities; community employment and capacity building; sharing and documentation of traditional knowledge; and the development and enhancement of regional partnerships.

Nanjit to Mallacoota Sea Country IPA, Victoria (Gurnaikurnai Land and Waters First Nations Corporation)

The IPA consultation area is in coastal waters of the Gippsland region in Victoria. The area comprises numerous marine and coastal parks and includes the Ramsar listed Gippsland Lakes and Raymond Island, a highly significant cultural site. A Junior Sea Country Ranger program will bring young Traditional Owners to work with and learn from senior rangers and Elders. IPA staff will participate in a Mulloway monitoring program to learn migratory patterns and health condition of this culturally important fish species, as well as undertake research to identify opportunities to protect and enhance habitat for Australian bass and estuary perch. Gurnaikurnai Land and Waters First Nations Corporation will continue to identify and map land-based sites of cultural significance, building on the historical accounts of First Nations People in the region.

Tayaritja (Bass Strait Islands) Sea Country IPA, Tasmania (Tasmanian Aboriginal Centre)

The IPA consultation area is located in north-east Tasmanian waters and will link five existing island IPAs and other islands (including the Badger, Chappell, and Clarke Islands IPAs). The area includes Ramsar wetlands and ecologically significant coastal habitats. IPA staff will rehabilitate, restore, monitor, and evaluate ecologically significant marine ecosystems, helping to protect threatened marine animals and seabirds and over 120 plant species. The project includes implementation of a cultural burning program and a pest animal and weed management program aimed at maintaining healthy coastal ecosystems.

6.6.3 Cultural Values and Sensitivities

6.6.3.1 Country and Sea Country Overview

Country is a cultural landscape, it includes the tangible (cultural heritage) and intangible (song, creation stories and cultural practices). First Nations cultural concepts are firmly intertwined with the nature of the environment, of Country. Country describes all aspects of place, environment, spirituality, law, and identity. Part of Country that extends into the oceans is known as Sea Country. Values of Country differ between First Nations groups, and not all First Nations groups and communities in Australia hold the same belief systems as formational pillars of their community or spirituality. Differences can be due to aspects of post-colonialism, such as dispossession, genocide, and cultural practice restrictions.

Due to the varied culture and history of First Nations groups, and in particular owing to various degrees of dispossession and removal from country, loss of connection, and continuation of culture, the responses of First Nations communities to caring for and talking about Country are different throughout Australia. These individualised but community-based beliefs and values contribute to the need for a varied and responsive approach to managing cultural (tangible and intangible) values.

A cultural landscape is about both pre-colonial and contemporary interactions between humans and the physical environment including non-human animals, plants, physical structures, ancestors, song lines, trade routes and other significant cultural connections to Country. Cultural landscapes are reflections of how First Nations people engaged with Country, as they see that landscape features are not just physical features, their understanding is that the landscape intrinsically connects the past and the present to people, stories, and history.

Smyth and Isherwood (2016) describe Sea Country as all estuaries, beaches, bays, and marine areas collectively, within a traditional estate. Sea Country contains evidence of the ancient mystical events by which all geographic features, animals, plants, and people were created. Sea Country contains sacred sites and contains tracks (or song lines) along which mythological beings travelled during the creation period (Smyth and Isherwood 2016). The sea, like the land, is integral to the identity of First Nations groups. Connection to Sea Country is accompanied by a complexity of cultural rights and responsibilities. Formal recognition of Sea Country rights lags considerably compared to land rights; this could be for a range of reasons including conflicting perspectives and opinions on traditional custodianship of land and how far it extends (Smyth and Isherwood 2016).

Coastal areas were amongst the most densely populated areas, due to abundance of resources. Sea Country, as it does on land, has been found to contain evidence of the ancient Dreamtime events by which all geographic features, animals, plants, and people were created. Sea Country may contain sacred sites, which may be related to these creation events, and it contains tracks (or Songlines) along which ancestral beings travelled during the creation period. Sea Country has a continuing cultural value because of the connection to creation and dreaming stories, ceremonial sites, and places of occupation.

Country is the term often used by First Nations people to describe the lands, waterways, and seas to which they are connected. The term contains complex ideas about law, place, custom, language, spiritual belief, cultural practice, material sustenance, family, and identity (AIATSIS 2022). Sea Country also known as Saltwater Country extends into the Operational and Planning Areas.

6.6.3.2 First Nations Groups Sea Country within the Operational and Planning Areas

There are First Nations groups with Native Title recognition in areas adjacent the Operational Areas and Planning Areas. However, it is important to also acknowledge and respect the intangible cultural values and sensitivities that exist for other First Nations groups described in this section that are not directly adjacent to an Operational Area, due to the interconnectedness of marine ecosystems and existences of various marine fauna and flora and intangible cultural values. Table 6-37 summarises the First Nations peoples Groups in relation to the Operational and Planning Areas

Table 6-37: Summary of First Nations Groups in relation to the Operational and Planning Areas

First Nations Group	Otway	Bass
Eastern Maar	Operational Area Planning Area	NA
Gunditj Mirring	Planning Area	NA
Wadawurrung	Planning Area	NA
Bunurong	NA	Operational Area
Gunaikurnai	Planning Area	Planning Area
Palawa (Tasmania)	Operational Area Planning Area	Operational Area Planning Area
Eden Local Aboriginal Land Council	NA	Planning Area
Bega Local Aboriginal Land Council	NA	Planning Area
Merrimans Local Aboriginal Land Council	NA	Planning Area
Wagonga Local Aboriginal Land Council	NA	Planning Area
Bodalla Local Aboriginal Land Council	NA	Planning Area

The land adjacent the Otway Operational and Planning Area is the traditional land of the Eastern Maar Peoples legally represented by the EMAC. EMAC is both a Registered Aboriginal Party and a Recognised Native Title Prescribed Body Corporate. Eastern Maar land extends north to Ararat and encompasses Port Fairy, Warrnambool, Port Campbell, and other areas along the Great Ocean Road. It also extends 100 m out to sea from low tide and therefore includes the iconic Twelve Apostles (EMAC 2024). Eastern Maar have always had a close connection with Sea Country which has nourished and supported their ancestors for thousands of years. Sea Country for Eastern Maar holds significant Dreaming stories, telling the story of their ancestors movement across Country. Harvesting of eel, or "*Kooyang",* is incredibly important to the Eastern Maar today and remains a cultural practice handed down from their ancestors (Source – consultation with Eastern Maar people Stakeholder ID 15333).

The land adjacent the Otway Planning Area includes the traditional lands of the Wadawurrung people. Sea Country, or "*Warre*" for Wadawurrung extends from Painkalac Creek at Aireys Inlet, east into Port Phillip Bay and to the Werribee River and to the north as far as Mt Emu and Fiery Creeks (Clark 1990). For the Wadawurrung peoples, *Warre*, holds the stories and footprints of their ancestors, with *Warre* being a place to meet, trade, share meals and practice ceremony. Eel, or *Beniyak,* have cultural significance to the Wadawurrung peoples (Source – consultation with Wadawurrung people Stakeholder ID 4194727).

The Wadawurrung native title claim and registration decision (Tribunal File No. VC2022/002) state that the claimants see Wadawurrung country and its waters as an anatomical being, with its head to the south, spine to the east, feet to the north and the arms lying along the Otway coast. This posture and orientation is replicated in traditional burial practices. Names of places in Wadawurrung language also follow the same theme and are named after body parts, like spine, head, tongue, or elbow. The Wadawurrung 'see our *Dja* land and *Warre* sea Country as all one' (WTOAC 2020).

Also adjacent to the Otway Planning Area is the lands and Sea Country of the Gunditjmara. Gunditjmara recognise four types of landscape across their Country Sea Country, as one of the four, "*Koonang Mirring"* is defined by the meeting of salt and fresh water. Abundant in shellfish, fish, and birds, it also has a history of conflict and violence between the Gunditjmara and colonial settlers. Koonang Mirring includes the submerged landscape and the place where the spirits of Gunditjmara ancestors cross the sea to Deen Maar (CoA 2017c).

The Bunurong First Nations peoples are the Traditional Owners of the Victorian land adjacent to the Bass Operational and Planning Areas and the Otway Planning Areas. They are represented by the Bunurong Land Council Aboriginal Corporation (BLCAC). Bunurong Country extends from the Werribee river to Wilsons Promontory includes some of the submerged land bridge to Tasmania (source - Consultation with BLCAC Stakeholder ID 1496). Through consultation with Beach, BLCAC advised that Sea Country is very significant for cultural practices and ceremony. Eels hold special cultural significance for the Bunurong people.

The Otway and Bass Operation and Planning Areas are also adjacent to *lutruwita* (Tasmania) The *palawa* (Tasmanian First Nations) are the Traditional Owners of *lutruwita* (Tasmania). *Palawa* people have inhabited Tasmania for at least 35,000 years. At the end of the last ice age the sea level rose, and Tasmania became isolated from the mainland of Australia. They survived in the changing landscape partly due to their ability to harvest aquatic resources, such as seals and shellfish. Following conflict between the European colonists and the Tasmanian First Nation peoples, many were relocated to missions on Bruny Island, Flinders Island, and other sites, and finally to Oyster Cove. Through consultation with Department of Premier and Cabinet and Department of Aboriginal Affairs Tasmania

(Stakeholder ID 243269638), Beach understands that kelp, whales, and mutton birds hold special cultural significance for First Nations peoples on mainland Tasmania, King Island and Flinders Island.

The Bass Planning Area is also adjacent to the Southern Yuin (*Murring*) nation which includes the *Ngarigo* speaking people of the *Monerro* (monaro) cultural landscape. The *Katungal* are the main sub group of coastal fishing people with which there are smaller groups identified. The languages spoken in this region are *Thawa* and *Bidwall* language groups. Southern Yuin people are represented by the Local Aboriginal Land Councils (LALC) as detailed in Section 6.6.2.4.

For the Southern Yuin people, traditional cultural fishing practices remain an integral part of the lives of First Nations peoples today. The following species are a traditional food source for the coastal Yuin and Monerro groups:

- Abalone (mutton fish)
- Bimbalas
- Oysters
- Mullet fish
- Eastern rock lobster

Other important cultural species include the southern right whale, which visits twice yearly, and dolphins, which are known to assist in fish harvesting. Blackfish or Warrgo, is a bush medicine for First Nations peoples and First Nations people in the Eden LALC have the legal right to continue to harvest this species.

Some of sea country priorities for the Eden LALC set out in the Land and Sea Country Management Plan (Donaldson et al. 2011) include restoration of coastal mangroves, marine debris clean-up programs, pacific oyster mapping and eradication program.

The Yuin people have strong cultural and spiritual ties to the land and sea in the coastal areas that are included in the Batemans Marine Park. The coast has provided food, shelter, and resources for First Nations people for thousands of years. The land and waterways, and the habitats that support the plants and animals, are important features in First Nations culture. They not only provide a source of food and medicine, but also include ceremonial areas, meeting places and sacred sites and spiritual areas. The traditional way to ensure that resources are maintained for the future is for them to become a totem for the local people. This encourages a system of kinship with the natural world, as well as ecological connectivity (Marine Parks Authority NSW 2013)

Species within the Batemans Marine Park that have cultural significance include:

- Barumguba (Montague Island)
- Mullet
- *Burumayal* / Bream
- Neptunes necklace, Nuruma, is a significant seasonal indicator.

- *Conk*/Triton shells
- *Walkamurra*/ abalone
- *Bhittinga* / oysters
- *Joongar /* octopus
- *Dhagala* / flathead
- Eagleray

6.6.3.3 Sea Country Values

South-east Marine Region (Victoria, Tasmania)

The Otway Planning Area overlaps the South-east Marine Region (Figure 6-103). Indigenous uses and values within the South-east Marine Region are described in Sea Country - an Indigenous Perspective (NOO 2002b). Specifically, Indigenous activities described in the South-east Marine Region Profile (CoA 2015a) state:

Most parts of coastal Australia are of continuing cultural and spiritual significance to Indigenous people, many of whom engage in subsistence hunting, fishing and gathering and depend directly on marine resources for food. Through their involvement in commercial activities, many Indigenous people also depend on marine resources for their income.

Fishing is an important part of Indigenous culture, and a variety of methods and equipment are used, including hand gathering, lines, rods and reels, nets, traps and spears. Indigenous fishing targets a range of species of fish, shellfish, crabs and worms that are used for food, medicine or bait. Abalone, crab and lobster harvesting are important Indigenous fisheries. Indigenous people in south-eastern Australia engage in fishing and shellfish collecting on a regular basis and are involved in commercial fishing activities.

Indigenous people in the South-east Marine Region have articulated particular aspirations in terms of access rights and traditional use of marine resources, participation in management processes, and participation in the fishing sector.

First Nations people’s interests in the South-east Marine Region, are diverse and complex. Indigenous people live around the region in major cities, regional centres, small towns and on First Nations land. Coastal areas of southeast Australia were amongst the most densely populated regions of pre-colonial Australia. These highly populated areas provided an abundance of marine and other resources. However, we know that many have been displaced from the coastal areas (NOO 2002b).

Temperate East Marine Region (NSW)

The Temperate East Marine Region covers a large area the runs from the southern boundary of the Great Barrier Reef Marine Park to Bermagui in southern New South Wales. The southernmost section of the Temperate East Marine Region is within the Bass Planning Area (Figure 6-103).

Many First Nations and Torres Strait Islander peoples have a close, long-standing relationship with coastal and marine environments and continue to rely on these environments and resources for their cultural identity, health, and wellbeing, as well as their domestic and commercial economies.

First Nations people claim inherited rights and responsibilities over sea country within the Temperate East Network.

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

6.6.3.4 Sea Country Values - Resources

Adornment and Function

Frequently, tangible resources, such as food items, animal and plant species, and other resources, such as stone, bone and wood, are also tied strongly to intangible elements of First Nations culture. First Nations people of Tasmania, the Palawa, were noted for creating durable and waterproof containers of sea-kelp threaded and dried to shape on wooden handles. In addition, shells were collected and worn as adornment. Throughout south-eastern Australia, reports of seaweed use include for cultural and ceremonial activity, medicine, clothing, food, fishing, and domestic/shelter uses (Thurstan et. al 2017). The Wadawurrung, for example, used "pink seaweed" as a poultice for jellyfish stings (Lane 1980).

Other fish and shellfish species have been noted by community during consultation, including abalone, cockles, and rock lobster (crayfish). The Eastern Maar have noted the migration routes of crustaceans as of notable significance. The Wadawurrung mention that crayfish, mussels, oysters, pipis, and fish provided important bush tucker, medicines, and other resources. Fish were caught using hooks, nets, and traps (WTOAC 2020). Other species were specifically not eaten or associated with other custom, for example, the Stingray (*Baalangurk)* was not eaten by the Kurnai (Howitt n.d.). Swans were hunted with boomerangs and spears, whilst other birds were caught in nets woven from plant fibres (WTOAC 2020).

Eels

It has been well documented that the Gunditjmara employed complex systems of aquaculture, comprising channels, weirs, and dams, to harvest *kooyang* (eels) on their Country (CoA 2017c). The migration of juvenile eels from freshwater to the ocean to mature and breed is integral to the survival of the species, and their physical health is inherently tied to the spiritually of the Gunditjmara. The aquaculture system is an economic and social base for Gunditjmara society (CoA 2017c). Eels and their migration are also held in social and cultural significance by the Eastern Maar, as neighbours to the Gunditjmara sharing many similar beliefs of their significance. Other coastal and river groups, including the Wadawurrung (buniya) and Bunurung, also utilised eels as an important resource and seek to protect their migration along rivers, creeks, and into the oceans. Section 6.4.7.3 provides more details on eels.

The Kulin and Kurnai Dreaming Story of Lo-an includes Lo-an and his wife Lo-an-tuka surviving mostly on eels cooked in a *marin-a-thung* (earth oven) on the Yarra flats. After finding a feather on his chest, Lo-an with Lo-an-tuka proceeded to follow the breeze to find the swans that the feather had come from and walked to the shores of Western Port. They camped for a long time feeding on swans and continued following the coastline to Corner Inlet. The Kulin believe they became the stars Sirius and Canopis. The Kurnai believe Lo-an is upon his mountain and looks out towards to sea, watching over the people (Massola 1968).

Whales

Through consultation, whales and whale migration have been noted as of significance by coastal groups in Victoria. Eastern Maar have noted the migration routes of the southern right and blue whale as of social and cultural importance. The same whale species are similarly noted by the Gunditjmara and Wadawurrung.

First Nations communities in the south-east of Australia often saw whales as spirits that transformed when they entered the water, creating a respectful relationship between whales and First Nations communities. Whale hunts took place from small, shore-based vessels, and targeted smaller animals (Eldridge 2015). In New South Wales, whale hunting targeted migrations from the Pacific to the Southern Ocean. First Nations methods of hunting may have included using fire and smoke to lure the whales to the coast and bays (Eldridge 2015), and the opportunistic utilisation of beached whales also occurred, which may have prompted periods of intense gathering of people and ceremony like those observed by early settlers such as Henty (Eldridge 2015). In Howitt's notes on the Kurnai, whales are called *Ganda* - 'Dead whales thrown up by the sea were supposed to have been killed by the *Mrarts* [ghost or spirit] and birds called *Yauruk* [or *Yara-wuk*] and sent ashore. The *Mrarts* then communicated to the *Biraaks* who told the Kurnai where to go and find the *Ganda*. (Howitt n.d.).

The Gunaikurnai have noted bottlenose dolphin at Lakes Entrance, and the significance of dolphins is echoed by the Wadawurrung. Wesson (2001) notes that 'the souls of prominent community leaders [were] reincarnated as dolphins and orcas'.

6.6.3.5 Sea Country Intangible Values

Landforms and landscape features in and surrounding watery places are known to hold particular significance for First Nations coastal communities. Islands off the Southern Ocean coastline have cultural importance to First Nations people as Islands of the Dead and are frequently connected to the shore by journey-after-death stories (Draper 2015).

For example, the Gunditjmara of Western Victoria seasonally occupied the caves and escarpments in the coastal limestone karst formation. These caves at Cape Bridgewater are associated with *Bunjil* who descended from the caves where he resided to walk along the shoreline (Bonwick 1858). The Gunditjmara believe that 'Bunjil, their creator and eagle and his brother Pallian ascended to the sky from Deen Maar in a sheet of flame after creating the land and sea and all living things' (Draper 2015). Mathews (1904) noted that the Gunditjmara buried their dead on the mainland with their heads pointed to Deen Maar island where their souls would be transported to await reincarnation. Dawson (1881) records that a haunted cave, Tarn wirring 'road of the spirits', is believed to form a passage between the mainland and the island, and the good spirit 'Put put cheptech' conveys the spirit from the island to the clouds. Other Islands in south-eastern Australia, such as Kangaroo Island (*Karta*), hold similar stories.

Contact and post-contact places are also noted to be in or adjacent to Sea Country, and these include sites of massacre and dispossession. The site of the Convincing Ground massacre (1833/34), where a group of whalers murdered Gunditjmara over ownership of a stranded whale, is located north of Allestree on the Portland coast. This place continues to be a place of great sorrow for the community. Other coastal massacre sites include on the Aire River Estuary at Cape Otway (1846), Eurmerella (1842), Freshwater Creek (1843) Twofold Bay (1806), and Cape Grimm (1828) (Newcastle University 2024). Missionary activity and forced removal of First Nations people in Tasmania resulted in detainment of First Nations people on Flinders Island (at Wybalenna). Other First Nations groups were taken to Swan

Island and Gun Carriage Island. This detainment resulted in significant loss of life, and a loss of culture, language, and connection.

Law, Spirituality and Songlines

Intangible heritage refers to the cultural assets, cultural knowledge and intellectual property collectively held by First Nations and may involve practices, oral traditions, ancestral narratives, performing arts, local knowledges and practices concerning nature, the environment, and the universe. Intangible cultural heritage performs an important function of safeguarding to recognise and protect knowledge and skills that are transmitted through it from one generation to the next.

Songlines are described as short songs pertaining to the travels and exploits of ancestral beings during the Dreamtime. These songs are usually sung in association with a ritual activity, particularly dancing (Tonkinson 1972). Songlines are stories ancestral beings which includes creation stories, they are multipurpose the stories educate and uphold traditional lore, they are also communication and trade routes. (Fuller & Busill 2021).

Understanding First Nations songlines and stories also means understanding the Dreaming. Often described as the 'Dreamtime', or 'deep time', recognising the existence of Dreamtime beyond the Western concept of past, present, and future.

First Nation's people around Australia have long had a strong connection to whales, which has significance as totemic ancestors to some groups. The arrival of whales along Australia's coastline marked the arrival of the "elders of the sea", which follows a songline or ancient memory code, that traces the journeys of ancestral spirits as they created the land, animals, and lore.

In Victoria, *Koontapool* (southern right whales) occur along the coastlines of south-west Victoria in Gunditjmara Sea Country to feed and birth. These *Koontapool Woorrkngan Yakeen* (Whale Birthing Dreaming Sites), are in coastal bay areas from Port Campbell to Portland, including Warrnambool. These places on Gunditjmara Country are known resting and feeding sites for mothers and calves and are directly related to *Gunditjmara Neey*n (midwives), explaining why Gunditjmara is a Matrilineal Nation. (DCCEEW 2022a).

A Kulin Dreaming story includes Angel Cave (between Port Philip and Western Port) where "One Day Bunjil, the All Father, was walking upon the sea, when suddenly there rose a great storm. Bunjil walked to the rocky shore and spoke to it, and immediately the shore rose up into a cliff and the cave was made before his eyes. Bunjil stepped into it and sheltered there till the storm was over' (Massola 1968).

A Kurnai Dreaming story of Port Albert includes the sick frog, Tide-lek, who drank all the water from the land. He didn't feel sick anymore, but he felt bad for leaving the people with nothing to drink. He walked across Port Albert one day and everyone tried to make him laugh to regurgitate the water, but they all failed until No-yang (the eel) danced on his tail and Tide-lek laughed and the land flooded. Many people died or were marooned, forming the islands. The pelican saved people with a large canoe. As part of this Dreaming Story, the pelican also formed the white pipe-clay used for ceremony at White Rock, the southernmost Island of the Seal Group east of Wilsons Promontory (Massola 1968).

In the south coast of NSW, the following Dreaming story is recorded. 'Long ago Daramulan lived on the earth with his mother Ngalalba. Originally the earth was bare and 'like the sky, as hard as a stone', and the land extended far out where the sea is now. There were no men or women, but only animals, birds, and reptiles. He placed trees on the earth. After Kaboka, the thrush, had caused a great flood on the earth, which covered all of the east coast country, there were no people left, except some who crawled out of the water onto Mount Dromedary... 'then Daramulan went up to the sky, where he lives and watches the actions of men. It was he who first made the Kuringal and the bull-roarer, the sound of which represents his voice. He told the Yuin what to do, and he gave them the laws which the old people have handed down from father to son to this time...' (Howitt 1904).

As part of the Kurnai creation stories the first man and woman were Borun the pelican, and Tuk the musk duck (VACL 2014). Totemic Species are spiritually important and can be bestowed in a number of ways – through family relations or through ceremony. Randall Mumbler, from the Eurobodalla region, for example, discusses that '... Fish are more likely to be ceremonial totems; it is not common to have a fish as a totem... I have certain species that I can't fish for or eat. These rules have been placed upon me through ceremony and so I stay away from them. There are certain fish that my brother and I never eat. That is also like a conservation thing...it keeps that species alive..." Randal Mumbler (in Donaldson 2012).

The Eastern Maar discuss their connection to Sea Country noting that the sea was 'central to our culture, economy, and survival. The coastline is home to sites that are important for our Dreaming - Three Sisters Rocks and Deen Maar (Lady Julia Percy Island) where our Ancestors leave the earth. Our connection with our Sea Country extends well beyond the current shoreline to the edge of the continental shelf. While this area is under the sea today, we occupied it for thousands of years and rising sea levels have not washed away the history, physical evidence or our connection (Eastern Maar Aboriginal Corporation 2015).

6.6.3.6 Submerged Cultural Heritage and Landscapes

First Nations peoples in Victoria have occupied, used, and managed sea country for thousands of years, including areas now submerged by sea level rise since time immemorial (Smyth 1993).

An understanding of submerged landscapes and sea level changes may be evident from stories from First Nations groups, "Indigenous peoples still relate to land that was inundated by sea during the last ice age and regard it as their own" (NOO 2002b).

The lava flows of the World Heritage listed Budj Bim Cultural Landscape (which is outside of the Operational and Planning Areas) have recently, through ocean scanning methods, been revealed to extend into the sea. The mapping of this geological formation allows the Gunditjmara to connect to Sea Country in new ways assisted by modern technology, as a supplement to their traditional knowledge and ancient connection to the sea. There is potential that early cultural deposits relating to aquaculture systems have been preserved in association with this formation, and as stated above evidence of this kind is highly significant to Gunditjmara.

6.6.3.7 Conservation and Contemporary Cultural Values

It is frequently raised by First Nations communities that ecological protection and sustainability is integral to First Nations cultural and contemporary values. Sea Country Plans, such as those completed by the Gunaikurnai (GLAWAC 2015), Wadawurrung (WTOAC. 2020), and Eastern Maar (EMAC 2015), highlight the importance of approaches that protect and enhance the environment, including biodiversity, coastal erosion, management of sea level rise and addressing climate change impacts. Goals include managing impacts to whale migration, bird and bat nesting and migration (such as the microbat, bent-wing bat, and orange-bellied parrot), protection of environmentally fragile resources such as seagrass and kelp fields, as well as securing habitat for threatened species such as the leafy seadragon.

'Increased pollution from coastal communities, agricultural and industrial run off is changing the sea hydrology and choking our sea life with plastics. Our Warre is being overused and heating up with climate changes. We are seeing the loss of our kelp forests and dramatic changes in sea life which we all depend upon' (WTOAC 2020).

'Our coastal dunes are layered with living places and hearths from the many generations of our ancestors living, harvesting, sharing meals, trading in these living places, and practicing ceremony here. We have the largest stretch of registered cultural sites in Australia along our coastline. Our fish traps, which were used to catch the abundant fish, have survived the storms and sea level changes. Ochre pits of different colours are dotted along our sandstone and limestone cliffs and headlands. Our sandy beaches, rock pools, rocky platforms and reefs were and continue to be places of abundance for harvesting food and resources like crustaceans, shellfish, and kelp' (WTOAC 2020).

Seals, or Bithaui or Gurnun in Kunai (Howitt n.d.), are noted by the Gunaikurnai as a significant species, and habitat for fur seals at Wilsons Promontory Marine National Park is identified as an important resource to be protected, particularly due to the reliance of species on both the land and sea for different life cycle stages. It is therefore considered important that programs for environmental management consider both land and marine environments, as they are interconnected and must be managed as a whole to ensure success (GLAWAC 2015).

Through the processes identified above, and in particular, consultation with First Nations Groups, Beach is confident we have identified the cultural heritage values, and cultural features and sensitivities of First Nations groups identified within the Operational and Planning Areas.

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

Section 7 evaluates the environmental impacts and risks of the Drilling Program and identifies where First Nations cultural values and sensitivities may be potentially affected. Table 6-38 provides a summary of the First Nations cultural values and sensitivities identified as per the methodology in Section 6.6.1, and shows where a potential impact has been identified via the evaluation of the environmental impacts and risks (Section 7). Where a potential impact to First Nations cultural values and sensitivities has been identified, details of the control measures, if required, to reduce impacts and risks from the Drilling Program are of an acceptable level and as low as reasonably practicable are provided as required by the OPGGS(E)R.

As noted in Section 6, the Planning Area is used as the spatial boundary for the describing the existing environment, however, it does not represent the environment that may be affected (EMBA) as the EMBA varies based on each impact and risk. Thus, the EMBA for each impact and risk is detailed in each impact and risk evaluation in Section 7.

Table 6-38: Summary of First Nations Cultural Values and Sensitivities and Where a Potential Impact has been Identified.

	Aspect - Planned							Aspect - Unplanned					
	Light emissions	Atmospheric emissions	Underwater sound	Physical presence	Seabed disturbance	Rig and vessel marine discharge	Drilling, completions, P&A marine discharge	Invasive Marine Species	Fauna interaction	Loss of Materials or Waste	Loss of containment	Spill Response	Comment
Cultural Values													
Budj Bim Cultural Landscape													The Budj Bim Cultural Landscape is outside of the Operational and Planning Areas.
Onshore cultural heritage, relics, and artefacts											✓	✓	In the highly unlikely event of a spill onshore cultural heritage, relics and artefacts could be impacted. This is assessed in Section 7.12.5.5 for direct impacts and Section 7.13.7.4 in relation to oil spill response.
Submerged Cultural Heritage					✓								Submerged cultural heritage could be disturbed if present where the rig anchors and drilling are located. This is assessed in Section 7.6.5.4.
Batemans Marine Park													The Batemans Marine Park is identified as being within the Planning Area but not within any of the EMBAs for the planned aspects or unplanned aspects.
Badger Island IPA											✓		Badger Island and hence the IPA has been identified as being within the Spill EMBA – Social but not any other EMBA for the planned aspects or unplanned aspects. Shoreline oil at the actionable level was not predicted to occur within the IPA. This is assessed in Section 7.12.5.5 in relation to a spill.
lungatalanana IPA (Clarke Island)													Clarke Island and hence the IPA has been identified as being within the Planning Area but not within any of the EMBAs for the planned aspects or unplanned aspects.
Mount Chappell Island IPA Mutton bird rookeries													Mount Chappell Island and hence the IPA has been identified as being within the Spill EMBA – Social but not any other EMBA for the planned aspects or unplanned aspects. Shoreline oil at the actionable level was not predicted to occur within the IPA. This is assessed in Section 7.12.5.5 in relation to a spill. A number of EMBAs for the planned aspects and unplanned aspects overlap the short-tailed shearwater (mutton bird) foraging Biologically important area. See Birds – muttonbird below.
Preminghana IPA Orange-bellied parrot Threatened plant and animal species Artefacts											✓		Preminghana IPA has been identified as being in the Spill EMBA – Social but not any other EMBA for the planned aspects or unplanned aspects. In addition, shoreline oil at the actionable level may occur within the IPA. This is assessed in Section 7.12.5.5. in relation to a spill and Section 7.13.7.4 in relation to oil spill response. A number of EMBAs for the planned aspects and unplanned aspects overlap the orange-bellied parrot migration route. See Birds – orange-bellied parrot below.
Deen Maar													Three sisters rocks and Deen Maar are~ 78.5 km from the Operational Area. Three sisters rocks and Deen Maar is identified

	Aspect - Planned							Aspect - Unplanned					Comment
	Light emissions	**Atmospheric emissions**	**Underwater sound**	**Physical presence**	**Seabed disturbance**	**Rig and vessel marine discharge**	**Drilling, completions, P&A marine discharge**	**Invasive Marine Species**	**Fauna interaction**	**Loss of Materials or Waste**	**Loss of containment**	**Spill Response**	
													as being within the Planning Area but not within any of the EMBAs for the planned aspects or unplanned aspects.
Kelp Seagrass											✓		Section 6.4.1.5 provides details on kelp and Section 6.4.1.4 on seagrass. In the highly unlikely event of a spill, impacts to kelp and seagrass could occur if they were in areas where hydrocarbons may be present. This is assessed in Section 7.12.5.1.
Abalone (mutton fish)											✓		Abalone are generally found in water depths up to 30 m (VFA 2024) which is outside of the Operational Area and EMBAs for planned aspects. In the highly unlikely event of a spill, impacts to abalone could occur if they were in areas where hydrocarbons may be present. This is assessed in Section 7.12.5.2.
Crab Rock lobster (crayfish) Crustacean migration route											✓		Section 6.4.5 provides details on invertebrate species such as crab and rock lobster. First Nations collection of crab and rock lobster would be within nearshore areas outside of the Operational Area. In the highly unlikely event of a spill, impacts to these species could occur if they were in areas where hydrocarbons may be present. This is assessed in Section 7.12.5.2. Impacts to crustacean migration route are not predicted from the Drilling Program. This was raised during stakeholder consultation for the future OGV Development in relation to pipelines which are not part of this EP scope.
Bimbalas (blood cockle Anadara spp) Mussels Oysters Pipis											✓		Collection of mollusc species such as bimbalas, mussels, oysters and pipis occurs nearshore outside of the Operational Area. In the highly unlikely event of a spill, impacts to the mollusc species could occur if they were in areas where hydrocarbons may be present. This is assessed in Section 7.12.5.2.
Eels (*Kooyang*)	✓		✓			✓	✓				✓		Section 6.4.7.3 provides detail on eels and their migration. Several EMBAs overlap where migrating eels may be present. See: Light – Section 7.2.5.1 and 7.2.5.4. Underwater sound – Section 7.4.8.4 and 7.4.8.7. Vessel & Rig discharges - 7.7.5.2 and 7.7.5.4. Drilling and P&A discharges – Section 7.8.3. Loss of Containment - 7.12.5.2
Fish - general	✓		✓			✓	✓				✓		Section 6.4.7.3 provides details on fish. Several EMBAs overlap where fish may be present. See: Light – Section 7.2.5.1 and 7.2.5.4. Underwater sound – Section 7.4.8.4 and 7.4.8.7. Vessel & Rig discharges - 7.7.5.2 and 7.7.5.4. Drilling and P&A discharges – Section 7.8.3.

	Aspect - Planned							Aspect - Unplanned					
	Light emissions	Atmospheric emissions	Underwater sound	Physical presence	Seabed disturbance	Rig and vessel marine discharge	Drilling, completions, P&A marine discharge	Invasive Marine Species	Fauna interaction	Loss of Materials or Waste	Loss of containment	Spill Response	Comment
													Loss of Containment - 7.12.5.2
Fish - Blackfish													Blackfish are an inland river fish (VFA 2024a) and therefore outside of the Operational and Planning Areas.
Fish - Mullet													Sea mullet are particularly abundant in estuaries and coastal waters of NSW (DPI 2024). Mullet may also be an inshore species (Feary 2015). In Victoria sea mullet usually live in the less saline areas of Port Phillip, and often venture into the Yarra River (Port Phillip Bay 2024). These areas are not within not within any of the EMBAs for the planned aspects or unplanned aspects.
Birds - general	✓	✓								✓	✓	✓	Section 6.4.7.4 provides details on the birds with a focus on those that have BIAs or are undertaken biologically important behaviour. The Light EMBA and Operational Area where fauna interaction and loss of waste or materials could occur, overlap a number of bird BIAs. In the highly unlikely event of a spill, impacts to birds could occur if they were in areas where hydrocarbons may be present. They may also be present in areas where access is required for spill response activities. Light – Section 7.2.5.1. Atmospheric emissions – Section 7.3.5 Fauna Interaction – Section 7.10.5.1 Loss of Materials or Waste – Section 7.11.4.1. Loss of Containment – Section 7.12.5.2 Spill Response - 7.13.7.1
Birds - Orange-bellied parrot	✓	✓							✓			✓	Section 6.4.7.4 provides details on the orange-bellied parrot. The Light EMBA and Operational Area where fauna interaction could occur, overlap the orange-bellied parrot migration route. In the highly unlikely event of a spill, impacts to orange-bellied parrots are not predicted as they do not land or forage at sea or on shorelines where hydrocarbons may be present. They may be present in areas where access is required for spill response activities. Light – Section 7.2.5.1. Atmospheric emissions – Section 7.3.5 Fauna Interaction – Section 7.10.5.1 Spill Response - 7.13.7.1
Birds – muttonbird	✓	✓							✓	✓	✓	✓	Section 6.4.7.4 provides details on the short-tailed shearwater (muttonbird). The Light EMBA and Operational Area where fauna interaction and loss of waste or materials could occur, overlap the short-tailed shearwater foraging BIA. In the highly unlikely event of a spill, impacts to short-tailed shearwaters could occur if they were forage at sea where hydrocarbons may be present. They may also be present in areas where access is required for spill response activities.

	Aspect - Planned: Light emissions	Aspect - Planned: Atmospheric emissions	Aspect - Planned: Underwater sound	Aspect - Planned: Physical presence	Aspect - Planned: Seabed disturbance	Aspect - Planned: Rig and vessel marine discharge	Aspect - Planned: Drilling, completions, P&A marine discharge	Aspect - Unplanned: Invasive Marine Species	Aspect - Unplanned: Fauna interaction	Aspect - Unplanned: Loss of Materials or Waste	Aspect - Unplanned: Loss of containment	Aspect - Unplanned: Spill Response	Comment
													Light – Section 7.2.5.1. Atmospheric emissions – Section 7.3.5 Fauna Interaction – Section 7.10.5.1 Loss of Materials or Waste – Section 7.11.4.1. Loss of Containment – Section 7.12.5.2 Spill Response - 7.13.7.1
Bats													Bats may be present in coastal areas of the Planning Areas but impacts from hydrocarbon exposure are not predicted to caves where including maternity caves.
Dolphins			✓			✓	✓		✓	✓	✓		Section 6.4.7.6 provides details on dolphins. The Underwater Sound EMBA and Operational Area where discharges, fauna interaction and loss of waste or materials could occur, overlap where dolphins may be present. In the highly unlikely event of a spill, impacts to dolphins could occur if they were in areas where hydrocarbons may be present. Underwater sound – Section 7.4.8.2. Vessel & Rig discharges - 7.7.5.2 Drilling and P&A discharges – Section 7.8.3. Fauna Interaction – Section 7.10.5.1 Loss of Materials or Waste – Section 7.11.4.1. Loss of Containment - 7.12.5.2
Whales Blue Southern right Orcas Migration routes			✓			✓	✓		✓	✓	✓		Section 6.4.7.6 provides details on whales. The Underwater Sound EMBA and Operational Area where discharges, fauna interaction and loss of waste or materials could occur, overlap where dolphins may be present. In the highly unlikely event of a spill, impacts to dolphins could occur if they were in areas where hydrocarbons may be present. Underwater sound – Section 7.4.8.2. Vessel & Rig discharges - 7.7.5.2 Drilling and P&A discharges – Section 7.8.3. Fauna Interaction – Section 7.10.5.1 Loss of Materials or Waste – Section 7.11.4.1. Loss of Containment - 7.12.5.2.
Seals			✓			✓	✓		✓	✓	✓		Section 6.4.7.6 provides details on seals. The Underwater Sound EMBA and Operational Area where discharges, fauna interaction and loss of waste or materials could occur, overlap where dolphins may be present. In the highly unlikely event of a spill, impacts to dolphins could occur if they were in areas where hydrocarbons may be present. Underwater sound – Section 7.4.8.2. Vessel & Rig discharges - 7.7.5.2 Drilling and P&A discharges – Section 7.8.3. Fauna Interaction – Section 7.10.5.1

	Aspect - Planned							Aspect - Unplanned					Comment
	Light emissions	Atmospheric emissions	Underwater sound	Physical presence	Seabed disturbance	Rig and vessel marine discharge	Drilling, completions, P&A marine discharge	Invasive Marine Species	Fauna interaction	Loss of Materials or Waste	Loss of containment	Spill Response	
													Loss of Materials or Waste – Section 7.11.4.1. Loss of Containment - 7.12.5.2.

7 Environmental Impact and Risk Assessment

7.1 Overview

In alignment with the OPGGS(E)R, this section of the EP details the potential environmental impacts and risks associated with the Drilling Program 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 oil spill 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. Environmental performance outcomes (EPOs), environmental performance standards (EPSs) and measurement criteria associated with each of the identified control measures are provided in Section 7.15.

Aspects associated with the use of vessels for oil spill response activities are as per vessel operations in Table 7-1. Other aspects and related impacts and risks associated with oil spill response activities are described in Section 7.13.

Table 7-1: Activity – Aspect Relationship

	Aspect - Planned							Aspect - Unplanned			
	Light emissions	**Atmospheric emissions**	**Underwater sound**	**Physical presence**	**Seabed disturbance**	**Rig and vessel marine discharge**	**Drilling, completions, P&A marine discharge**	**Invasive Marine Species**	**Fauna interaction**	**Loss of Materials or Waste**	**Loss of containment**
Support Operations											
Rig operations	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓
Vessel operations	✓	✓	✓	✓		✓		✓	✓	✓	✓
Helicopter		✓	✓								
Pre-laid anchors				✓	✓						
Spill response	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Well Activities											
Drilling					✓		✓				✓
Completions (Yolla 7 only)							✓				✓
Flaring (Yolla 7 only contingency)	✓	✓									
Well suspension					✓		✓				✓
P&A					✓		✓				✓

7.2 Light Emissions

7.2.1 Source of Aspect

As the activity will be undertaken 24 hours a day, lighting on the drill rig and vessels is required at night for navigation and to ensure safe operations.

In addition, flaring may be undertaken on the Yolla 7 well for up to 48 hours (contingency only).

7.2.2 Extent and Duration of Aspect

Drill Rig and Vessel Lighting	
Extent (EMBA)	*20 km for marine turtles, seabirds, and migratory shorebirds.* The extent for drill rig and vessel light emissions is based on the National Light Pollution Guidelines for Wildlife (CoA 2023). The guidelines recommend undertaking a light impact assessment where important habitat for listed species sensitive to light are located within 20 km of the light source. The 20 km threshold provides a precautionary limit based on observed effects of sky glow on marine turtle hatchlings demonstrated to occur at 15-18 km and fledgling seabirds grounded in response to artificial light 15 km away (CoA 2023). Seabird grounding, as described in Rodriguez et al. (2014), relates to impacts of onshore fixed light sources such as streetlights and buildings and the effect this can have on young fledgling birds making their first flight from their nests to the open ocean. Thus, 20 km is adopted as the extent at which light emissions may impact marine turtles, seabirds, and migratory shorebirds. *200 m for zooplankton, invertebrates, and fish.* For zooplankton and invertebrates, the Guidelines detail that for vessel lights zooplankton and their vertebrate predators descend away from the surface; these effects occurred at depths of up to 200 m, and up to 200 m horizontally from the light source. Experiments using light traps also detailed that some fish and zooplankton species are attracted to light sources (Meekan et al. 2001), with traps drawing catches from up to 90 m (Milicich et al. 1992). Thus, 200 m is adopted as the extent at which light emissions may impact zooplankton, invertebrates, and fish. The actual predicted area of impact at any one time will be significantly less than 20 km or 200 m around each vessel operating within the operational areas.
Duration	560 days Drill rig and vessel navigational and safety lighting is required at night for the duration of the activity.
Flaring (contingency only)	
Extent (EMBA)	*50 km from the Yolla 7 well* A light assessment study undertaken for the ConocoPhillips Australia Otway Exploration Drilling Campaign (Xodus Group 2023) located in the Bass Strait predicted the area that may be affect by light from flaring to be up to 49 km from the rig with no measurable changes to ambient light intensity levels beyond this distance. Shell (2009) estimated that light from production flaring activities can be detected as far as 51 km from the source. Similarly, an assessment by Woodside (2014) for the Browse FLNG development reported that the maximum distance at which production flaring under routine operational conditions was detectable was 47.9 km.
Duration	48 hours

7.2.3 Predicted Environmental Impacts

The predicted environmental impacts from light emissions are:

- Changes in fauna behaviour, through attraction or avoidance of light-sensitive species.
- Changes to the functions, interests, or activities of other users.
- Changes in ambient light leading to changes to aesthetic, and conservation values.

7.2.4 EMBA

The National Light Pollution Guidelines for Wildlife (CoA 2023) recommend undertaking a light impact assessment where important habitat for listed species sensitive to light are located within 20 km of the light source (CoA 2023). In addition, an area of 50 km for flaring at the Yolla 7 well location was used. This combined area is referred to as the light EMBA. Figure 7-1 details the light EMBA.

The results of the light EMBA PMST Report are presented in Appendix E. 3.

Light emissions may impact the following receptors within the light EMBA:

- Zooplankton, invertebrates, and fish
- Seabirds and migratory shorebirds
- Marine turtles
- Commercial squid fisheries
- Coastal communities

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

- Conservation values and sensitivities
- Cultural values and sensitivities

7.2.5 Predicted Level of Impact

7.2.5.1 Ecological Receptors

Seabirds may be attracted to the light glow from the rig, support vessels and flaring. Bright lighting can disorientate birds, thereby increasing the likelihood of seabird injury or mortality through collision with the vessel, or mortality from starvation due to disrupted migration or foraging at sea (Wiese et al. 2001). Disorientation may also result in entrapment, stranding, grounding, and interference with navigation (CoA 2023). Whilst all bird species are vulnerable to the effects of lighting, seabirds active at night while migrating, foraging, or returning to colonies are most at risk (CoA 2023).

For the light impact assessment, the process outlined in the guidelines is used. The aim of the guidelines is that artificial light will be managed so wildlife is:

- Not disrupted within, nor displaced from, important habitat.
- Able to undertake critical behaviours such as foraging, reproduction and dispersal.

Identification of marine turtles, seabirds, and migratory shorebirds was undertaken through definition of a light EMBA. Identification of other species such as zooplankton, invertebrates and fish were identified using the Operational Area based on an extent of impact of 200 m.

The guidelines detail that important habitats are those areas necessary for an ecologically significant proportion of a listed species to undertake important activities such as foraging, breeding, roosting or dispersal. Table 7-2 details the shorebirds and seabirds that may be foraging, breeding, roosting, or migrating within the light EMBAs. These were identified from the light EMBA PMST Report (Appendix E. 3), and BIAs were identified from the National Conservation Values Atlas. No roosting or breeding behaviours have been identified within the light EMBA.

Artificial light can disrupt turtle nesting and hatching behaviours and is listed as a key threat in the Recovery Plan for Marine Turtles in Australia (CoA 2017b). Listed turtle species may occur within the light EMBA, however, no biologically important behaviours, BIAs, or habitat critical to survival for marine turtles were identified. In addition, there are no turtle nesting areas in the region. Therefore, impacts to turtles from light emissions is not predicted.

The light-sensitive receptors that may occur within the light EMBAs are:

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

Table 7-2: Light Sensitive Receptors within the light EMBAs with BIAs or undertaking Biologically Important Behaviour

Receptor	Biologically Important Behaviour
Albatross	
Antipodean albatross	Foraging, feeding or related behaviour likely to occur within area
	Foraging BIA
Black-browed albatross	Foraging, feeding or related behaviour likely to occur within area
	Foraging BIA
Buller's albatross, Pacific albatross	Foraging, feeding or related behaviour likely to occur within area
	Foraging BIA
Campbell albatross, Campbell black-browed albatross	Foraging, feeding or related behaviour likely to occur within area
	Foraging BIA
Gibson's albatross	Foraging, feeding or related behaviour likely to occur within area
Indian yellow-nosed albatross	Foraging BIA
Northern Buller's albatross	Foraging, feeding or related behaviour likely to occur within area
Northern royal albatross	Foraging, feeding or related behaviour likely to occur within area
Salvin's albatross	Foraging, feeding or related behaviour likely to occur within area
Shy albatross	Foraging, feeding or related behaviour likely to occur within area
	Foraging BIA
Southern royal albatross	Foraging, feeding or related behaviour likely to occur within area

Receptor	Biologically Important Behaviour
Wandering albatross	Foraging, feeding or related behaviour likely to occur within area
	Foraging BIA
White-capped albatross	Foraging, feeding or related behaviour known to occur within area
Petrels	
Common diving-petrel	Foraging BIA
Northern giant petrel	Foraging, feeding or related behaviour likely to occur within area
Southern giant-petrel	Foraging, feeding or related behaviour likely to occur within area
White-faced storm-petrel	Foraging BIA
Shearwaters	
Flesh footed shearwater	Foraging, feeding or related behaviour likely to occur within area
Short-tailed shearwater	Breeding known to occur within area
	Foraging BIA
Wedge-tailed shearwater	Foraging, Breeding BIA
Other	
Black-faced Cormorant	Breeding known to occur within area
Little Curlew	Roosting likely to occur within area
Little penguin	Breeding known to occur within area
	Foraging BIA
Orange-bellied parrot	Migration route likely to occur within area
Painted snipe	Roosting likely to occur within area
Swinhoe's Snipe	Roosting likely to occur within area
White-fronted tern	Foraging, feeding or related behaviour likely to occur within area

Albatross

The light EMBA PMST Report (Appendix E. 3) identified likely foraging behaviour for a number of albatrosses. Some of these species have foraging BIAs that the light EMBA overlaps (Table 7-2). These

BIAs are shown in

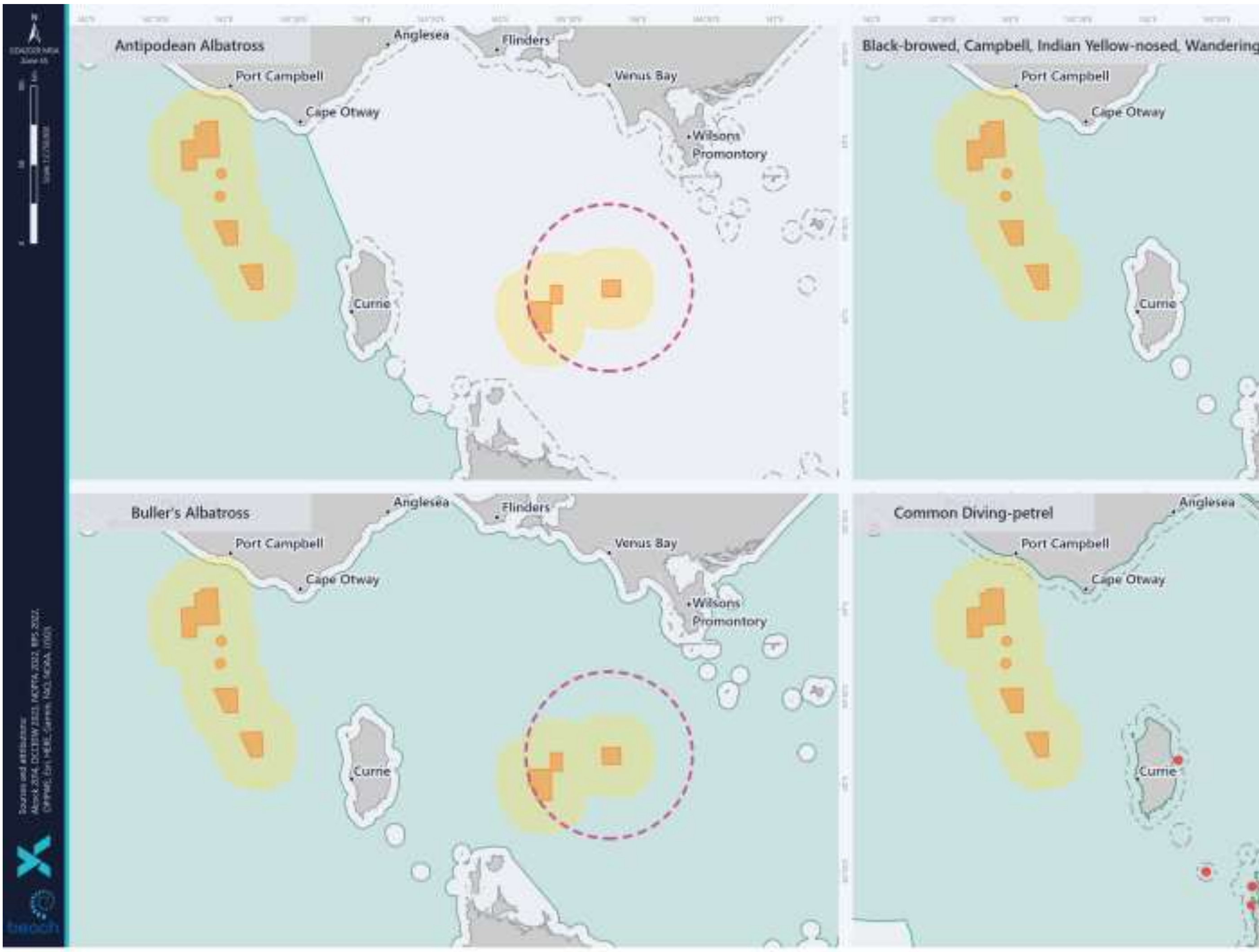

Figure 7-2 and Figure 7-3. Though, the National Recovery Plan for Albatrosses and Petrels 2022 (CoA 2022a) identifies light emissions as a threat, it classifies marine infrastructure interactions including those associated with artificial light as having no risk category priority and affecting 'Nil' species in Australian jurisdiction. In addition, no actions are identified.

All albatross species are migratory with widespread distributions throughout the Southern hemisphere and have been shown to travel large distances when foraging. For example, the wandering albatross has been shown to cover distance between 3,600 and 15,000 km in a single foraging trip during the breeding season on subantarctic islands (Jouventin and Weimerskirch 1990). The recognised foraging BIAs for albatross species generally covers large areas. For example, the entire South-east Marine Region is recognised as a foraging BIA for the Indian yellow-nosed, Campbell and the black-browed albatross species (

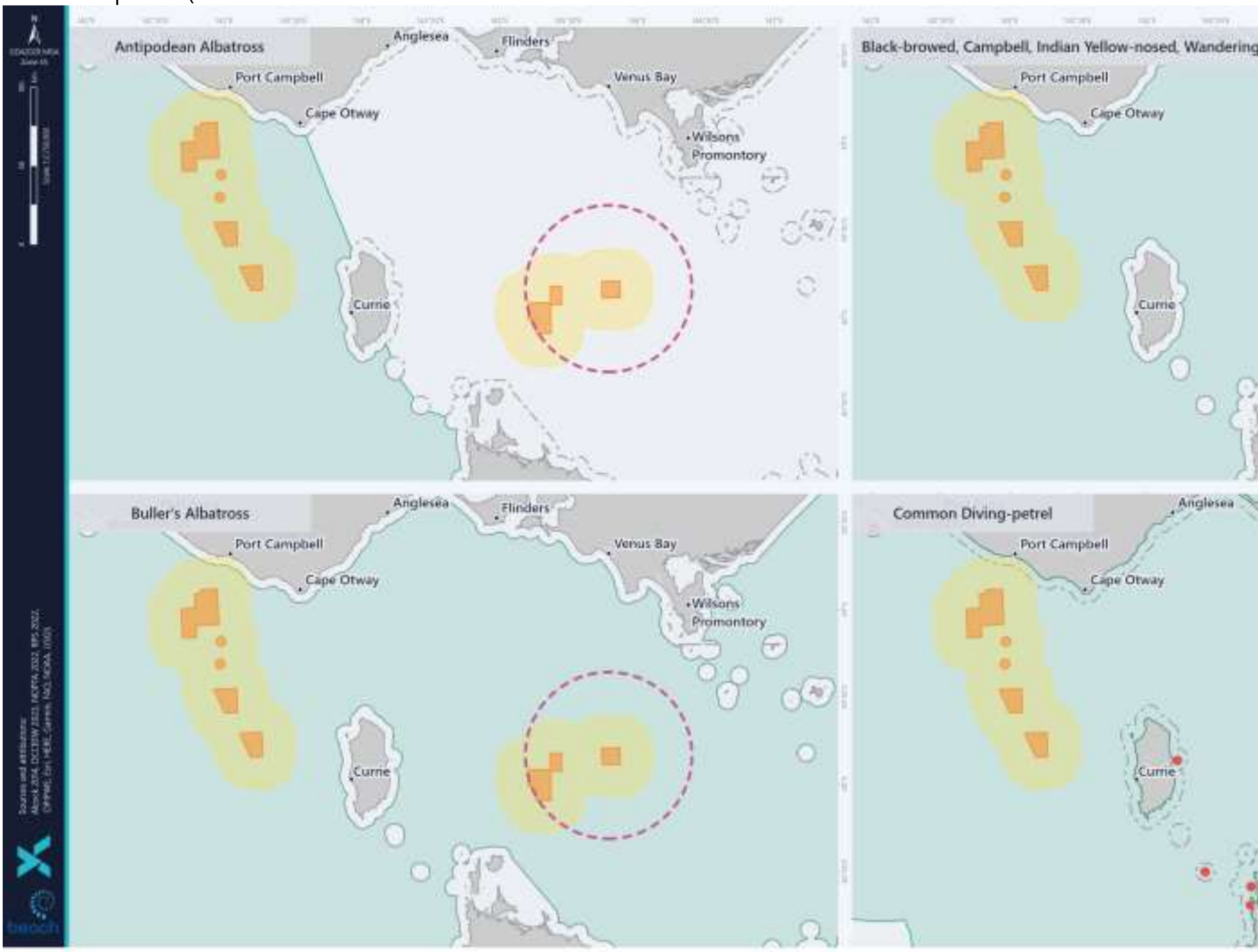

Figure 7-2).

Albatross forage most actively during daylight and are less active at night because their ability to see and capture prey from the air is reduced (Phalan et al. 2007).

Petrels

The light EMBA intersects a foraging BIA for the common diving petrel and white-faced storm-petrel and foraging, feeding or related behaviour likely to occur for the northern and southern giant petrel.

The BIAs are shown in

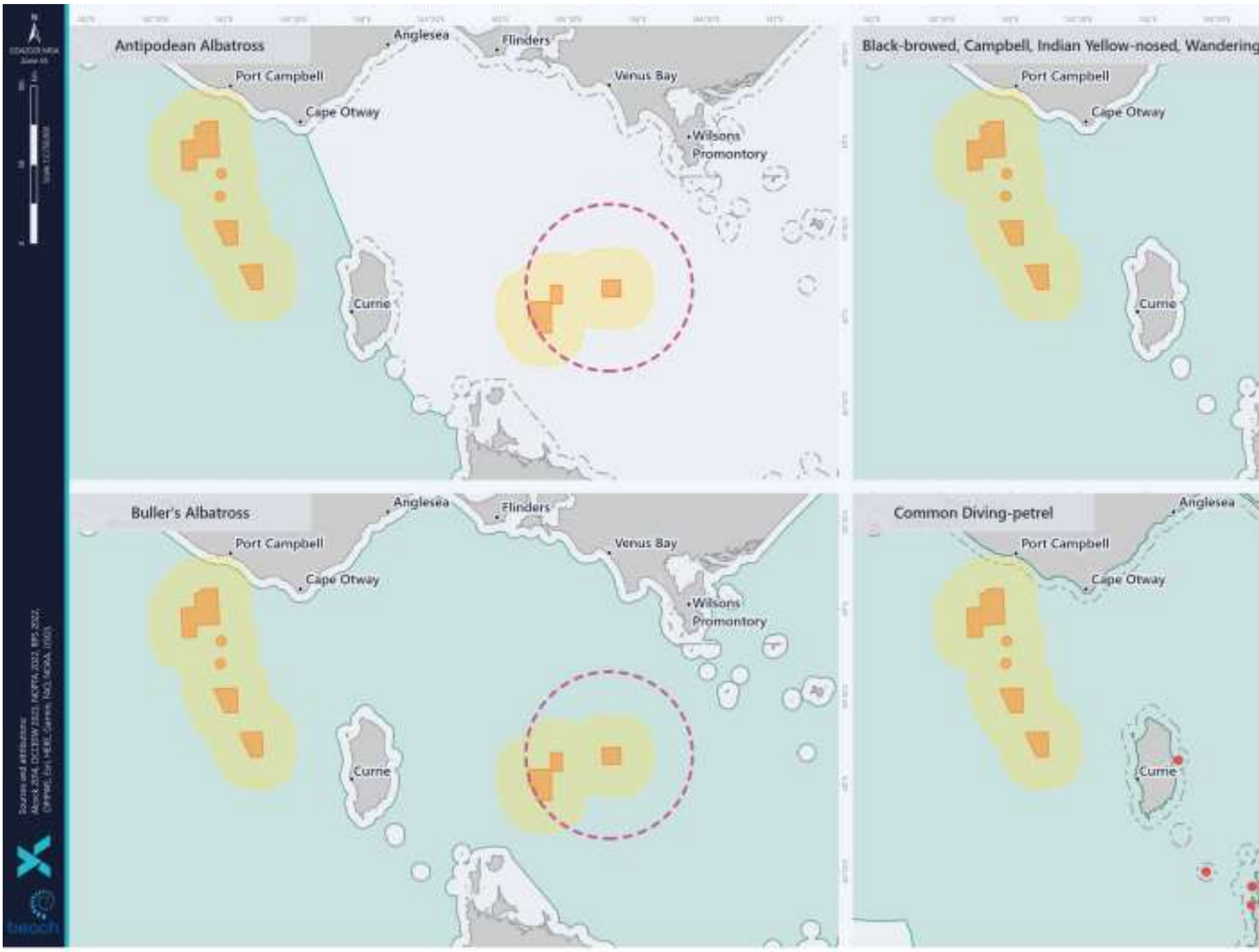

Figure 7-2 and Figure 7-3. Though, the National Recovery Plan for Albatrosses and Petrels 2022 (CoA 2022a) identifies light emissions as a threat, it classifies marine infrastructure interactions including those associated with artificial light as having no risk category priority and affecting 'Nil' species in Australian jurisdiction. In addition, no actions are identified.

Petrel species have a widespread distribution throughout the Southern hemisphere, with wide, recognised foraging areas.

The common diving petrel is listed as marine and does not have a recovery plan or conservation advice. Brooke (2004) details that common diving petrels spend the night in burrows during the breeding season and seem to forage mainly during the day, although they also forage at night on vertically migrating plankton. They are thought to be fairly sedentary, remaining more or less in the area of their breeding colony year-round, although they may venture into the open ocean to forage outside of the breeding season and some studies suggest seasonal movements (Brooke 2004).

The northern giant petrel was identified in the light EMBA PMST Report as foraging likely within the light EMBA. It is thought to be a predominantly diurnal forager, but it feeds its chicks during both the day and at night (DCCEEW 2023a). Breeding occurs on Macquarie Island between New Zealand and Antarctica.

The southern giant-petrel was identified in the light EMBA PMST Report as foraging likely within the light EMBA. The southern giant-petrel is listed as endangered. Light is not identified as a key threatening process for the southern giant-petrel (CoA 2022a).

The white-faced storm-petrel is widely distributed throughout Australia, with the Australian population estimated to be about 25 % of the global population (CoA 2020a). The species is migratory, moving from their temperate breeding grounds to tropical and subtropical locations in late March (Underwood and Bunce 2004). A foraging BIA for the white-faced storm petrel was identified within the light EMBA PMST report. The white-faced storm-petrel is a listed marine species. Light has not been identified as threatening process for this species (DCCEEW 2023c).

Shearwaters

The flesh-footed shearwater was identified in the light EMBA PMST Report as foraging likely within the light EMBA. The flesh-footed shearwater routinely attends fishing vessels to feed on baited hooks, discarded scraps and prey attracted to the surface by such vessels (DCCEEW 2023), thus they may be attracted to lighted water surfaces to forage.

The light EMBA overlaps the short-tailed shearwater foraging BIA (Figure 7-3). The light EMBA PMST Report identified breeding known to occur within the area, but as detailed in Figure 7-3 the light EMBA does not overlap any known breeding sites for the short-tailed shearwater. This species is listed as marine and migratory and does not have a recovery plan or conservation advice. When present in Australian waters (September to May) the species are known to typically forage during daylight, returning to the colonies after feeding at night (AAD 2020)

The light EMBA overlaps the wedge-tailed shearwater breeding, foraging BIA based around Muttonbird Island, Victoria (Figure 7-3). The species have been recorded to predominantly forage during the day and form large aggregations referred to as “rafts” just offshore from their breeding colony just on dusk and enter and leave the colony at night to avoid predators (Warham 1996). This species is listed as marine and migratory and does not have a recovery plan or conservation advice. Light has not been identified as a threat to this species (DCCEEW 2023b).

Black-faced Cormorant

The light EMBA PMST Report identified breeding known to occur for the black-faced cormorant, a listed marine species. The black-faced cormorant is recognised as a conservation value in the South-east Marine Region (CoA 2015a). They are a large seabird that is endemic to southern Australia and is mostly found along the coasts of Tasmania and Victoria (CoA 2020b). Breeding normally occurs on rocky islands, but also on stacks, slopes and sea cliffs in colonies of up to 2,500 individuals (del Hoyo et al. 1992). It feeds in coastal waters, sometimes in sheltered places in bays and islets and can even be found entering rivers along the coast (CoA 2020b).

Little Curlew

The light EMBA PMST Report identified roosting likely to occur within the area for the little curlew, which is a migratory wetlands species. The little curlew is the smallest curlew. It rarely occurs in Victoria but has been recorded east of Wilson's Promontory and at Lake Tyers, Lake Wellington, and Shallow Inlet, around Port Phillip Bay, and also from lakes in the western Victoria and in the region of Mystic Park (Higgins & Davies 1996). The little curlew breeds from late May to early August, in central and north-east Russia (DoE 2024).

Little Penguin

The light EMBA PMST Report identified breeding known to occur within the area for the little penguin and a foraging BIA. As detailed in Figure 7-4 the light EMBA does not overlap a little penguin foraging or breeding BIA. The impacts from light to little penguins is not assessed further.

Orange-bellied Parrot

The light EMBA PMST Report identified migration route likely for the critically endangered orange-bellied parrot (Figure 7-5). No BIAs or habitat critical to the survival of the species where identified.

The orange-bellied parrot is a ground feeding parrot which breeds in south-west Tasmanian. They migrate from Tasmania to Victoria between late February and early April (Australian Museum 2022b). In Victoria, the orange-bellied parrot mostly occurs in sheltered coastal habitats, such as bays, lagoons, and estuaries, or, rarely, saltworks. The orange-bellied parrot is a ground feeding parrot which breeds in south-west Tasmania between November and March and then overwinters on the coast of south-east mainland Australia between April and October (DELWP 2016). During winter, on mainland Australia, orange-bellied parrots are found mostly within 3 km of the coast (DELWP 2016).

The 2022-23 breeding season showed a record number of 74 orange-bellied parrots return to breeding grounds and production of 59 fledglings, the third highest fledgling production since 2004 (SWIFFT 2023). As of November 2023, 79 individuals had return to breeding grounds the largest number of returns in over 15 years (DNRET 2023).

The orange-bellied parrot recovery plan identifies illuminated structures and illuminated boats as a potential barrier to migration and movement (DELWP 2016). The Drilling Program overlaps the period when orange-bellied parrots migrate between Tasmania and Victoria between late February to early April (Australian Museum 2020).

Painted Snipe

The light EMBA PMST Report identified roosting likely to occur within the area for the painted snipe, which is an endangered, migratory wetlands species. The painted snipe is a stocky wading bird that has been recorded at wetlands in all states of Australia. The painted snipe breeds in shallow wetlands with areas of bare wet mud and both upper and canopy cover nearby (DoE 2024a). Nest records are all, or nearly all, from or near small islands in freshwater wetlands (DoE 2024a). As the light EMBA does not overlap wetlands or nearshore areas (Figure 7-1) it is unlikely to be roosting within the light EMBA. The National Recovery Plan for the Australian Painted Snipe (CoA 2022) does not identify light as a threat.

Swinhoe's Snipe

The light EMBA PMST Report identified roosting likely to occur within the area for Swinhoe's snipe which is a marine and migratory species. Few definite records exist for Swinhoe's Snipe in Australia (DoE 2024b). Swinhoe's Snipe breeds in central and southern Siberia (DoE 2024b). During the non-breeding season Swinhoe's Snipe occurs at the edges of wetlands, such as wet paddy fields, swamps and freshwater streams (DoE 2024b). As the light EMBA does not overlap wetlands or nearshore areas (Figure 7-1) it is unlikely to be roosting within the light EMBA.

White-fronted Tern

The white-fronted tern was identified in the light EMBA PMST Report as foraging likely occurring within the light EMBA. They are a medium sized tern endemic to Australasia breeding in New Zealand and on Flinders and Cape Barren Island off the north-east coast of Tasmania (CoA 2020a). This species can be found in coastal areas, nesting on rocky or sandy beaches and shingle islands in rivers, also on coastal cliffs and deserted barges, often close to the surf (CoA 2020a). The white-fronted tern often feeds in flocks and in winter it feeds over oceanic waters and feeds almost exclusively on fish, but will also take shrimp, feeding in the surf zone or several km out to sea (CoA 2020a).

Zooplankton, Invertebrates and Fish

Normal working lights on marine research vessels—and, by implication, lights from other sources including fishing boats, cargo vessels, recreational watercraft, jetties and oil and gas platforms—have been shown to cause zooplankton and their vertebrate predators to descend away from the surface; these effects occurred at depths of up to 200 m, and up to 200 m horizontally from the light source (Berge et al. 2020). Since most zooplankton need to ascend to forage on phytoplankton near the water's surface, light pollution may lead to an overall reduction in zooplankton, with cascading effects on their predators, and so on up the food chain (CoA 2023).

Fish 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.

The extent of the impact is predicted to be 200 m from each well and 50 km for flaring at Yolla 7. The consequence is assessed as Minor (1) and is of an acceptable level based on:

- Lighting on the rig and support vessels will be limited to that which is required for navigational and safety purposes.
- Flaring may occur at one well for a maximum of 48 hrs.
- During the Beach Otway Drilling Campaign in 2021/2022, no birds were identified to be attracted or grounded due to rig or vessel lighting or due to flaring.
- The National Recovery Plan for Albatrosses and Petrels 2022 (CoA 2022a) identifies light emissions as a threat, it classifies marine infrastructure interactions including those associated with artificial light as having no risk category priority and affecting 'Nil' species in Australian jurisdiction. In addition, no actions are identified.
- Albatross forage most actively during daylight and are less active at night because their ability to see and capture prey from the air is reduced (Phalan et al. 2007).

- The orange-bellied parrot, which is classed as critically endangered, may migrate over the light EMBA between late February and early April and illuminated structures and illuminated boats have been identified as a potential barrier to migration and movement for this species (DELWP 2016).
- As the light EMBA overlaps a number of seabird foraging and breeding BIAs, the migratory route for the critically endangered orange-bellied parrot and areas where birds are likely or known to be foraging, breeding, or roosting, the rig and vessel will have a Lighting Management Plan to minimise external light emissions as required by the National Light Pollution Guidelines.
- Artificial light is listed as a key threat in the Recovery Plan for Marine Turtles in Australia (CoA 2017b), however, no biologically important behaviours, BIAs, or habitat critical to survival for marine turtles were identified within the light EMBA.
- Light pollution is listed as a threat to seabirds in the Wildlife Conservation Plan for Seabirds (CoA 2020a), with potential for consequences affecting individuals but not whole populations.
- No BIAs or spawning areas are identified within the light EMBA for fish or invertebrates.

7.2.5.2 Socio-economic Receptors

Coastal Communities

Light pollution associated with offshore mining operations (including oil and gas) and other offshore activities is listed as a pressure on the conservation values of the South-east Marine Reserve Network within the South-east Commonwealth Marine Reserves Network Management Plan (2013-2023) (DNP 2013). However, the management plan does not list tourism as being impacted.

As shown in Figure 7-1 no coastal communities are within the light EMBA, and tourism activities are not likely to be undertaken at night within the light EMBA.

Fisheries

The light EMBA overlaps a small area of low and medium fishing intensity for the Southern Squid Jig Fishery (Figure 7-6). This fishery targets a single species, Gould's squid, using either hand operated or mechanically powered jigs. Squid jigging typically occurs midwater at depths between 50 and 100 m at night using large lights that illuminate the waters around a boat (SETFIA 2023). As squid are attracted to light there is a potential for them to be attracted to the rig and vessel resulting in them not being able to be caught by the fishery.

Phototactic behaviour (the attraction to artificial light) has been observed both in fish and squids with some species known to have a positive phototaxis by moving towards and aggregating in the illuminated zone of artificial lights (Ibrahim and Hajisamae 1999). Hence fishing with artificial lights (surface light) is one of the most advanced and successful methods to increase the catch rate of squid and pelagic fish (Nguyen and Winger 2019). Whilst research into light levels that may attract squid species is limited, Ibrahim and Hajisamae (1999) found optimal levels to attract big fin reef squid (*Sepioteuthis lessoniana*) varied between 1.5 and 25 Lux and the mitre squid (*Loligo chinensis*) between 1.5 and 22.5 Lux. In Nguyen and Winger (2019) Japanese squid (*Todarodes pacificus*) are shown to have a preferred range of approximately 10 Lux but were also shown to aggregate to levels as low as 0.0034 Lux. Modelling by ConocoPhillips (2023), for the same rig and vessels that will be used for the Drilling

Program, showed that light emissions from routine operations will reach intensity levels of 1.5 Lux within 300 m of the light source.

The extent of the impact is predicted to be up to 20 km from each well and 50 km for flaring at Yolla 7 (contingency). The consequence is assessed as Minor (1) and is of an acceptable level based on:

- Lighting on the rig and support vessels will be limited to that which is required for navigational and safety purposes.
- Flaring may occur at one well for a maximum of 48 hrs.
- There are no coastal communities within the light EMBA.
- Tourism activities are not likely to be undertaken at night within the light EMBA.
- Squid targeted by the Southern Squid Jig Fishery may be attracted to the rig and vessels but will be available to the fishery when they move outside of the rig 500 m petroleum safety zone. The light EMBA overlaps a small proportion of the fishery and only when wells are being drilling within the Otway Vic/P43 and Vic/P73 for up to five wells.
- The rig and vessel will have a Lighting Management Plan to minimise external light emissions as required by the National Light Pollution Guidelines.

7.2.5.3 Conservation Values and Sensitivities

The light EMBA PMST Report identified two Australian Marine Parks and two State marine protected areas (Table 7-3). As detailed in Table 7-3 and Figure 7-7 the Arches Marine Sanctuary is 560 m outside of the light EMBA. Two terrestrial parks, Port Campbell National Park and Bay of Islands Coastal Park, were identified from the light EMBA PMST Report, however as detailed in Figure 7-1 the light EMBA does not intersection with any shoreline.

In addition the West Tasmania Canyon KEF overlaps the light EMBA (Figure 7-7).

The 50 km flaring EMBA does not overlap any protected areas.

Table 7-3: Light EMBA and Marine Protected Areas

Marine Protected Area		Intersection with light EMBA	% Intersection with light EMBA	Distance to light EMBA
Boags	Multiple Use Zone	✓	18.94	-
Zeehan	Multiple Use Zone	✓	59.88	-
	Special Use Zone	✓	1.10	-
Twelve Apostles Marine National Park		✓	35.30	-
The Arches Marine Sanctuary		-	-	560 m

Light emissions associated with offshore mining operations and other offshore activities is listed as a pressure on the conservation values of the South-east Marine Region (DNP 2013). As described in Section 6.2.2, conservation values for both the Boags and Zeehan AMPs include seafloor features, and habitat for conservation significant bird and marine mammal species (DNP 2013). Species known to forage within the Boags AMP include the shy albatross and the common diving petrel. In addition Boags AMP values include BIAs for black-browed albatross, Buller's albatross, Campbell albatross, Indian yellow-nosed albatross, shy albatross, wandering albatross, little penguin, short-tailed shearwater, common diving petrel and white-faced storm petrel. The species known to forage within the Zeehan AMP include the black-browed, wandering, and shy albatrosses. In addition Zeehan AMP values include BIAs for Antipodean albatross, black-browed albatross, Buller's albatross, Campbell albatross, Indian yellow-nosed albatross, shy albatross, wandering albatross, short-tailed shearwater, wedge-tailed shearwater, common diving petrel and white-face storm petrel. Evaluation of light on these bird species is assessed in Section 7.2.5.1.

Light emissions are not identified as a key management objective for conservation of natural values associated the Twelve Apostles Marine National Park (Parks Victoria 2006b). Conservation values for the Twelve Apostles Marine National Park are detailed in Section 6.2.8. Light sensitive receptors relevant to the values of the Twelve Apostles Marine National Park are invertebrates and fish. Based on the evaluation of light on ecological receptors in Section 7.2.5.1, impacts to invertebrates and fish within the Twelve Apostles Marine National Park are not predicted based on impacts to invertebrates and fish from light is only predicted up to 200 m from the light source and the Operational Area where rig and vessel lighting will occur is ~18 km from the Twelve Apostles Marine National Park.

The light EMBA overlaps the West Tasmania Canyon KEF for wells within T/30P. The values associated with the West Tasmania Canyon KEF are described in Section 6.2.15.6 with light sensitive receptors being fish associated with sponges near canyon heads. Impacts to fish within the West Tasmania Canyon KEF are expected to be low based the greatest diversity is between 200 m and 350 m depth (CoA 2015a) and as detailed in Section 7.2.5.1 impacts to fish from light are not predicted in water depths greater than 200 m.

The extent of the impact is predicted to be up to 20 km from each well. The consequence is assessed as Minor (1) and is of an acceptable level based on:

- Lighting on the rig and support vessels will be limited to that which is required for navigational and safety purposes.
- Flaring may occur at one well, Yolla 7, for a maximum of 48 hrs (contingency only).
- The 50 km flaring EMBA does not overlap any protected areas or KEFs.
- The National Recovery Plan for Albatrosses and Petrels 2022 (CoA 2022a) identifies light emissions as a threat, it classifies marine infrastructure interactions including those associated with artificial light as having no risk category priority and affecting 'Nil' species in Australian jurisdiction. In addition, no actions are identified.
- Albatross forage most actively during daylight and are less active at night because their ability to see and capture prey from the air is reduced (Phalan et al. 2007).
- As the light EMBA overlaps a number of seabird foraging and breeding BIAs, the migratory route for the critically endangered orange-bellied parrot and areas where birds are likely or known to be foraging, breeding, or roosting, the rig and vessel will have a Lighting Management Plan to minimise external light emissions as required by the National Light Pollution Guidelines.

- Light pollution is listed as a threat to seabirds in the Wildlife Conservation Plan for Seabirds (CoA 2020a), with potential for consequences affecting individuals but not whole populations.
- Impacts to invertebrates and fish associated with the Twelve Apostles Marine National Park and West Tasmania Canyon KEF are not predicted based on light impacts to invertebrates and fish at a distance of 200 m.

7.2.5.4 Cultural Values and Sensitivities

From Section 6.6.3, the following cultural values and sensitivities have been identified as potentially affect by light:

- Birds including orange-bellied parrot and short-tailed shearwater (muttonbird).
- Fish.
- Eels.

Section 7.2.5.1 details the predicted environmental impact to these receptors. Based on that assessment the severity of impact to cultural values and sensitivities from light is assessed as Minor (1) and of an acceptable level based on:

- Lighting on the rig and support vessels will be limited to that which is required for navigational and safety purposes.
- Flaring may occur at one well for a maximum of 48 hrs.
- There are no coastal communities within the light EMBA.
- During the Beach Otway Drilling Campaign in 2021/2022, no birds were identified to be attracted or grounded due to rig or vessel lighting or due to flaring.
- The National Recovery Plan for Albatrosses and Petrels 2022 (CoA 2022a) identifies light emissions as a threat, it classifies marine infrastructure interactions including those associated with artificial light as having no risk category priority and affecting 'Nil' species in Australian jurisdiction. In addition, no actions are identified.
- Albatross forage most actively during daylight and are less active at night because their ability to see and capture prey from the air is reduced (Phalan et al. 2007).
- The orange-bellied parrot, which is classed as critically endangered, may migrate over the light EMBA between late February and early April and illuminated structures and illuminated boats have been identified as a potential barrier to migration and movement for this species (DELWP 2016).
- As the light EMBA overlaps a number of seabird foraging and breeding BIAs, the migratory route for the critically endangered orange-bellied parrot and areas where birds, including muttonbirds, are likely or known to be foraging, breeding, or roosting, the rig and vessel will have a Lighting Management Plan to minimise external light emissions as required by the National Light Pollution Guidelines.

- Light pollution is listed as a threat to seabirds in the Wildlife Conservation Plan for Seabirds (CoA 2020a), with potential for consequences affecting individuals but not whole populations.
- No BIAs or spawning areas are identified within the light EMBA for fish or invertebrates and the area (200 m) where invertebrates may be attracted to light is small and temporary.
- Koster et al. (2021) who tracked the Australasian short-finned eels off Victoria, detailed that mean night-time swimming depth of all eels showing diel vertical migration in time with the phase of the moon, with the mean depth increasing with increasing moon irradiation. As anguillid eels do not feed during their spawning migration, it has been suggested that the function of the vertical migrations relates to predator avoidance, swimming efficiency, thermal regulation, and control of maturation. Thus, it would seem that short-finned eels move away from rather than be attracted to light when migrating.

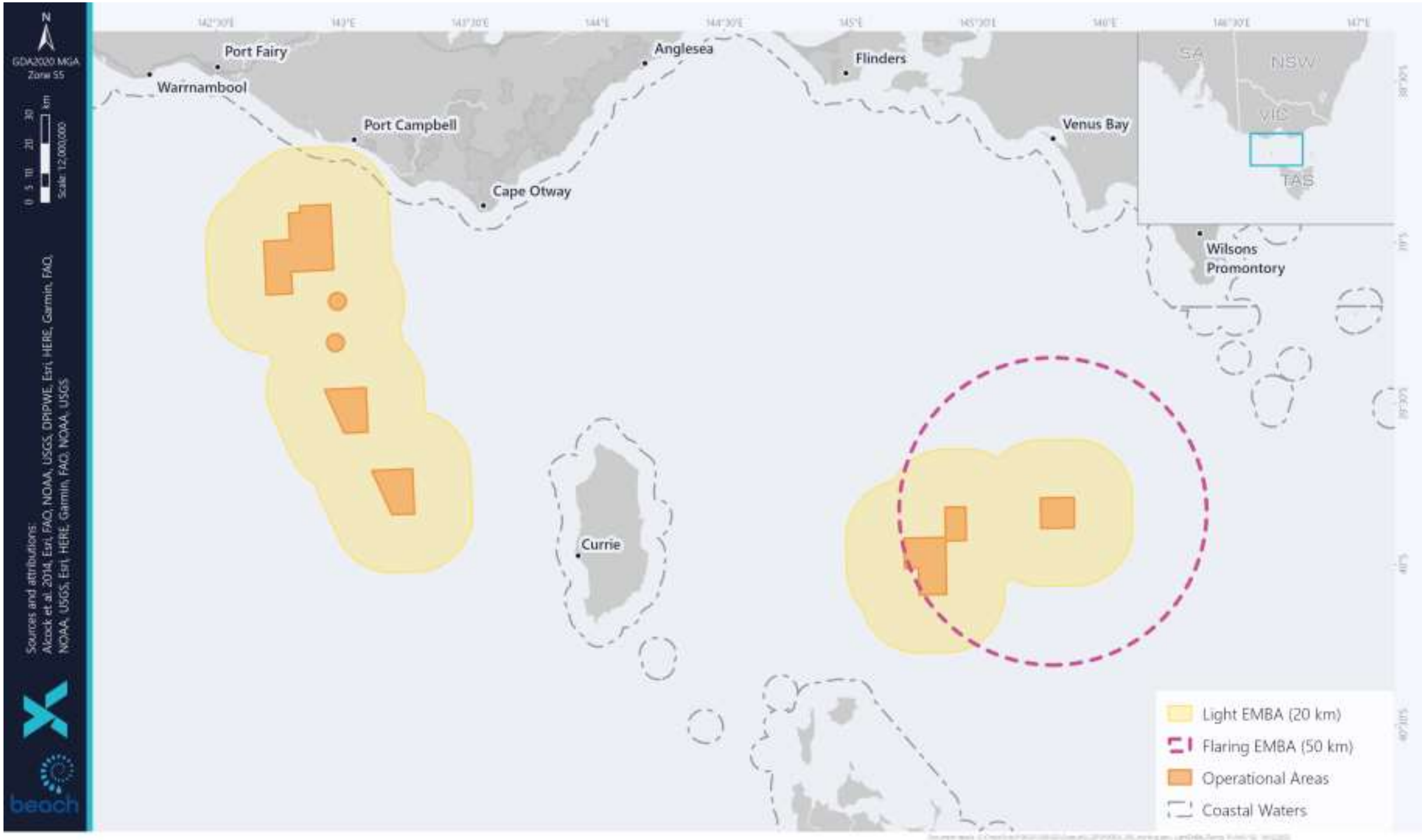

Figure 7-1: Light EMBA

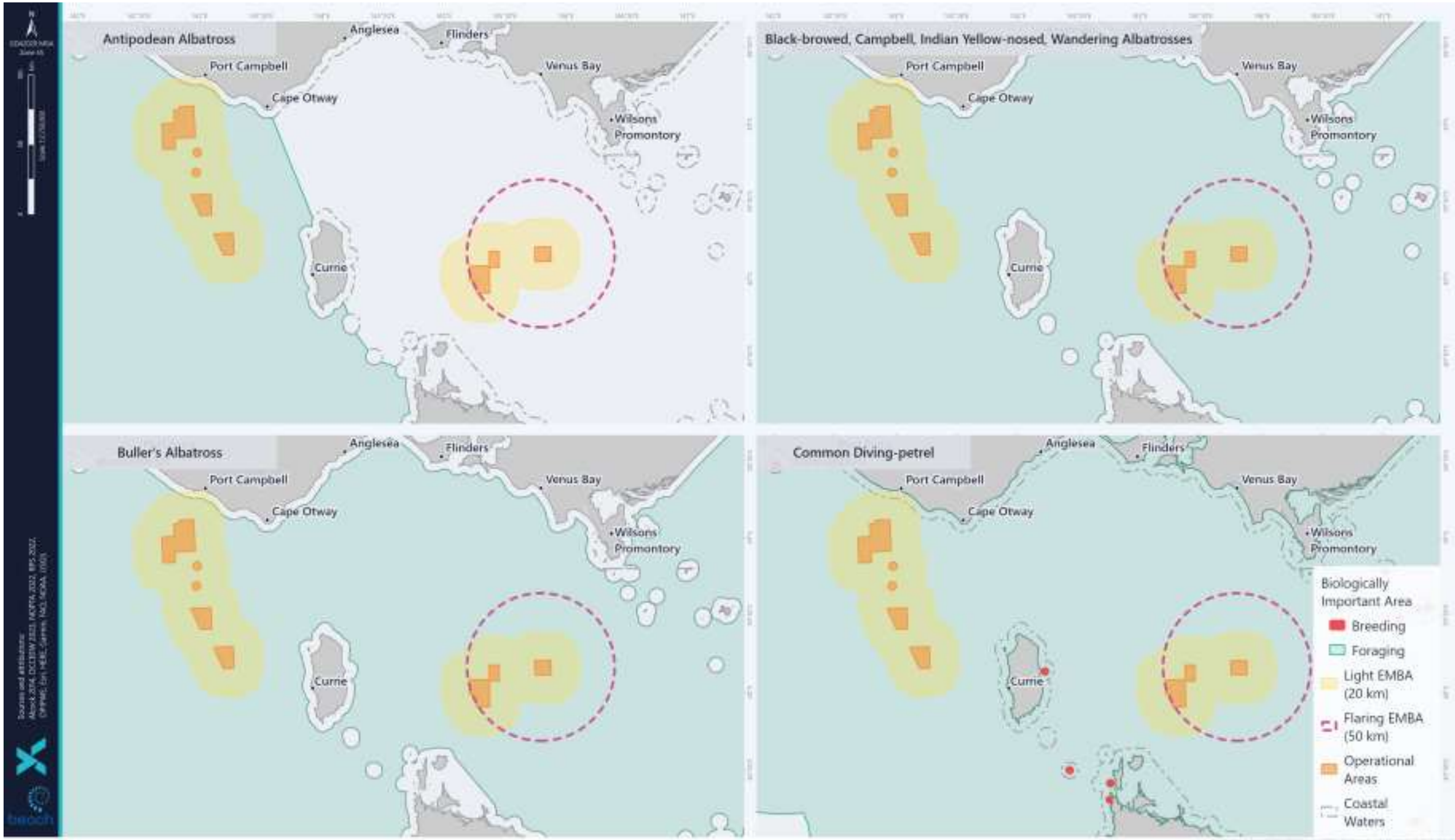

Figure 7-2: Light EMBA and BIAs for Antipodean Albatross, Buller's, Black-browed Albatross, Campbell Albatross, Indian Yellow-nosed Albatross, Wandering Albatross and Common Diving-petrel.

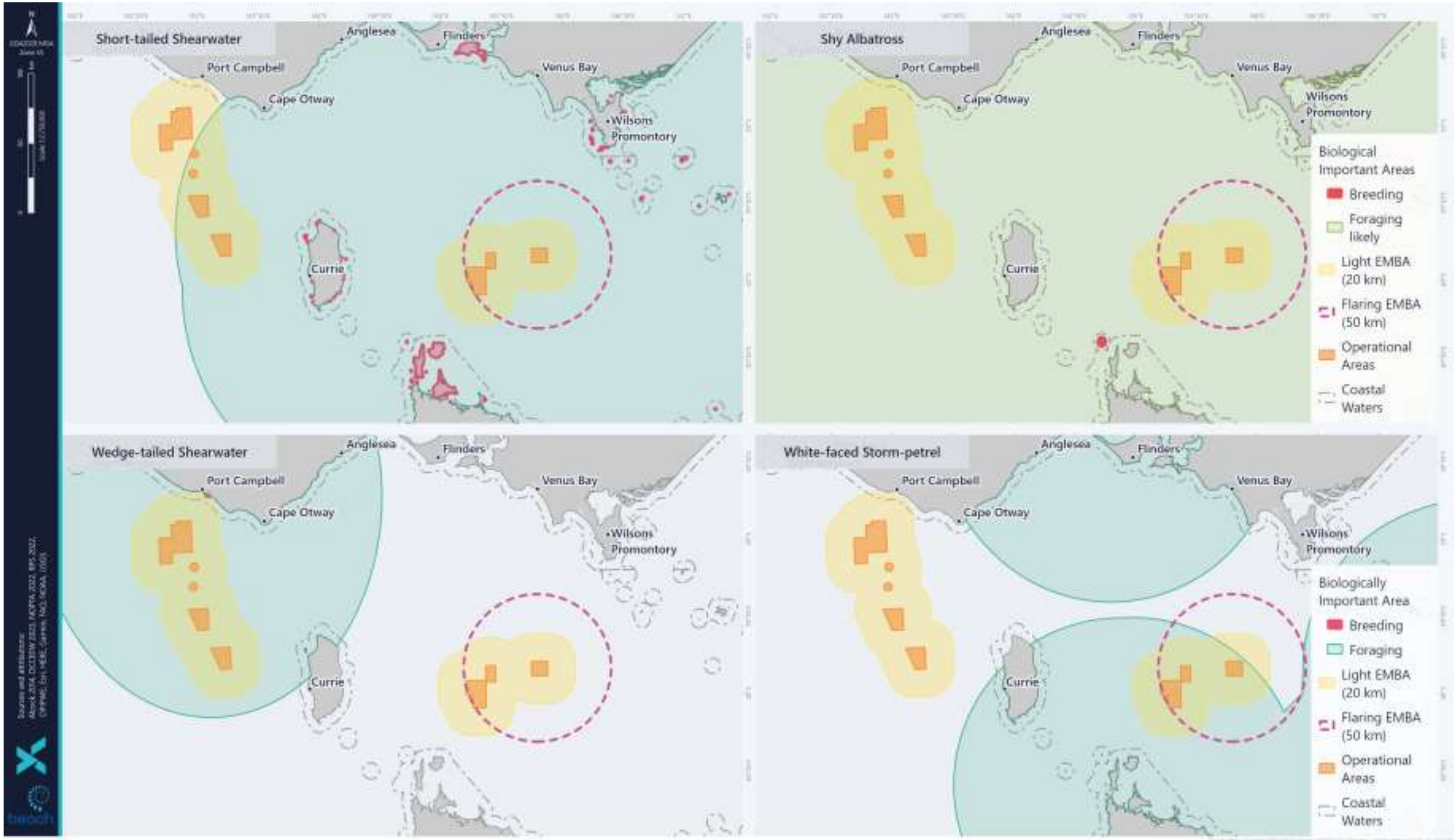

Figure 7-3: Light EMBA and BIAs for Short-tailed Shearwater, Shy Albatross, Wedge-tailed Shearwater and White-faced Storm Petrel

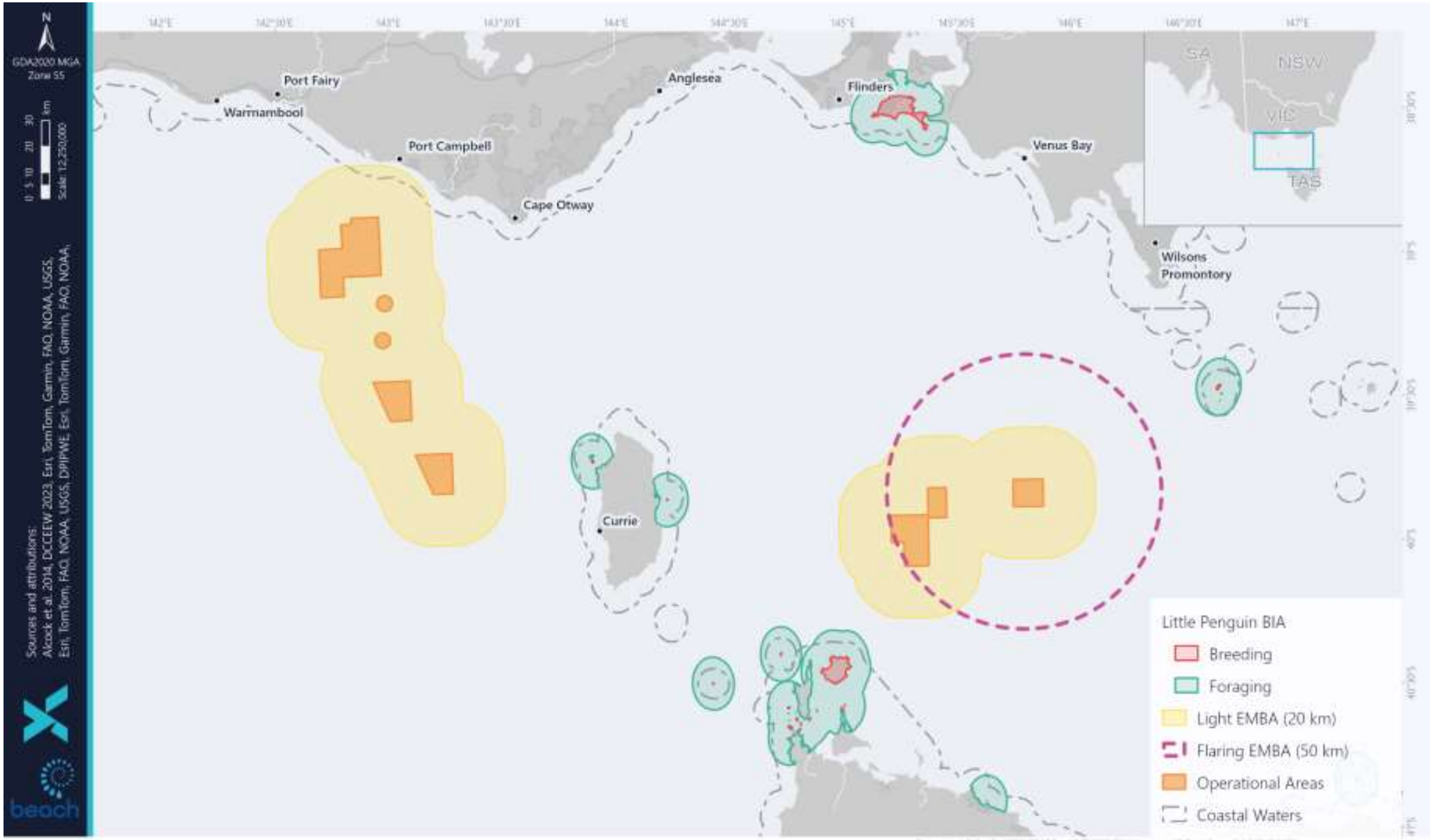

Figure 7-4: Light EMBA and BIAs for Little Penguin

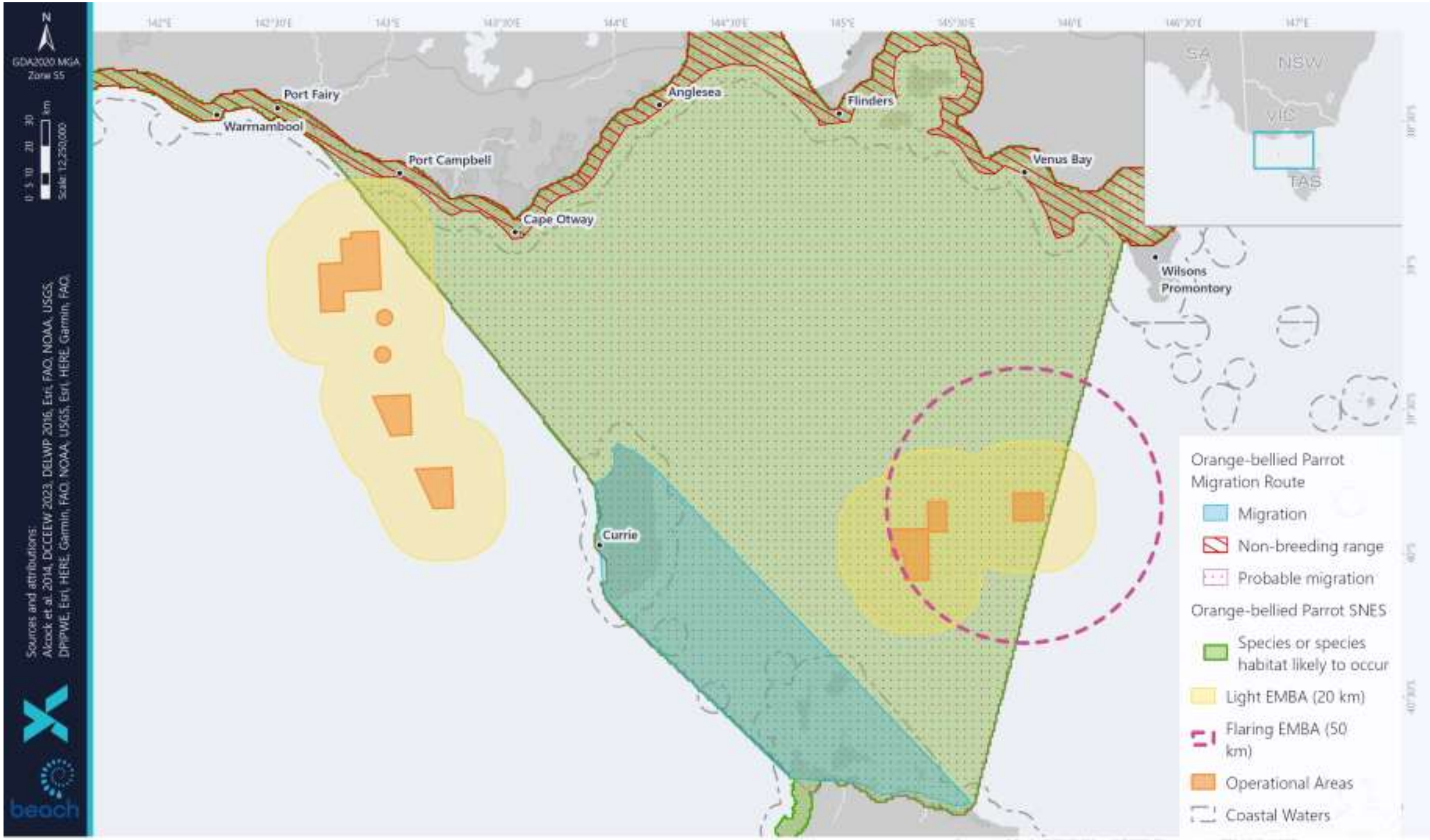

Figure 7-5: Light EMBA and Orange-bellied Parrot Migration Route

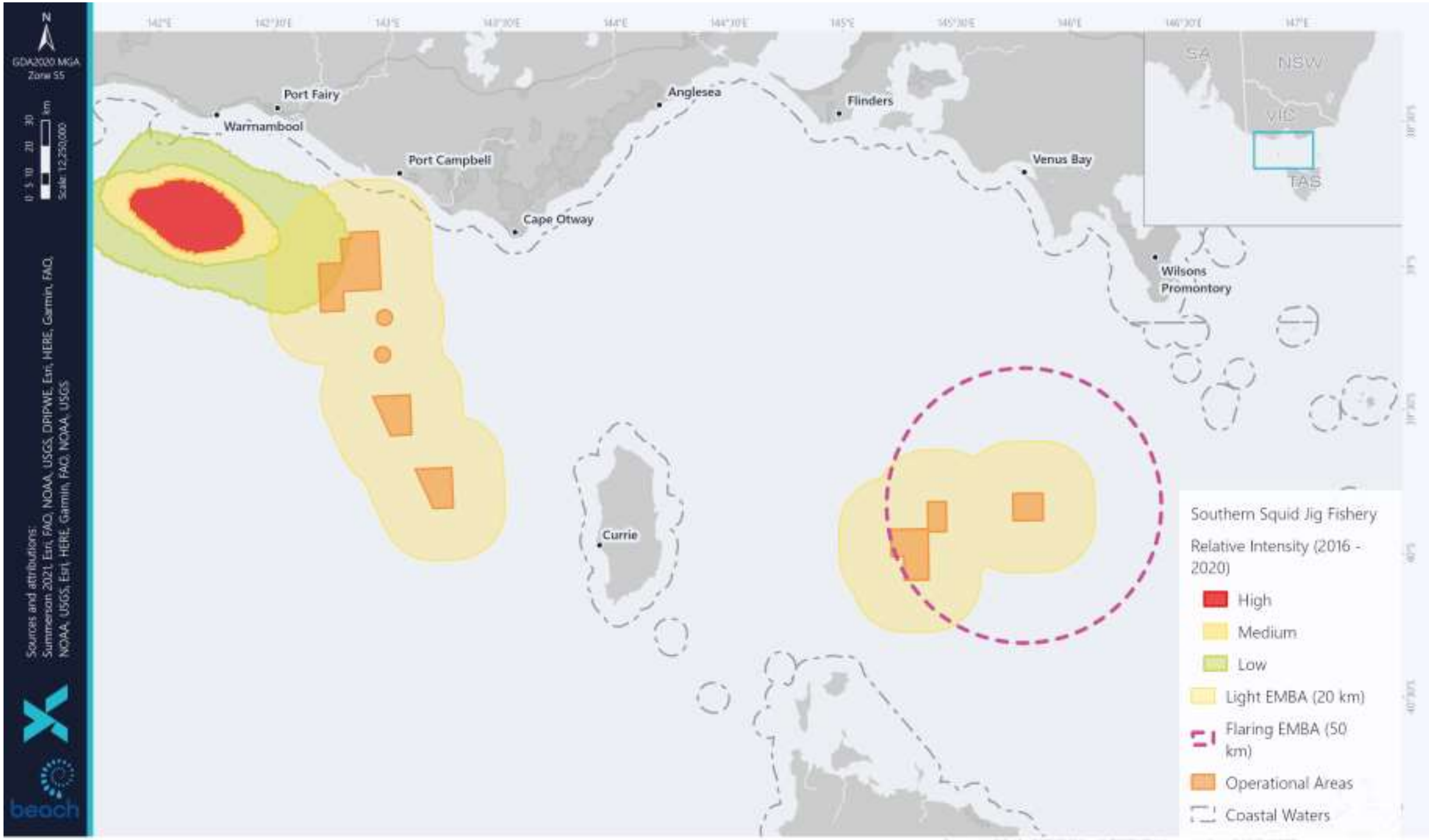

Figure 7-6: Light EMBA and Southern Squid Jig Fishing Intensity

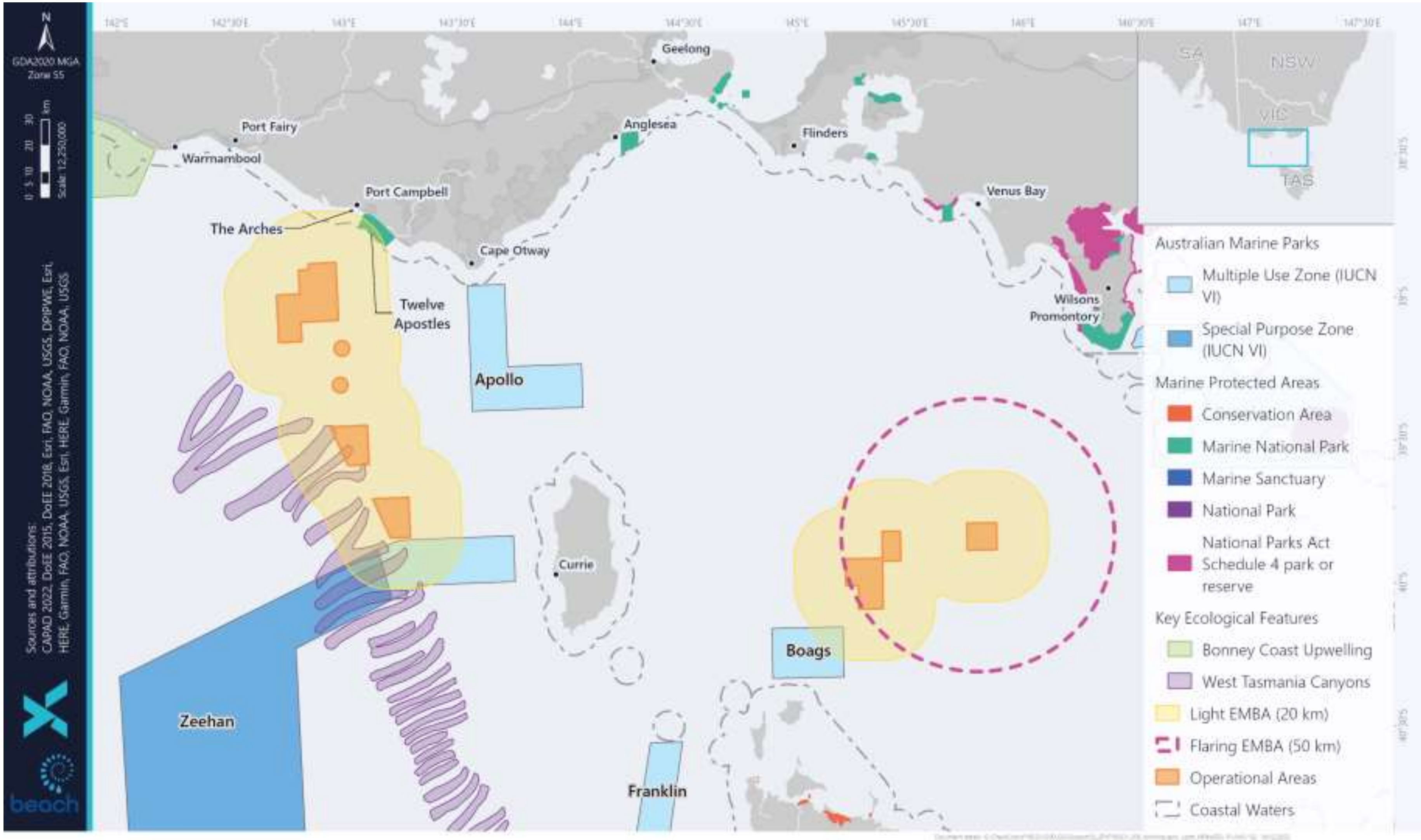

Figure 7-7: Light EMBA and Australian and State Marine Protected Areas, and KEFs

7.2.6 Demonstration that Impacts will be ALARP

ALARP decision context and justification	ALARP Decision Context: Type A Impacts from light emissions are relatively well understood though there is the potential for uncertainty in relation to the level of impact. Activities are well practised, and there are no conflicts with company values, no partner interests and no significant media interests. Additional controls may be required to ensure impacts can be managed to an acceptable level.
Adopted Control Measures	**Description**
CM01: Marine Assurance Process	The rig and vessels will meet relevant maritime laws and includes pre-commencement rig and vessel inspections of class certification requirements under the Navigation Act 2012 and associated Marine Orders. Marine Orders 21 and 30 for the safety of navigation and prevention of collisions require that onboard navigation, watchkeeping, radar equipment, and lighting meets the International Rules for Preventing Collisions at Sea (COLREGs) and industry standards. In addition, workplace lighting is required to support safe working conditions at night in accordance with health and safety requirements.
CM07: Light Management Plan	The National Light Pollution Guidelines for Wildlife (CoA 2023) provide management options for mitigating the effect of light to seabirds. A review of the management options relevant to the Drilling Program is provided in the additional controls section, noting that the light EMBA does not overlap any bird rookeries or nesting areas. Beach will contract a suitably qualified specialist to develop and support the implementation of a Light Management Plan as per the National Light Pollution Guidelines for Wildlife (CoA 2023). Once safety navigational lighting requirements are met (as per vessel class), the Light Management Plan will detail additional mitigations to ensure artificial lighting is reduced to minimum levels based on the information in the Seabird Light Mitigation Toolbox (CoA 2023) wherever practicable, whilst maintaining safe working conditions and navigation. Specifically, outwards facing lighting will be reduced to minimum levels, wherever practicable.
CM10: (Contingency) Well Testing Program	Minimise Flaring: Flaring will be limited to a maximum of 48 hours for one well (Yolla 7) if well testing is carried out (contingent activity). Minimise Flaring at Night: Initial flow will be conducted in good visibility conditions as per Beach WECS. A check will be undertaken to ensure no birds are on or near to the flare boom prior to commencing flaring.

Additional Control Measures Assessed

Control	**Cost/Benefit Analysis**	**Control Implemented?**
Limit or exclude night-time operations	Elimination of work lights associated with routine operations could result in a minor decrease in lighting. Limiting operations to day-time hours would not eliminate the impact of artificial light required for navigation and safe stand-by operations. Restricting night-time operations would increase the duration of the program and the associated HSE impacts and	No

	costs and would be grossly disproportionate the reduction in impact.	
Seasonal timing	Beach has determined that the risk to foraging or migrating birds during the period of the Drilling Program cannot be avoided due to variability in timing of environmentally sensitive periods and unpredictable presence of some species with: • Orange-bellied parrot: late February to early April (Australian Museum 2020). • Common diving petrel: year round (DCCEEW 2023h). • Northern giant petrel: May to October (DCCEEW, 2023a) • Short-tailed shearwater: September to April (AAD, 2020) Therefore, there is no period where avoidance of both species is possible. In addition, Beach is required to meet its requirements under the OPGGS Act and petroleum licence conditions to explore and development gas reserves within their petroleum titles. Titleholders must also P&A suspended wells to comply with the requirements under section 572 of the OPGGS Act to remove all structures, equipment and other property that is neither used nor to be used in connection with operations authorised by the title. To progress these petroleum activities, Beach is planning a rig campaign commencing no earlier than November 2024 (subject to rig availability). This rig campaign will be shared across Beach's Bass and Otway assets, along with other titleholders who also have drilling activities planned in the region. A rig has been secured by Beach along with three other consortium members operating in the Otway Basin. The driver behind the consortium approach is to realise efficiencies through the execution of multiple wells in one campaign, reducing mobilisation and demobilisation activities and shared use of aviation and shore base support. Being part of a consortium also provides the flexibility to negotiate rig slot sequencing with other operators therefore optimising rig utilisation and minimising down-time. As the Drilling Program could take up to 560 days there will be some overlap with periods when foraging or migrating birds will be within the light EMBA. Controls have been identified to ensure lighting is reduced to that for safe operations. In addition, during the Beach Otway Drilling Campaign in 2021/2022, no birds were identified to be attracted or grounded due to rig or vessel lighting or due to flaring. In 15 years of Beach operating the Thylacine-A Wellhead Platform no orange-bellied parrots have been recorded. In addition, no orange-bellied parrots were observed during the Otway Phase 4 or Phase 5 offshore campaigns. Avoiding the orange-bellied parrot migration is not commensurate to the level of impacts predicted. Other species are present all year round or for large portion of the year or do not forage at night thus restricting the period when activities will occur does not afford any benefit to these species.	No

Change lighting types aboard the rig and vessels to those with less impact (e.g. use of motion sensors / timers, change colour of lights, reduced intensity, and frequency of lighting)	Changing the colour, intensity, frequency and/or positioning of lighting could potentially reduce the adverse impacts of artificial light on certain fauna. Navigation lighting colours and minimum lighting for crew safety are stipulated by law. Given the variety of marine fauna that may be present and their varying sensitives to different light wavelengths, the control measure is not regarded as being practical and is likely to be of minimal overall benefit. During the Beach Otway Drilling Campaign in 2021/2022, no birds were identified to be attracted or grounded due to rig or vessel lighting. The costs of replacing lighting are considered grossly disproportionate to the benefit gained.	No
Vessels maintain a dark zone between the orange-bellied parrot migration pathway and the light sources during migration season.	Position of vessels is determined by safe operational requirements. Evaluation of trade-offs indicates an unacceptable navigation and safety risk associated with the establishment of dark zones. Further, repositioning is likely to result in only minor reductions in light emissions. The HSE trade-offs are considered grossly disproportionate to the benefit gained.	No
Reduce unnecessary outdoor deck lighting on all vessels and permanent and floating oil and gas installations in known seabird foraging areas at sea.	The Light Management Plan will include requirements to minimise non-essential lights and outward facing lights ensuring safety navigational lighting and safe work condition requirements are met.	Yes CM07: Light Management Plan
Vessels working in seabird foraging areas during breeding season should implement a seabird management plan to prevent seabird landings on the ship, manage birds appropriately and report the interaction.	A rescue program will not prevent birds grounding, but it has been proven useful to reducing mortality of seabirds, and therefore, an environmental benefit. Preparedness for handling will also reduce safety risks to personnel. Administrative costs of incorporating this program into induction package and implementation throughout activity. The Light Management Plan will include a program for handling grounded birds and reporting requirements.	Yes CM07: Light Management Plan
Do not flare.	Well testing is a contingency for the Yolla 7 well and may be required to remove well construction fluid, so this is not received by the Yolla A platform and the Lang Lang Gas Plant, and if necessary, undertake production testing to evaluate the reservoir potential and understand reservoir fluid properties. No birds where grounded or attracted to the flare during the Beach Otway Drilling Campaign in 2021/2022. As flaring is a contingency and if undertaken will be for up to 48 hrs the cost of downtime for two 12 hour periods is disproportionate to the benefits as it is unlikely that birds are attracted to the flare.	No
Limit flaring to daylight hours only.	Limiting flaring to day-time hours would eliminate the impact of artificial light from flaring during night-time hours when light is most apparent and potential impacts are greatest. No birds where grounded or attracted to the flare during the Beach Otway Drilling Campaign in 2021/2022.	No

	As flaring is a contingency and if undertaken will be for up to 48 hrs the cost of downtime for two 12 hour periods is disproportionate to the benefits as it is unlikely that birds are attracted to the flare.

7.2.7 Demonstration that Impacts will be of an Acceptable Level

Consequence rating	Minor (1)
Likelihood of occurrence	NA
Residual risk	NA
Acceptability Assessment	
To meet the principles of ESD	Light emissions were assessed as having a Minor (1) consequence which is not considered as having the potential to result in serious or irreversible environmental damage. There is high confidence in the predicted level of impact as Beach has significant experience operating in the Otway and Bass based on their existing offshore developments and associated activities including the Beach Otway Drilling Campaign in 2021/2022.
Internal context	The proposed management of the impact is aligned with the Beach Environment Policy. Activities will be undertaken in accordance with the Implementation Strategy (Section 8).
External context	There have been no stakeholder objections or claims regarding light emissions.
Other requirements	Light emissions will be managed in accordance with the National Light Pollution Guidelines for Wildlife (CoA 2023). The Guidelines recommend: • Infrastructure with artificial lighting that is externally visible should have best practice lighting design implemented. • Where there is important habitat for seabirds within 20 km of a project, an EIA should be undertaken. These requirements are met by this impact assessment and the implementation of CM07: Light Management Plan. Light pollution is identified as a threat in the Wildlife Conservation Plan for Seabirds (CoA 2020a) and with the following actions relevant to light: • Manage the effects of anthropogenic disturbance to seabird breeding and roosting areas. • Ensure all areas of important habitat for seabirds are considered appropriately and consistently in the development assessment process. This requirement is met by this impact assessment and the implementation of CM07: Light Management Plan. The light EMBA does not overlap any seabird breeding and roosting areas. Light emissions are identified as a threat in National Recovery Plan for Albatrosses and Petrels 2022 (CoA 2022a) however, no actions are identified. The implementation of vessel Light Management Plans will ensure that lighting is of a level that will not impact on the recovery of threatened albatrosses or petrels. The National Recovery Plan for the Orange-bellied Parrot (DELWP 2016) identifies illuminated boats and structures as a threats with the action of assess the risk from barriers on the migration route. With the action of manage threat if the risk rating warrants action. This requirement is met by this impact assessment and the implementation of CM07: Light Management Plan.

	The Wildlife Conservation Plan for Migratory Shorebirds (DoE 2015b) identifies light as part of anthropogenic disturbance as threat but has no actions. The National Recovery Plan for the Australian Painted Snipe (CoA 2022) does not identify light as a threat. There are no other recovery plans, conservation advice or listing advice for seabirds within the light EMBA.
Monitoring and reporting	Reporting of injury to or death of EPBC Act-listed species will be undertaken as detailed in Section 8.3.1.
Acceptability outcome	**Acceptable**

7.3 Atmospheric Emissions

7.3.1 Source of Aspect

Atmospheric emissions are generally considered to be any emission or entrainment process from a point, non-point or mobile sources that results in air pollution. This includes pollutants associated with greenhouse gas (GHG) emissions. With regards to the Drilling Program these emission sources include:

- Rig and vessel fuel use.
- Helicopter fuel use.
- Flaring operations as a part of flow-back and well testing. Flaring is a contingency for one well (Yolla 7).
- Venting of rig dry bulk storage tanks during transfer of bulk dry barite, bentonite, and cement from the vessel to the rig.
- Fugitive emissions - very small volumes of gases or vapours are released from pressure-containing equipment such as valves, piping flanges, pumps, storage tanks, compressors, etc. on the rig and vessels. Volumes are kept to a minimum through upkeep of machinery aboard the rig and vessels, during implementation of the planned maintenance system.

7.3.2 Extent and Duration of Aspect

Vessel and Drill Rig Operations - Drilling	
Extent	Operational Area Based on the furthest distance of impact.
Duration	560 days Continuous atmospheric emissions will be generated by power generation on the vessels and rig.
Flaring (Yolla-7 contingency only)	
Extent	Yolla 7 Operational Area
Duration	48 hrs

7.3.3 Predicted Environmental Impacts

The release of atmospheric emissions (gaseous GHG emissions), such as carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O), along with non-GHG emissions, such as sulphur oxides (SOx) and nitrogen oxides (NOx), can result from the operation of the rig and vessel engines, helicopters, generators, fixed plant, equipment and during flaring. Small quantities of dry barite, bentonite and cement will also be released whilst the holding tanks are venting after the transfer of bulk solids.

The predicted environmental impacts from atmospheric emissions are:

- Atmospheric emissions leading to a change in air quality and an increase in greenhouse gas emission.

7.3.4 EMBA

Predicted impacts from atmospheric emissions associated with the Drilling Program will be limited to the operational area. Receptors which may be affected by atmospheric emissions within the operational area include:

- Air quality
- Seabirds.

The accumulation of GHG emissions in the atmosphere has been shown to contribute to climate change (BOM and CSIRO 2022, IPCC 2022a). Climate change impacts occur at a global scale over a long timeframe and cannot be attributed to any single source of emissions or specific activities.

Climate change associated with an increase in GHG emissions is likely to affect various values and sensitivities within Australia, such as:

- Physical environment such oceanography, water quality, climate.
- Ecological receptors associated with marine, terrestrial and wetland ecosystems.
- Socio-economic receptors such as coastal communities and fisheries.
- Cultural values and sensitivities.

It is important to acknowledge that climate change impacts cannot be directly attributed to any one activity. Rather they are the result of global GHG emissions minus global GHG sinks, that have accumulated in the atmosphere since the industrial revolution began.

7.3.5 Predicted Level of Impact

7.3.5.1 Air Quality

As the Operational Area is away from coastal settlements and given the limited extent of reduced air quality, adverse impact on local or regional biodiversity, ecological integrity, social amenity, or human health is not predicted.

The Operational Area overlaps foraging BIAs for albatross, petrel, and shearwater species. No habitat critical to the survival of birds occur within the Operational Area. As it is unlikely that seabirds would remain close to the emission source for an extended period impacts are not predicted.

Natural gas and diesel combustion, along with venting, 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 atmospheric GHG load, which adds to global warming potential, they are relatively small on a global scale, representing an insignificant contribution to overall GHG emissions. These emissions are not considered to have a determinable local-scale impact and therefore impacts are considered to be low.

The extent of the area of potential impact is predicted to be close to the emission source for the duration of the emission. The consequence is assessed as Minor (1) and is of an acceptable level based on:

- The low level of emissions.

- The open ocean environment and prevailing winds of the Otway and Bass mean that atmospheric emissions will rapidly disperse to background levels close to the emission source.
- Impacts to seabirds are not predicted.
- Impacts to coastal communities are not predicted.

7.3.5.2 Greenhouse Gas Emissions

The use of fuel to power engines, generators and any mobile/fixed plant and flaring if the Yolla 7 well is tested, will result in gaseous GHG emissions. GHG emissions up to a 150 kt CO_2-e are forecast for the Drilling Program. The GHG forecast calculations and assumptions are detailed in Appendix F. The calculations assumes worst-case conditions, i.e. the longest possible drilling duration for each well and maximum flaring duration and rate. GHG emissions from the vessels, rig, helicopters, flaring, and materials represent 52%, 31%, 1%, 8%, and 8% of the total emissions, respectively.

The total GHG emissions estimate for the Drilling Program is less than ~0.01% and 0.05% of the Australian and Victorian carbon budgets, respectively, for the duration of the Drilling Program. See the GHG Emissions Technical Summary in Appendix F for details on what data was used to determine this data.

While these emissions add to the GHG load in the atmosphere, they are small when compared to national emissions and insignificant on a global scale and are not predicted to have determinable impact. The Drilling Program is similar to other shipping and industrial activities contributing to the accumulation of GHG in the atmosphere.

As per the Greenhouse Gas Protocol Corporate Accounting and Reporting Standard (2004), only Scope 1: GHG emissions, emissions that a company makes directly, are emitted during the Drilling Program, i.e., from the combustion of diesel during operations and from flaring. The GHG emissions estimation for the Drilling Program was calculated using the National Greenhouse and Energy Reporting (Measurement) Determination 2008 methodology made in accordance with the National Greenhouse and Energy Reporting Act 2007 (NGER Act) (DCCEEW 2022d).

Accidental release and fugitive emissions of ozone-depleting substances (ODS) have the potential to contribute to ozone layer depletion, attributing to increased ultraviolent radiation reaching the earth's surface from the sun, further accelerating global warming and climate change (WMO 2022). Though fugitive emissions are known to occur, given the short duration of the activity and the high energy airshed, the small volume of fugitive emissions will be quickly dissipated and is not considered a risk to air quality.

Physical Environment

Anthropogenic driven climate change has been demonstrated to result in changes in the frequency and intensity of extreme weather events such as droughts, floods, heatwaves, storms, and fire, impacting ecosystem's composition, resilience, and function (IPCC 2022a).

Climate change has been attributed to fundamental changes to the physical and chemical characteristics of the ocean, such as ocean warming, sea levels rising, acidification and deoxygenation (IPCC 2022a). Sea surface temperatures have increased globally over recent decades and are expected to continue to rise. Estimates of warming in the Southern Tasman Sea of between 0.6 to 0.9°C, and between 0.3 to 0.6°C elsewhere along the Australian coast, are predicted by 2030 (Church et al. 2006).

Ecological Receptors

Climate change can result in a range of impacts to specific species, environments, and ecosystems within Australia. It is important to acknowledge that climate change impacts cannot be directly attributed to one activity, as they are the result of global emissions that have accumulated within the atmosphere over time.

The impacts from climate change are highly species-dependent and spatially variable. Some impacts which are already apparent include changes to biodiversity, such as shifts in genetic composition, changes to migration patterns, altered lifecycles and reduced reproduction rates of certain species (Steffen et al. 2009). The increase in the frequency and intensity of extreme weather events has been shown to impact population dynamics, species boundaries, morphology, behaviour, reproduction and ecosystem composition, resilience, and function (IPCC 2022a).

In the marine environment, changes to the physical and chemical characteristics of the environment can result in alterations to species distribution, abundance, seasonal timing, habitat loss, extinction, population declines and increases in the frequency and intensity of thermally induced coral bleaching events (IPCC 2022a, BOM and CSIRO 2022). Increasing acidity, from CO_2 being absorbed by oceans and fresh water, increases the solubility of calcium carbonate, which is the central component of the skeletal material in aquatic organisms (Steffen et al. 2009).

Furthermore, species are globally shifting polewards driven by heat increases, shifts in seasonal timings and ecosystem changes, causing multiple losses of local species, mass mortality events, and loss of specific ecosystems such as kelp forests (IPCC 2022a). The shift will have adverse socio-economic consequences on certain activities which rely on these species such as aquaculture and fisheries.

Socio-economic Receptors

Socio-economic impacts resulting from climate change include impacts to the functions, interests or activities of other users who rely on specific ecological values that may experience adverse impacts, such as commercial and recreational fisheries and aquaculture.

Climate change may impact marine crustacean populations by intensifying habitat loss and interfering with feeding, moulting, reproductive performance, biochemical compositions, behaviour, movement and survival (Azra et al. 2022).

Crustacean responses to climate change vary by species, life-history stage, reproduction status and geographical distribution. For example, research on the southern rock lobster has shown they can increase their resilience to warmer water temperatures (Oellermann et al. 2022). However, the southern rock lobster is restricted by the inability to shift their range further south due to a lack of coastal habitat. Consequently, the main threat from climate change is expected to be climate driven competition with the increasingly abundant eastern rock lobster as it expands its range south (Oellermann et al. 2022).

Conservation Values and Sensitivities

The Zeehan AMP and Apollo AMP are the closest AMPs to the Otway Operational Areas, while the Boags AMP is the closest to the Bass Operational Areas. The values of these marine reserves include ecological receptors that may be sensitive to the impacts of climate change.

The South-east Commonwealth Marine Reserves Network Management Plan does not specify climate change as a main pressure; however, it does identify that the effects are unpredictable and may include shifts in major currents, rising sea levels, ocean acidification and changes in the variability and extremes of climatic features (e.g. sea temperature, winds, and storm frequency and intensity) (DNP 2013). The Plan states that there is a high level of uncertainty about the effects that climate change related pressures will have on the conservation values protected by the South-east Commonwealth marine reserves.

The Arches Marine Sanctuary and Twelve Apostles Marine National Park are the closest state marine protected areas to the Operational Areas. The Great Ocean Road Action Plan which covers the Twelve Apostles Marine National Park, The Arches Marine Sanctuary along with the Great Ocean Road, identifies impacts of climate change to these protected areas.

Whilst the release of GHG emissions is known to contribute to global climate change, the amount estimated to be released as a result of the Drilling Program is insignificant on a global scale and is not expected to have determinable impacts to protected areas.

Cultural Values and Sensitivities

Impacts to cultural heritage sites and places of spiritual importance in coastal locations may also be experienced due to rising sea levels. Sea levels have been estimated to have risen on average by 1.2 mm per year between 1920 and 2000 due to climate change (Church et al. 2006). By 2100, research is expecting sea levels to have increased by a further 18 to 59 cm in response thermal expansion and melting of icesheets (Solomon et al. 2007).

Whilst the release of GHG emissions is known to contribute to global climate change, the amount estimated to be released as a result of the Drilling Program is insignificant on a global scale and is not expected to have determinable impacts.

Summary

For the Drilling Program there is no gas production. Any future offshore gas production to back fill existing production at the Otway and Lang Lang Gas Plants require separate regulatory approvals that include an assessment of direct and indirect GHG emissions.

The consequence severity of GHG emissions from the Drilling Program on the physical, ecological, conservation, socio-economic and cultural receptors and values described above is assessed as Minor (1) and is of an acceptable level based on:

- Although emissions of GHG such as carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O) during the activity will add to the GHG load in the atmosphere, they represent an insignificant contribution on a global scale and are not expected to have determinable impacts. Consequently impacts are not predicted to affect:
  - Species with conservation management plans that identify climate change as a threat.

  - Commercially important species, noting that the giant crab and southern rock lobster fisheries in Victoria, and the southern rock lobster fishery in Tasmania having stock listed as a sustainable status (FRDC 2020, 2020a) and neither have a EPBC threatened status, therefore, any minor impact is unlikely to affect the productivity of either population.
  - The South-east Commonwealth Marine Reserves Network Management Plan stating that there is a high level of uncertainty around the effects that climate change may have upon the conservation values protected by the reserves (DNP 2013).
- Maintenance of equipment containing ozone depleting substances is controlled to ensure the likelihood of an accidental release or fugitive emissions is minimised.

7.3.6 Demonstration that Impacts will be ALARP

ALARP decision context and justification	**Atmospheric emissions: ALARP Decision Context: Type A.** Impacts from atmospheric emissions are well understood and there is nothing new or unusual. Good practice is defined, and uncertainty is minimal. There are no conflicts with company values, no partner interests, and no significant media interests. No objections or claims where raised by stakeholders in relation to atmospheric emissions. As the impact consequence is rated as Minor (1) applying good industry practice (as defined in Section 2.7.2.1) is sufficient to manage the impact to ALARP. **GHG emissions: ALARP Decision Context: Type B** Impacts from GHG emissions are relatively well understood though there is the potential for uncertainty in relation to the level of impact. Activities are well practised, and there are no conflicts with company values, but there is significant partner and media interest in GHG emissions form oil and gas activities including Beach's activities. Though objections or claims where raised by stakeholders in relation to GHG emissions this was in relation to future development and processing of gas reserves and not specific to the Drilling Program.
Adopted Control Measures	**Source of good industry practice control measures**
CM01: Marine Assurance Process	The rig and vessels will meet relevant maritime laws and includes pre-commencement rig and vessel inspections of class certification requirements under the Navigation Act 2012 and associated Marine Orders. Rig and vessels will comply with Marine Orders – Part 97: Marine Pollution Prevention – Air Pollution (appropriate to vessel class) for emissions from combustion of fuel, including: • Hold a valid Air Pollution Prevention certification or equivalent in accordance with MARPOL Annex VI. • Use low sulphur fuel in accordance with Marine Order 97: Marine Pollution Prevent – Air Pollution (Division 7). • National (AMSA) and International (IMO / MARPOL) Emissions and Discharge Standards for vessels. • Have a Ship Energy Efficiency Management Plan as per MARPOL 73/78 Annex VI.

	• Engine NOx emission levels will comply with Regulation 13 of MARPOL 73/78 Annex VI. • Only MARPOL VI-approved waste incinerators shall be used to incinerate solid combustible waste (food waste, paper, cardboard, rags, plastics). • ODS handling procedures as per MARPOL Annex VI, including maintenance of ODS record book where rechargeable systems containing ODS are recharged or repaired. A Preventative Maintenance System is in place that provides a status on the maintenance of equipment and detailed manufacturer's specification on maintenance procedures for: ◦ Equipment detail as a control in this EP will be inspected to ensure effective operation. ◦ Power generation and propulsion systems on the MODU and vessels will be inspected to ensure efficient operation.
CM02: Vessel and Rig Operating Procedures	Bulk solids transferred in accordance with bulk transfer procedures to reduce the risk of an unintentional release bulk product (powder) to sea during tank venting. The procedures include standards for: • Certified equipment with confirmed integrity (e.g. hose and valves). • Transfer process (e.g. safety, communication, monitoring, inventory, emergency shut down procedures, procedural documents, and spill incident details).
CM10: (Contingency) Well Testing Program	Flaring if undertaken will be limited to a maximum of 48 hours on one well (Yolla 7). A flaring system and air compressors will be used to atomise hydrocarbons to minimise smoke during combustion and aid in the reduction of atmospheric emissions. A minimum standard for the destruction efficiency of the flare will be specified in the minimum equipment requirements.

Additional Controls Assessed

Control	Cost/Benefit Analysis	Control Implemented?
Use of low GHG fuels	Vessel that use low GHG fuels are relatively new and are not common in Australian waters. To bring vessels into Australia to support operations is an increased cost. Beach via its Procurement Vetting Process (CM11) assesses suppliers emissions management and via this process would support low emission vessels if available.	Yes – as per CM11: Procurement Vetting Process
Prohibit use of ODS (ozone depleting substances)	Eliminates emissions associated with ODS activities during the Drilling Program. Increase in health risk from storage of wastes. Increase in risk due to transfers (increased fuel usage, potential increase in collision risk, disposal on land).	Reject
No bulk product (powder) transfers	Eliminates impacts to air quality from unintentional release. Bulk product is required to perform the activity and transfers of bulk product are required. Transfer activities are carried out in accordance with rig owner's procedures to reduce the risk of an unintentional release.	Reject

Consequence rating	Minor (1)

Likelihood of occurrence	NA
Residual risk	Low

7.3.7 Demonstration that Impacts will be of an Acceptable Level

Consequence rating	Minor (1)
Likelihood of occurrence	NA
Residual risk	Low
Acceptability Assessment	
To meet the principles of ESD	Air emissions were assessed as having a Minor (1) consequence which is not considered as having the potential to result in serious or irreversible environmental damage. There is high confidence in the predicted level of impact as Beach has significant experience operating in the Otway and Bass based on their existing offshore developments and associated activities including the Beach Otway Drilling Campaign in 2021/2022.
Internal context	The proposed management of the impact is aligned with the Beach Environment Policy, Climate Change Policy, Sustainability Policy, Risk Management Standard, Environment Management Standard and Sustainability Standard as detailed in Section 8. Activities will be undertaken in accordance with the Implementation Strategy (Section 8).
External context	There have been no stakeholder objections or claims regarding atmospheric emissions or GHG emissions associated specifically with the Drilling Program.
Other requirements	The following published material identifies climate change as a threat to the relevant threatened and migratory species within the operational area: • National Recovery Plan for Albatrosses and Petrels (CoA 2022a). • Wildlife Conservation Plan for Migratory Shorebirds (DoE 2015b.) • Conservation Advice for *Ardenna grisea* (sooty shearwater) (DCCEEW 2023l). • National Recovery Plan for the Orange-bellied Parrot *Neophema chrysogaster* (DELWP 2016). • Recovery Plan for Marine Turtles in Australia (CoA 2017b). • Conservation Management Plan for the Blue Whale (CoA 2015) • Conservation Management Plan Southern Right Whale (DSEWPaC 2012a) • Draft National Recovery Plan for the Southern Right Whale (DCCEEW 2022a). • Listing Advice: *Megaptera novaeangliae* Humpback Whale (DAWE 2022a). • Conservation Advice *Balaenoptera borealis* (sei whale) (TSSC 2015g). • Conservation Advice for *Balaenoptera physalus* (fin whale) (TSSC 2015f). • Recovery Plan for the White Shark (*Carcharodon carcharias*) (DSEWPaC 2013a).

Monitoring and reporting	Fuel use and flaring volumes will be recorded as detailed in in Section 8.3.8. Atmospheric and GHG emissions will be recorded and reported in alignment with the *National Greenhouse and Energy Reporting Act* 2007 (NGER Act) and National Pollution Inventory as detailed in Section 8.3.8.
Acceptability outcome	**Acceptable**

7.4 Underwater Sound

7.4.1 Source of Aspect

Underwater sound will be generated by:

- Drill rig and vessel operations
- Transponders for anchor and rig positioning
- Helicopter operations
- Wellhead cutting

7.4.2 Extent and Duration of Aspect

Vessel and Drill Rig Operations - Drilling	
Extent	1.17 - 2.21 km Based on the furthest distance to a sound exposure criteria for drilling.
Duration	560 days Continuous underwater sound will be generated by the vessels and rig propellor cavitation, thrusters, hydrodynamic flow around the hull, and operation of machinery and equipment.
Vessel and Drill Rig Operations - Resupply	
Extent	6.23 – 19.6 km Based on the furthest distance to a sound exposure criteria for resupply.
Duration	3 hours per day Based on a review of operational details from Beach Energy's Otway Drilling Campaign, conducted from February 2021 to July 2022, resupply operations are predicted to occur near-daily for an average duration of 3 hours.
Helicopter Operations	
Extent	18 m Richardson et al. (1995) reported helicopter sound (for Bell 214 type) being audible in air for four minutes before it passed over receivers, but only detectable underwater for 38 seconds at 3 m depth and for 11 seconds at 18 m depth for the same flight path.
Duration	11 seconds on take-off and landing at the drill rig up to 7 times per week.
Wellhead Cutting	
Extent	Not distinguishable from the drilling underwater sound emissions
Duration	~1- 2 hours though may take up to 6 hours for more complex wells

7.4.3 Predicted Environmental Impacts

Potential impacts of underwater sound emissions to marine fauna from the Drilling Program are:

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

7.4.4 EMBA

The sound EMBA is the area where sound levels are predicted to be above sound exposure criteria which are detailed in the relevant receptors impact assessment sections. Acoustic modelling undertaken to determine the sound EMBA is described in Section 7.4.8.1.

Continuous underwater sound emissions may impact ecological receptors within the sound EMBA such as:

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

As different sound exposure criteria apply to these receptors, sound EMBAs for each receptor is defined in the receptor consequence sections to identify potential receptors that may be affected.

Fish and marine mammals are values of the following within the sound EMBA:

- Conservation values and sensitivities
- Socio economic receptors
- Cultural values and sensitivities

7.4.5 Predicted Level of Impact: Helicopter

Helicopters are used to transport personnel to and from the drill rig. The presence of the helicopter and its associated sound field will be highly transient. On approach to the drill rig the helicopter will descend to the helideck where there is greatest potential to ensonify the water column. Sound pressure will be greatest at the sea surface and rapidly diminish with increasing depth. Helicopter engine sound is emitted at a range of frequencies generally, below 500 Hz (Richardson et al. 1995). Richardson et al. (1995) reported helicopter sound (for Bell 214 type) being audible in air for four minutes before it passed over receivers, but only detectable underwater for 38 seconds at 3 m depth and for 11 seconds at 18 m depth for the same flight path. Thus, the predicted extent of impact is between 3 to 18 m for a period of 11 – 38 seconds twice a day (landing and take-off). Based on such short-term, intermittent sounds the consequence to whales (including pygmy blue whales within the foraging BIA, southern right whales within the migration BIA and fin or sei whales which may also be foraging) and other marine fauna is assessed as Minor (1).

7.4.6 Predicted Level of Impact: Wellhead Cutting

Wellhead cutting will be required for the P&A of the legacy suspend wells and would typically take ~1-2 hours though may take up to 6 hours for more complex wells. Pangerc et al. (2016) described the underwater sound measurement data during an underwater diamond wire cutting of a 32" conductor (10 m above seabed in ~80 m depth) and found that at lower frequencies, the operation was generally indistinguishable above the background noise of the vessel. This is confirmed via acoustic modelling undertaken by JASCO (Koessler and McPherson 2021 Appendix G. 4) who modelled a stationary vessel at Thylacine North-1 on DP (operating at 20% MCR) plus a stationary vessel on DP (operating at 20% MCR) using a ROV cutting tool at Geographe-4. This showed an increase of ~30 m for the behaviour exposure criteria compared to an installation vessel on DP and ~6 m for the TTS 24 h exposure criteria.

As the wellhead cutting will not be distinguishable from the drilling underwater sound emissions it is inherently part of the assessment of drilling sound emissions.

7.4.7 Predicted Level of Impact: Transponders

An array of long baseline and/or ultra-short baseline transponders may be installed on the seabed for metrology and rig positioning. An array of transponders is proposed within a radius of 500 m from the proposed well location.

Transponder transmissions are not continuous but consist of short 'chirps' with a duration that ranges from 3 to 40 milliseconds. Transponders will not emit any sound when on standby and may emit acoustic signals for about six hours per well if used. When required for general positioning, they will emit one chirp every five seconds (estimated to be required for four hours at a time). When required for precise positioning, they will emit one chirp every second (estimated to be required for two hours at a time).

Transponders typically emit pulses of medium frequency sound, generally within the range 21 to 31 kHz. The estimated SPL would be 180 to 206 dB re 1 µPa at 1 m (Jiménez-Arranz et al. 2017). Based on empirical spreading loss estimates measured by Warner and McCrodan (2011), received levels from transponders may reach the cetacean behavioural response criteria for impulsive sources (160 dB re 1 µPa) out to ~42 m. As detailed in Table 7-5 this is significantly less than the distances to the behavioural response criteria for the vessel and drilling.

As the transponders will not be distinguishable from vessel and drilling underwater sound emissions it is inherently part of the assessment of drilling sound emissions.

7.4.8 Predicted Level of Impact: Drill Rig and Vessels

Vessels generate continuous sound from propellor cavitation, thrusters, hydrodynamic flow around the hull, and operation of machinery and equipment. Sound from support vessels operating during drilling activities has been assessed to determine the cumulative impact of multiple continuous sound sources in close proximity.

The drill rig will generate sound from onboard equipment vibrations (e.g. pumps, generators, and machinery), and a smaller portion transmitted directly via the drill bit during drilling.

The drill rig may operate in a thruster assist mode to move into the well location and in emergency situations as per the Rig Safety Case. This system generates variable non-impulsive sound during infrequent operation of one up to six thrusters in response to feedback from the mooring system. A review of 33 months of historical operational data from the North Sea indicates thrusters are typically not active (>96% of the time) and utilisation is otherwise limited low loads across a small number of thrusters for short periods, (typically hours) in response to metocean conditions.

7.4.8.1 Underwater Sound Modelling

JASCO Applied Sciences (JASCO) have performed four underwater acoustic modelling studies that are used to information this impact assessment. Table 7-4 details the Drilling Program locations and activities applicable to each of the studies and scenarios modelled.

As part of Beach's Drilling Campaign in 2021/2022, in the Otway Basin, JASCO undertook underwater sound monitoring to determine the source levels of the Ocean Onyx semi-submersible drill rig and support vessels, and further validate their propagation models (McPherson et al. 2021). The data from this monitoring program is used to inform the JASCO underwater acoustic modelling studies used for this impact assessment.

The modelling study assessed distances from the Drilling Program activities where underwater sound levels reached exposure criteria corresponding to various levels of potential impact to marine fauna. The marine fauna considered was based on a review of receptors that may be affected by continuous sound, these were marine mammals, turtles, and fish. The exposure criteria selected for the modelling and the impact assessment were selected as they have been accepted by regulatory agencies and they represent current best available science (Koessler et al. 2020, Matthews et al. 2020).

Modelling was not undertaken for anchor prelay or for drill rig mooring. As anchor prelay and drill rig mooring will involve the use of the support vessels on DP the modelling for resupply would be an approximate proxy.

Table 7-4: Drilling Program Locations and Activities and Relevant Sound Modelling Studies and Scenarios

Location	Drilling Program Activity	Relevant Modelling Report	Relevant Modelling Scenario	Justification
Bass Operational Areas	Drilling, Completions, P&A including Wellhead Cutting	Trefoil Drilling Underwater Sound Modelling Addendum (Stroot et al. 2022) Appendix G. 1	Scenario 1 MODU Drilling	As detailed in Figure 3-2 the proposed wells and P&A activities in the Bass Operational Areas are within a similar water depths and based on the seabed surveys undertaken have similar seabed characterisations (Section 6.4.1.1), thus underwater sound emissions would travel in a similar manner within these locations.
	Drill Rig Resupply		Scenario 2 MODU Drilling with OSV under DP (4 hr)	
Wells in VIC/P43 and VIC/P73	Drilling, P&A including Wellhead Cutting	Beach Otway Development Acoustic Monitoring: Characterisation, Validation, and Marine Mammals (McPherson et al. 2021) Appendix G. 4	Scenario 5 MODU Drilling Scenario 8 MODU Drilling + OSV Standby Transit)	As detailed in Figure 3-1 the proposed wells in Vic/P43 and VIC/P73 and the Geographe 1 well are within a similar water depths and based on the seabed surveys undertaken have similar seabed characterisations (Section 6.4.1.2), thus underwater sound emissions would travel in a similar manner within these locations.
Geographe 1	P&A including Wellhead Cutting			
Wells in VIC/P43 and VIC/P73 Geographe 1	Drill Rig Resupply		Scenario 7 MODU Drilling with OSV under DP (4 hr)	
Thylacine 1	P&A including Wellhead Cutting	Beach Otway Project: Additional and Revised Modelling Study (Koessler and McPherson 2021) Appendix G. 2	Scenario A1 MODU Drilling Scenario A7 MODU Drilling + OSV Standby Transit	The underwater sound modelling was undertaken at the Thylacine North 1 well which is in 100 m water depth and the Thylacine 1 well is in 100 m water depth. The wells are ~5 km apart and based on the seabed surveys undertaken have similar seabed characterisations (Section 6.4.1.2), thus underwater sound emissions would travel in a similar manner within these locations.
	Drill Rig Resupply		Scenario 5 MODU Drilling + 4h OSV Resupply	
Wells in T/30P	Drilling, P&A including Wellhead Cutting	Beach Otway Project, Additional Modelling at Well Location South (Connell and Koessler 2023) Appendix G. 3	Scenario 1 MODU Drilling Scenario 4 MODU Drilling + OSV Standby Transit	As detailed in Figure 3-1 proposed wells within the T/30P Operational Areas are within similar water depths and on the shelf edge, thus underwater sound emissions would travel in a similar manner within these locations.
	Drill Rig Resupply		Scenario 3 MODU Drilling + OSV under DP (4hr) + OSV under Transit (20hr) (Resupply Ops)	

Table 7-5: Marine Mammal PTS, TTS and Behaviour Sound Exposure Criteria and Predicted Furthest Distances

Hearing group	SEL24h threshold ($L_{E,24h}$; dB re 1 µPa²·s)	Bass Drilling	Bass Resupply	VIC/P43, VIC/P73, Geographe 1 Drilling	VIC/P43, VIC/P73, Geographe 1 Drilling & Support Vessel	VIC/P43, VIC/P73, Geographe 1 Resupply	Thylacine Drilling	Thylacine Drilling & Support Vessel	Thylacine Resupply	T/30P Drilling	T/30P Drilling & Support Vessel	T/30P Resupply
		R_{max} (km)	R_{max} (km)	R_{max} (km)	R_{max} (km)	R_{max} (km)	R_{max} (km)	R_{max} (km)	R_{max} (km)	R_{max} (km)	R_{max} (km)	R_{max} (km)
PTS												
LF cetaceans	199	0.02	0.09	-	-	-	0.03	0.06	0.12	-	-	0.10
HF cetaceans	198	0.02	0.09	-	-	-	0.02	0.04	0.05	-	-	0.05
VHF cetaceans	173	0.09	0.15	0.19	0.19	0.2	0.23	0.26	0.26	0.13	0.13	0.17
Phocid seals	201	Not modelled	Not modelled	-	-	-	0.02	0.04	0.05	Not modelled	Not modelled	Not modelled
Otariid seals	219	-	-	-	-	-	-	-	0.03	-	-	0.03
TTS												
LF cetaceans	179	0.33	0.6	0.31	0.31	0.95	0.39	0.39	1.06	0.23	0.23	1.48
HF cetaceans	178	0.06	0.13	0.13	0.13	0.16	0.13	0.13	0.16	0.09	0.09	0.12
VHF cetaceans	153	1.3	1.4	1.07	1.06	1.09	1.12	1.12	1.16	1.43	1.44	1.53
Phocid seals	181	Not modelled	Not modelled	0.12	0.12	0.35	0.12	0.12	0.32	Not modelled	Not modelled	Not modelled
Otariid seals	199	0.02	0.09	-	-	-	0.02	0.02	0.07	-	-	0.05
Behaviour	**SPL threshold (Lp; dB re 1 µPa)**											
Marine mammals	120	2.12	6.23	1.17	2.09	7.02	1.24	1.32	7.89	1.46	2.21	19.6

Note: a dash indicates the level was not reached within the limits of the modelling resolution (20 m).

7.4.8.2 Marine Mammals

Exposure Criteria - PTS and TTS

The US National Marine Fisheries Service (NMFS 2018) reviewed available literature to determine exposure criterion for the onset of temporary hearing TTS and PTS for marine mammals based on their frequency hearing range. NMFS (2018) details that after sound exposure ceases or between successive sound exposures, the potential for recovery from hearing loss exists, with PTS resulting in incomplete recovery and TTS resulting in complete recovery.

Southall et al. (2019) reviewed the criteria which have remained the same, however, the mid-frequency cetaceans from NMFS (2018) are classified as high-frequency cetaceans in Southall et al. (2019), and high-frequency cetaceans from NMFS (2018) are classified as very-high-frequency cetaceans in Southall et al. (2019). For this impact assessment the cetacean classification from Southall et al. (2019) are used.

The NFMS (2018) exposure criteria are based on a cumulative SEL over a period of 24 h. Table 7-5 details the criteria and furthest modelled distances to them for each scenario.

The PTS and TTS 24 h criteria are only relevant to those receptors that are likely to be present in the area of ensonification for a period of 24 h. For this assessment the PTS and TTS 24 h criteria was applied to marine mammals that may be undertaking biologically important behaviours, such as calving, foraging, resting or migration (as defined by CoA 2015), that could result in them being within the ensonification area above the PTS and TTS criteria for a period of 24 h or greater.

Exposure Criteria - Behaviour

Numerous studies on marine mammal behavioural responses to sound exposure have not resulted in consensus in the scientific community regarding the appropriate metric for assessing behavioural reactions. The current interim NFMS (NOAA 2019) 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 extensive literature and studies in relation to marine mammal behavioural response to impulsive (seismic, pile driving) and non-impulsive (drilling, vessels) and found that most marine mammals exhibited varying responses between 140 and 180 dB re 1 µPa.

Southall et al. (2021) provides recommendations and discusses the nuances of assessing behavioural response, the authors do not recommend new numerical thresholds for onset of behavioural responses for marine mammals.

Table 7-5 details the furthest modelled distance to the NOAA (2019) exposure criteria for each scenario.

Phocid Seals

As detailed in Table 7-5 not all well locations modelled the sound exposure criteria for Phocid seals as they have not been known to occur in the Otway and Bass areas.

As detailed in Table 7-5 distances to the sound exposure criteria for Phocid seals are:

- PTS criteria is reached at 40 m for drilling and P&A, and 50 m for resupply.

- TTS criteria is reached at 120 m for drilling and P&A, and 350 m for resupply.
- Behaviour criteria is reached at between 1.17 km to 2.21 km for drilling and P&A, and between 6.23 km to 19.6 km depending on the location.

No Phocid seals were identified within the 20 km Sound EMBA based on the PMST Report (Appendix E. 4) thus impacts are not assessed further.

Otariid Seals

As detailed in Table 7-5 distances to the sound exposure criteria for Otariid seals are:

- PTS criteria is only reached at 30 m for resupply at Thylacine and T/30P.
- Furthest distance to the TTS criteria is 20 m during drilling and P&A and 90 m for resupply.
- Behaviour criteria is reached at between 1.17 km to 2.21 km for drilling and P&A, and between 6.23 km to 19.6 km depending on the location.

Based on the PMST Report the Australian sea-lion and New Zealand fur-seal may occur, and the Australian fur-seal is likely to occur within the 20 km Sound EMBA, but no biologically important behaviours or biologically important areas were identified within the Sound EMBA.

The consequence is assessed as Minor (1) and is of an acceptable level based on:

- There are no biologically important behaviours, biologically important areas, aggregation areas or haul-out areas identified within the sound EMBA.
- PTS and TTS are not predicted as the PTS and TTS 24 h criteria are relevant to those receptors that are likely to be present in the area of ensonification for a period of 24 h, and no biologically important behaviours or biologically important areas were identified within the Sound EMBA for Otariid seals. It is highly unlikely that Otariid seals would stay within the drill rig for the duration required to experience PTS and TTS from drilling (30 m for 24 hours) or resupply (90 m for 4 hours).
- Breeding colonies for Australian fur seal and New Zealand fur seal known to occur along the Victorian coastline, including Deen Maar, and the west side of King Island are outside the sound EMBA.
- The Recovery Plan for the Australian Sea Lion (*Neophoca cinerea*) (DSEWPaC 2013b) does not identify underwater sound as a threat to the recovery of the species.
- The Conservation Advice for the Australian Sea-lion *Neophoca cinerea* (TSSC 2020c) details that studies of pinnipeds in the Northern Hemisphere indicate that exposure to sharp, short sounds of moderate intensity for extended periods (e.g. from seismic surveys, construction, or operation activities) may cause avoidance behaviour and/or hearing threshold changes in pinnipeds. Continuous sound from drilling and P&A do no consists of sharp, short sounds of moderate intensity for extended periods.

Very High-frequency Cetaceans

As detailed in Table 7-5 distances to the sound exposure criteria for very high-frequency (VHF) cetaceans are:

- Furthest distance to the PTS criteria is 260 m for drilling, P&A and resupply.
- Furthest distance to the TTS criteria is 144 m during drilling and P&A and 90 m for resupply.
- Behaviour criteria is reached at between 1.17 km to 2.21 km for drilling and P&A, and between 6.23 km to 19.6 km depending on the location.

Based on the PMST Report very high-frequency cetaceans such as pygmy and dwarf sperm whales may occur within the 20 km Sound EMBA, but no biologically important behaviours or biologically important areas were identified within the Sound EMBA.

The consequence is assessed as Minor (1) and is of an acceptable level based on:

- There are no biologically important behaviours or biologically important areas for very high-frequency cetaceans within the sound EMBA.
- No threatened very high-frequency cetaceans where identified within the sound EMBA.
- PTS and TTS are not predicted as the PTS and TTS 24 h criteria are relevant to those receptors that are likely to be present in the area of ensonification for a period of 24 h, and no biologically important behaviours or biologically important areas were identified within the Sound EMBA for very high-frequency cetaceans. It is highly unlikely that very high-frequency cetaceans would stay within the drill rig for the duration required to experience PTS and TTS from drilling (260 m for 24 hours) or resupply (260 m for 4 hours).

High-frequency Cetaceans

As detailed in Table 7-5 distances to the sound exposure criteria for high-frequency (HF) cetaceans are:

- Furthest distance to the PTS criteria is 40 m for drilling and P&A, and 90 m for resupply.
- Furthest distance to the TTS criteria is 130 m during drilling and P&A and 160 m for resupply.
- Behaviour criteria is reached at between 1.17 km to 2.21 km for drilling and P&A, and between 6.23 km to 19.6 km depending on the location.

Based on the PMST Report high-frequency cetaceans such as dolphin species, beaked and toothed whales, may occur within the 20 km Sound EMBA, but no biologically important behaviours or biologically important areas were identified within the Sound EMBA.

The consequence is assessed as Minor (1) and is of an acceptable level based on:

- There are no biologically important behaviours or biologically important areas for high-frequency cetaceans within the sound EMBA.
- No threatened high-frequency cetaceans where identified within the sound EMBA.

- PTS and TTS are not predicted as the PTS and TTS 24 h criteria are relevant to those receptors that are likely to be present in the area of ensonification for a period of 24 h, and no biologically important behaviours or biologically important areas were identified within the Sound EMBA for high-frequency cetaceans. It is highly unlikely that high-frequency cetaceans would stay within the drill rig for the duration required to experience PTS and TTS from drilling (130 m for 24 hours) or resupply (160 m for 4 hours).

Low-frequency Cetaceans

As detailed in Table 7-5 distances to the sound exposure criteria for low-frequency (LF) cetaceans are:

- Furthest distance to the PTS criteria is 30 m for drilling and P&A, and 120 m for resupply.
- Furthest distance to the TTS criteria is 390 m during drilling and P&A and 1.48 km for resupply.
- Behaviour criteria is reached at between 1.17 km to 2.21 km for drilling and P&A, and between 6.23 km to 19.6 km depending on the location.

Table 7-6 details the low-frequency cetaceans that have biologically important areas and/or biologically important behaviours within the sound EMBA.

Table 7-6: Low-frequency Cetaceans with Biologically Important Behaviours within the Sound EMBA

Species	Biologically Important Behaviour
Blue whale	Foraging, feeding or related behaviour known to occur within area.
	Otway - foraging (annual high use area) and known foraging area. Bass – foraging BIA
Fin whale	Foraging, feeding or related behaviour likely to occur within area.
	No BIAs
Pygmy right whale	Foraging, feeding or related behaviour may to occur within area.
	No BIAs
Sei whale	Foraging, feeding or related behaviour likely to occur within area.
	No BIAs
Southern right whale	Species or species habitat known to occur within area
	Migration BIA

Blue Whales

The Operational Areas and sound EMBA overlap the pygmy blue whale foraging (annual high use area) and known foraging area (Otway) and foraging BIA (Bass) (Figure 7-8).

Foraging behaviour for blue whales has been identified in the area where the PTS, TTS and behavioural sound exposure criteria is reached. As detailed in Section 6.4.7.6, blue whale foraging within the Otway and Bass, and hence the area where the PTS, TTS and behavioural criteria is reached, is typically from January to April (Gill et al. 2011) though whales may be present from November to June (McCauley et al. 2018) which overlaps the period when the Drilling Program will occur.

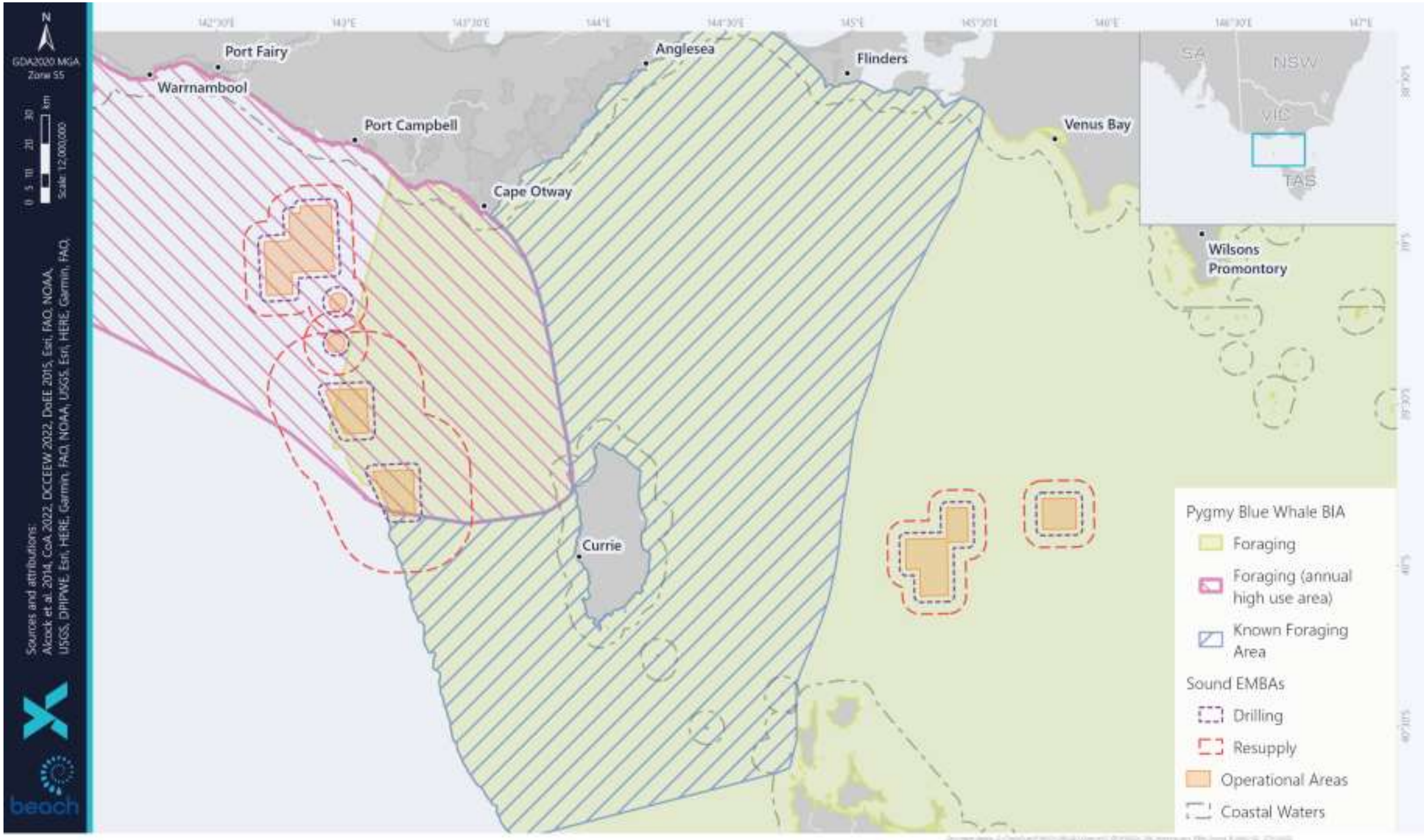

Figure 7-8: Drilling Program Operational Areas, Sound EMBAs and Pygmy Blue Whale Foraging BIAs

NOPSEMA on their website page Blue Whale Conservation Management Plan – FAQs detail the following:

> *If an offshore project or activity creates noise above relevant published injury and/or behavioural disturbance impact criteria inside a Foraging Area, proponents and titleholders should firstly evaluate all feasible measures to avoid times of the year when blue whales are likely to be foraging.*
>
> *If it is not possible to avoid times of year when there is credible information indicating that blue whale foraging in a Foraging Area is likely, it is important to note that there are requirements of the EPBC Act and the NOPSEMA EPBC Act-endorsed Program that constrain decision makers to 'not act inconsistently' with EPBC Act instruments, such as a recovery plan (e.g. the CMP).*
>
> *Accordingly, in order to demonstrate, with a high level of confidence, that requirements of the CMP will be met, approvals documentation needs to include content such as:*
>
> - *well-founded Environmental Impact Assessment;*
> - *commitment(s) to implement whale detection that will be effective in detecting whales over the extent and duration of predicted impacts, including provision for detection measures to be scalable based on triggers such as activity timing and location, and whale sighting data; and*
> - *associated management measures that are likely to be effective at preventing unacceptable impacts over the extent and duration scales informed by impact predictions and whale detection data gathered during the activity.*
>
> *In all cases, titleholders should refer to the guidance on key terms within the CMP that is available on the DCCEEW website, to inform their EIA and selection of control measures.*

Beach has determined that the risk to all threatened cetaceans that may be undertaking biologically important behaviour during the period of the Drilling Program cannot be avoided due to variability in timing of environmentally sensitive periods and unpredictable presence of some species, with blue whales potentially present in foraging areas between November to June (McCauley et al. 2018), and southern right whale typically present in the migration BIA from April to October (NCVA 2023h). Therefore, there is no period where avoidance of both species is possible.

In addition, Beach is required to meet its requirements under the OPGGS Act and petroleum licence conditions to explore and development gas reserves within their petroleum titles. Titleholders must also P&A suspended wells to comply with the requirements under section 572 of the OPGGS Act to remove all structures, equipment and other property that is neither used nor to be used in connection with operations authorised by the title. To progress these petroleum activities, Beach is planning a rig campaign commencing no earlier than November 2024 (subject to rig availability). This rig campaign will be shared across Beach's Bass and Otway assets, along with other titleholders who also have drilling activities planned in the region. A rig has been secured by Beach along with three other consortium members operating in the Otway Basin. The driver behind the consortium approach is to realise efficiencies through the execution of multiple wells in one campaign, reducing mobilisation and demobilisation activities and shared use of aviation and shore base support. Being part of a consortium also provides the flexibility to negotiate rig slot sequencing with other operators therefore optimising rig utilisation and minimising down-time.

As the Drilling Program could take up to 560 days there will be some overlap with periods when blue whales will be foraging in the Otway and Bass.

Thus, in order to demonstrate, with a high level of confidence, that requirements of the Conservation Management Plan for the Blue Whale (CoA 2015) will be met, Beach has undertaken a well-founded assessment of impacts to foraging blue whale from the Drilling Program and made commitments to implement a Whale Management Procedure (CM08) that includes whale observation and measures that have proven to be effective at preventing unacceptable impacts to foraging blue whales as per Beach's previous Otway Drilling Campaign.

The Conservation Management Plan for the Blue Whale (CoA 2015) 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.

DAWE (2021a) defines 'displaced as a foraging area' as:

> *The recovery plan requirement, Action A.2.3, applies in relation to BIAs. A whale could be displaced from a Foraging Area if impact mitigation is not implemented. This means that underwater anthropogenic noise should not:*
>
> - *Stop or prevent any blue whale from foraging.*
> - *Cause any blue whale to move on when foraging.*
> - *Stop or prevent any blue whale from entering a Foraging Area.*
>
> *It is considered that a whale is displaced from a Foraging Area if foraging behaviour is disrupted, regardless of whether the whale can continue to forage elsewhere within that Foraging Area. Mitigation measures must be implemented to reduce the risk of displacement occurring during operations where modelling indicates that behavioural disturbance within a Foraging Area may occur.*

DAWE (2021a) defines 'injury to blue whales' as:

> *For the purpose of interpreting and applying Action Area A.2 of the Blue Whale CMP, injury is both permanent and temporary hearing impairment (Permanent Threshold Shift and Temporary Threshold Shift) and any other form of physical harm arising from anthropogenic sources of underwater noise.*

As detailed in Table 7-5 the extent and duration of impact differs based on the activity being undertaken, however, the severity is assessed as moderate and is of an acceptable level based on:

- A conservative approach has been taken in applying the sound modelling and results such as the furthest distance to the PTS, TTS behavioural response sound exposure criteria for the scenarios modelled to assess potential impacts.
- The Conservation Management Plan for the Blue Whale (CoA 2015) 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 (CoA 2015) 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 drilling, P&A and vessel generate continuous sound and do

not have high intensity signals it is unlikely that they would cause injury or death to foraging pygmy blue whales.

- As the furthest distance to the 24 hr PTS sound exposure criteria is 120 m PTS impacts to blue whales are not predicted, as it would be highly unlikely for a pygmy blue whale to remain within 120 m of the drill rig for 24 hours even if it was foraging in the area.
- As the furthest distance to the 24 hr TTS sound exposure criteria for drilling is 390 m TTS impacts to blue whales whilst drilling or P&A are not predicted as it would be highly unlikely for a pygmy blue whale to remain within 390 m of the drill rig for 24 hours even if it was foraging.
- As the distances to the 24 hr TTS sound exposure criteria for resupply ranges from 600 m to 1.48 km depending on the well location, it is feasible that a foraging pygmy blue whale may remain within these distances of the drill rig while resupply occurs thus, Beach will implement a Whale Management Procedure (CM08) that includes whale observation and measures that have proven to be effective at preventing unacceptable TTS impacts to foraging blue whales as per Beach's previous Otway Drilling Campaign.
- Distances to the behavioural response sound exposure criteria for drilling range from 1.17 km to 2.21 km and for resupply from 6.23 km to 19.6 km depending on the location. Within these distances the behavioural response may range from biologically unimportant reactions to cessation of feeding to moving away from the sound source.
- The largest area of potential impact within the pygmy blue whale high density foraging BIA (35,627 km^2) is very small, at any one time being:
  - ~0.04% for the drilling and P&A
  - Between ~0.5% to ~3.4% for resupply for up to 3 hrs.
- Beach will implement a Whale Management Procedure (CM08) that includes whale observation and measures that have proven to be effective at preventing unacceptable impacts to foraging blue whales as per Beach's previous Otway Drilling Campaign.

Southern Right Whales

The Operational Areas and sound EMBA do not overlap the southern right whale reproduction BIA but do overlap the southern right whale migration BIA (Figure 7-9). As detailed in Section 6.4.7.6, southern right whales are typically within the migration BIA from April to October (NCVA 2023h) which overlaps the period when the Drilling Program will occur.

Beach has determined that the risk to all threatened cetaceans that may be undertaking biologically important behaviour during the period of the Drilling Program cannot be avoided due to variability in timing of environmentally sensitive periods and unpredictable presence of some species, with blue whales potentially present in foraging areas between November to June (McCauley et al. 2018), and southern right whale typically present in the migration BIA from April to October (NCVA 2023h). Therefore, there is no period where avoidance of both species is possible.

In addition, Beach is required to meet its requirements under the OPGGS Act and petroleum licence conditions to explore and development gas reserves within their petroleum titles. Titleholders must also P&A suspended wells to comply with the requirements under section 572 of the OPGGS Act to remove all structures, equipment and other property that is neither used nor to be used in connection with operations authorised by the title. To progress these petroleum activities, Beach is planning a rig campaign commencing no earlier than November 2024 (subject to rig availability). This rig campaign will be shared across Beach's Bass and Otway assets, along with other titleholders who also have drilling activities planned in the region. A rig has been secured by Beach along with three other consortium members operating in the Otway Basin. The driver behind the consortium approach is to realise efficiencies through the execution of multiple wells in one campaign, reducing mobilisation and demobilisation activities and shared use of aviation and shore base support. Being part of a consortium also provides the flexibility to negotiate rig slot sequencing with other operators therefore optimising rig utilisation and minimising down-time. As the Drilling Program could take up to 560 days there will be some overlap with periods when southern right whales are migrating in the Otway and Bass.

Thus, in order to demonstrate, with a high level of confidence, that requirements of the Conservation Management Plan for the Southern Right Whale (DSEWPaC 2012a) and draft National Recovery Plan for the Southern Right Whale (DCCEEW 2022a) will be met, Beach has undertaken an assessment of impacts to migrating southern right whales from the Drilling Program and made commitments to implement a Whale Management Procedure (CM08) that includes whale observation and measures that have proven to be effective at preventing unacceptable impacts to southern right whales as per Beach's previous Otway Drilling Campaign.

The Conservation Management Plan for the Southern Right Whale identifies shipping and industrial noise as a threat but does not detail any actions of requirements for managing noise. The draft National Recovery Plan for the Southern Right Whale details that actions within and adjacent to southern right whale BIAs and habitat critical to the survival of the species, should demonstrate that it does not prevent any southern right whale from utilising the area or cause injury (TTS and PTS) and/or disturbance.

As detailed in Table 7-5 the extent and duration of impact differs based on the activity being undertaken, however, the severity is assessed as moderate and is of an acceptable level based on:

- A conservative approach has been taken in applying the sound modelling and results such as the furthest distance to the PTS, TTS behavioural response sound exposure criteria for the scenarios modelled to assess potential impacts.
- The sound EMBA does not overlap the southern right whale reproduction BIA and thus no impact to the reproduction BIA are predicted.
- The Conservation Management Plan for the Southern Right Whale identifies shipping and industrial noise as a threat that is classed as a minor consequence which is defined as individuals are affected but no affect at a population level.
- Marine mammal observer data from January 2021 to April 2022 for the drilling program in the Otway Development Area identified three southern right whales consisting of a single individual in each month of June, July and August.
- PTS and TTS impacts to migrating southern right whales are not predicted as they are a mobile species migrating through the area to reach coastal habitat or return to southern foraging

grounds and studies report swim speeds for the southern right whale of between 3 – 3.3 km / hr (Mate et al. 2011, Mackay et al. 2015 cited in Charlton 2017).

  - As the furthest distance to the 24 hr PTS sound exposure criteria is 120 m PTS impacts to migrating southern right whales are not predicted, as it would be highly unlikely for a migrating southern right whale to remain within 120 m of the drill rig for 24 hours based on their swimming speeds.

  - As the furthest distance to the 24 hr TTS sound exposure criteria for drilling is 390 m TTS impacts to migrating southern right whales whilst drilling or P&A are not predicted as it would be highly unlikely for a migrating southern right whale to remain within 390 m of the drill rig for 24 hours based on their swimming speeds.

  - As the distances to the 24 hr TTS sound exposure criteria for resupply ranges from 600 m to 1.48 km depending on the well location, TTS impacts to migrating southern right whales are not predicted as resupply is on average for 3 hours and southern right whales would only be within the 24 hr TTS sound exposure criteria for less than an hour based on their swimming speeds.

- Distances to the behavioural response sound exposure criteria for drilling range from 1.17 km to 2.21 km and for resupply from 6.23 km to 19.6 km depending on the location. Within these distances the behavioural response may range from biologically unimportant reactions to moving away from the sound source.

- Avoidance behaviour may be exhibited if southern right whales are migrating through the area where the behavioural sound exposure criteria is reached. Disturbance of migrating mothers could increase their energy expenditure which could result in a reduction of energy available for their calf and for their return migration (Christiansen et al. 2014b). Based on an average swim speed of between 3 – 3.3 km / hr (Mate et al. 2011, Mackay et al. 2015 cited in Charlton 2017) energetic costs would be extremely low if avoidance behaviour occurred for drilling and P&A (1.17 km to 2.21 km) and low for resupply (6.23 km to 19.6 km) that on average occurs for 3 hours.

- Southern right whales may avoid the area where the behavioural sound exposure criteria is reached but there is no impediment to them continuing to and from the coastal reproduction BIA. Southern right whales are a highly mobile migratory species that travel thousands of kilometres between habitats used for essential life functions (DSEWPaC 2012a). Along the Australian coast, individual southern right whales use widely separated coastal areas (200–1,500 km apart) within a season, indicating substantial coast-wide movement. The longest movements are undertaken by non-calving whales, though calving whales have also been recorded at locations up to 700 km apart within a single season (DSEWPaC 2012a). As such, avoidance of the sound EMBA is unlikely to prevent them from undertaking their seasonal migrations.

- Beach will implement a Whale Management Procedure (CM08) that includes whale observation and measures that have proven to be effective at preventing unacceptable impacts to migrating southern right whales as per Beach’s previous Otway Drilling Campaign.

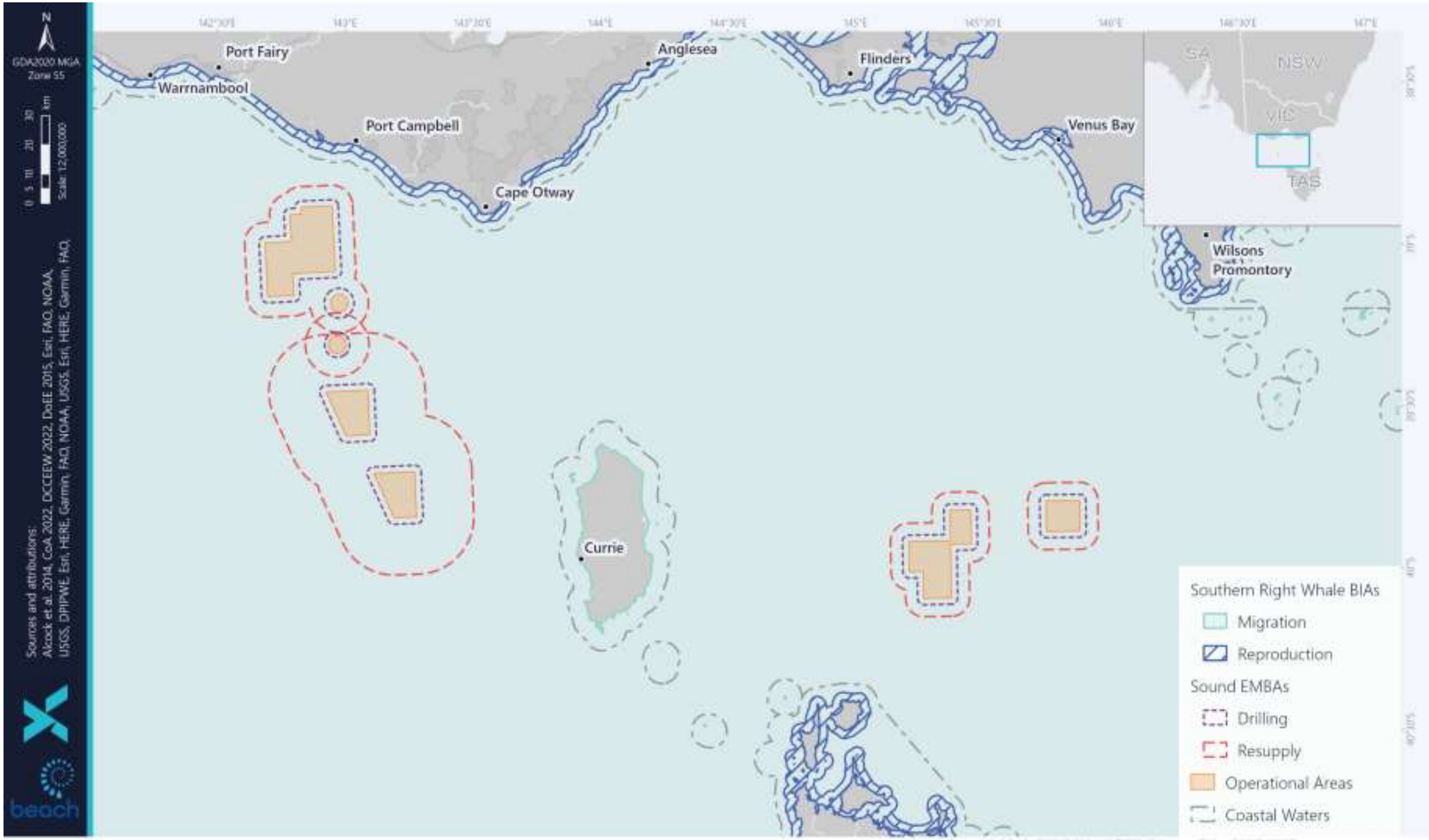

Figure 7-9: Drilling Program Operational Areas, Sound EMBAs and Southern Right Whale BIAs

Other Whales

Foraging behaviour for fin, pygmy right and sei whales has been identified within the sound EMBA. As detailed in Section 6.4.7.6 cetacean foraging within the Otway and Bass is typically from January to April (Gill et al. 2011) though whales may be present from November to June (McCauley et al. 2018) which overlaps the period when the Drilling Program will occur.

Beach has determined that the risk to all threatened cetaceans that may be undertaking biologically important behaviour during the period of the Drilling Program cannot be avoided due to variability in timing of environmentally sensitive periods and unpredictable presence of some species, with fin, pygmy right and sei whales potentially present in foraging areas between November to June (McCauley et al. 2018) and southern right whale typically present in the migration BIA from April to October (NCVA 2023h). Therefore, there is no period where avoidance of both species is possible.

In addition, Beach is required to meet its requirements under the OPGGS Act and petroleum licence conditions to explore and development gas reserves within their petroleum titles. Titleholders must also P&A suspended wells to comply with the requirements under section 572 of the OPGGS Act to remove all structures, equipment and other property that is neither used nor to be used in connection with operations authorised by the title. To progress these petroleum activities, Beach is planning a rig campaign commencing no earlier than November 2024 (subject to rig availability). This rig campaign will be shared across Beach's Bass and Otway assets, along with other titleholders who also have drilling activities planned in the region. A rig has been secured by Beach along with three other consortium members operating in the Otway Basin. The driver behind the consortium approach is to realise efficiencies through the execution of multiple wells in one campaign, reducing mobilisation and demobilisation activities and shared use of aviation and shore base support. Being part of a consortium also provides the flexibility to negotiate rig slot sequencing with other operators therefore optimising rig utilisation and minimising down-time. As the Drilling Program could take up to 560 days there will be some overlap with periods when fin, pygmy right and sei whales will be foraging in the Otway and Bass.

The fin, pygmy right 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 biologically important areas) 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 fin and sei whales.

As detailed in Table 7-5 the extent and duration of impact differs based on the activity being undertaken, however, the severity is assessed as moderate and is of an acceptable level based on:

- A conservative approach has been taken in applying the sound modelling and results such as the furthest distance to the PTS, TTS behavioural response sound exposure criteria for the scenarios modelled to assess potential impacts.

- The fin and sei whale's conservation advice (TSSC 2015f, TSSC 2016g) has 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, as it is not a threatened species, and the Species Profile and Threats Database (DoE 2023) does not identify anthropogenic noise and acoustic disturbance as a threat.
- As the furthest distance to the 24 hr PTS sound exposure criteria is 120 m PTS impacts to fin, pygmy right and sei whales are not predicted, as it would be highly unlikely for a fin, pygmy right or sei whale to remain within 120 m of the drill rig for 24 hours even if it was foraging in the area.
- As the furthest distance to the 24 hr TTS sound exposure criteria for drilling is 390 m TTS impacts to fin, pygmy right and sei whales whilst drilling or P&A are not predicted as it would be highly unlikely for a fin, pygmy right or sei whale to remain within 390 m of the drill rig for 24 hours even if it was foraging.
- As the distances to the 24 hr TTS sound exposure criteria for resupply ranges from 600 m to 1.48 km depending on the well location, it is feasible that a foraging fin, pygmy right or sei whale may remain within these distances of the drill rig while resupply occurs thus, Beach will implement a Whale Management Procedure (CM08) that includes whale observation and measures that have proven to be effective at preventing unacceptable impacts to foraging fin, pygmy right or sei whales as per Beach's previous Otway Drilling Campaign.
- Distances to the behavioural response sound exposure criteria for drilling range from 1.17 km to 2.21 km and for resupply from 6.23 km to 19.6 km depending on the location. Within these distances the behavioural response may range from biologically unimportant reactions to cessation of feeding to moving away from the sound source.
- Low numbers of fin, sei and pygmy right whales are predicted within the Sound EMBA based on:
    - The sound EMBA is ~75 km from the Bonney coast upwelling KEF which is known as feeding aggregation area (Gill et al. 2011, McCauley et al. 2018) where fin and sei whales have been alighted feeding (Gill et al. 2015, Morrice et al. 2004).
    - No biologically important areas were identified for these species.
    - Aerial surveys in the Otway region (2002 – 2013) recorded seven fin whale sightings consisting of 8 individuals, 12 sei whale sightings consisting of 14 individuals and one pygmy right whale sighting consisting of 100 individuals (Gill et al. 2015). Gill et al. (2015) did observer feeding behaviour for sei and fin whales but noted that it is at least an opportunistic feeding area for these species.
    - Infrequent presence of fin whales has been recorded in Portland between 2009 to 2016 (Erbe et al. 2016, Aulich et al. 2019).

7.4.8.3 Marine Turtles

The Recovery Plan for Marine Turtles in Australia (CoA 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.

In 2006, the Working Group on the Effects of Sound on Fish and Turtles was formed to develop sound exposure criteria for fish and turtles. The Working Group developed guidelines with specific thresholds for different levels of effects for several species groups including turtles (Popper et al. 2014).

Popper et al. (2014) details that there is no direct evidence of mortality or potential mortal injury to sea turtles from ship sound emissions.

Popper et al. (2014) found that there was no data to available to propose a quantitative exposure guideline or criteria for marine turtles for continuous sound such as those generated by vessels and rigs 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 (10s 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.

Finneran et al. (2017) presented thresholds for turtle PTS and TTS for continuous sound. Table 7-7 details the criteria and modelled distances to them from the reports detailed Table 7-4. In summary:

- The furthest distance to the 24 hr PTS criteria was reached within 50 m.
- The furthest distance to the 24 hr TTS criteria was reached within 100 m.

From the PMST Report (Appendix E. 1) three marine turtle species are likely or may occur within the Operational Areas though no BIAs or habitat critical to the survival of the species were identified. No biologically important behaviours were identified.

The extent of the area of impact is predicted to be up to 100 m of a well location whilst the rig is on location. The consequence is assessed as Minor (1) and is of an acceptable level based on:

- The Recovery Plan for Marine Turtles in Australia (CoA 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 by underwater noise.
- Thresholds for turtle PTS and TTS over 24 hrs were predicted to occur with a maximum distance of 100 m from each well location where no marine turtle important habits are located.
- 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 avoidance behaviour of small number of individuals.

- The Recovery Plan for Marine Turtles in Australia does not identify any actions relevant to underwater noise.

7.4.8.4 Fish

Popper et al. (2014) details that there is no direct evidence of mortality or potential mortal injury to fish from ship sound emissions. Popper et al. (2014) details that risks of mortality and potential mortal injury, and recoverable injury impacts to fish with no swim bladder (sharks) or where the swim bladder is not involved in hearing is low and that TTS in hearing may be a moderate risk near (tens of metres) the vessel. For fish with a swim bladder involved in hearing, risks of mortality and potential mortal injury impacts is low. However, some evidence suggests that fish sensitive to acoustic pressure show a recoverable loss in hearing sensitivity, or injury when exposed to high levels of sound and Popper et al. (2014) details sound exposure criteria for fish with a swim bladder involved in hearing. Table 7-8 details the criteria and modelled distances to them from the reports detailed Table 7-4. In summary:

- The 48 h recoverable injury sound exposure criteria was not reached for drilling and P&A activities.
- The 48 h recoverable injury sound exposure criteria was only reached for resupply activities at distances from 0.02 m to 0.07 m.
- The 12 hr TTS sound exposure criteria was only reached at Bass for drilling and P&A activities at a distance of 0.02 m.
- The 12 hr TTS sound exposure criteria was reached for resupply activities at distances from 0.09 m to 0.16 m.

From the PMST Report (Appendix E. 1) the Operational Areas are within a distribution BIA for the white shark though no habitat critical to the survival of the species or biologically important behaviours were identified.

The northern T/30P Operational Area overlaps the West Tasmania Canyons KEF (Figure 7-10) which have the potential for site-attached fish due to the presence of low-relief bryozoan thicket and diverse sponge communities (Williams et al. 2009).

The nearest marine protected area, Zeehan AMP, is 1 km from the T/30P Operational Area is identified as having rocky limestone banks that provide important seabed habitats for a variety of commercial fish species and concentrations of larval blue wahoo and ocean perch demonstrate the role of the area as a nursery ground (DNP 2013).

Low to medium levels of commercial fishing for fish species were identified within the Operational Areas with scalefish and shark fishing occurring nearshore in the Otway and within the Bass Operational Areas (Section 6.5.9).

Eels that have important cultural value to First Nations may also migrate through the Operational Areas (Section 6.4.7.3).

Impacts to King George whiting spawning and recruitment was raised by a stakeholder (Stakeholder ID 25165861) in relation to the Corner Inlet Fishery. Post-larvae of King George whiting appear in bays and inlets of Victoria from September to November each year (Jenkins et al. 2000) with the only spawning aggregations identified to date in South Australia near Kangaroo island and south-east Spencer gulf (Jenkins et al. 2000, Hamer et al 2004).

The extent of the area of impact is predicted to be up to 160 m of a well location whilst the rig is on location. The consequence is assessed as Minor (1) and is of an acceptable level based on:

- The 48 h recoverable injury sound exposure criteria was not reached for drilling and P&A activities.
- The 48 h recoverable injury sound exposure criteria was only reached for resupply activities at distances from 0.02 m to 0.07 m. Impacts to fish are not predicted as:
    - Pelagic species such as sharks and scalefish which continually move are unlikely to remain within 20 - 70 m of the drill rig for 48 hrs.
    - Site-attached fish are associated with seabed features and water depths of the Bass Operational Area range from 55 – 80 m, thus the 12 hr TTS sound exposure criteria (70 m) could be reach in some areas. To mitigate any impacts to site attached fish a seabed survey will be undertake prior to the commencement of the Drilling Program to allow for the consideration of seabed habitat type in the final selection of well locations to avoid area of high relief outcrops, reefs or sponge beds that are likely to be associated with site-attached fish.
- The 12 hr TTS sound exposure criteria was only reached at Bass for drilling and P&A activities at a distance of 0.02 m. Impacts to fish are not predicted as:
    - Pelagic species such as sharks and scalefish which continually move are unlikely to remain within 20 m of the drill rig for 12 hrs.
    - Site-attached fish are associated with seabed features and water depths of the Bass Operational Area range from 55 – 80 m, thus the 12 hr TTS sound exposure criteria (20 m) is not reached at the seafloor.
- The 12 hr TTS sound exposure criteria was reached for resupply activities at distances from 0.09 m to 0.16 m. Impacts to fish are not predicted as:
    - Pelagic species such as sharks and scalefish which continually move are unlikely to remain within 90 - 160 m of the drill rig for 12 hrs.
    - Seabed surveys within of the VIC/P43 and VIC/P73 titles and at Geographe and Thylacine did not identify site-attached fish and habitats associated with site attached fish (Section 6.4.1.2).
    - To mitigate any TTS impacts to site attached fish a seabed survey will be undertake prior to the commencement of the Drilling Program to allow for the consideration of seabed habitat type in the final selection of well locations to avoid area of high relief outcrops, reefs or sponge beds that are likely to be associated with site-attached fish.

- The Recovery Plan for the White Shark (*Carcharodon carcharias*) (DSEWPaC 2013a) does not identify sound impacts as a threat and no habitat critical to the survival of the species or biologically important behaviours were identified.
- Impacts to eels that may migrate through the Otway and Bass shelf to deeper waters are not predicted to be impacted as a study by Koster et al. 2021 tracked 16 shortfinned eels found that the average speed was 30.8 ± 7.3 km/day while eels were on the continental shelf and 29.7 ± 11.1 km/day while in deep water. Thus, migrating eels are unlikely to be impacted based on the small distances to the 48 h recoverable injury (furthest 70 m) and 12 h TTS (furthest 160 m) sound exposure criteria and the distance eels travel while migrating.
- Impacts to King George Whiting and their spawning and recruitment are not predicted based on the very small distances to the 48 h recoverable injury (furthest 70 m) and 12 h TTS (furthest 160 m) sound exposure criteria. Based on these distances sound exposure is not predicted at the bays and inlets of Victoria where post-larvae of King George whiting appear or at spawning aggregations identified in South Australia near Kangaroo island and south-east Spencer gulf (Jenkins et al. 2000, Hamer et al 2004).
- The 48 h recoverable injury and 12 hr TTS sound exposure criteria are not reached at the Zeehan AMP, so no impacts to fish associated with the Zeehan AMP are predicted.
- The northern T/30P Operational Area overlaps the West Tasmania Canyons KEF in water depths >150 m (Figure 7-10). Impacts to site attached fish associated with low-relief bryozoan thicket and diverse sponge communities are not predicted based on the:
    - 48 h recoverable injury sound exposure criteria at T/30P is reached at 20 m.
    - 12 h TTS (furthest 160 m) sound exposure criteria at T/30P is reached at 110 m.
- Impacts to sharks and scalefish that are commercially fished are not predicted based on the small distances to the 48 h recoverable injury (furthest 70 m) and 12 h TTS (furthest 160 m) sound exposure criteria, where these pelagic species are unlikely to be present for time periods where impacts could occur.

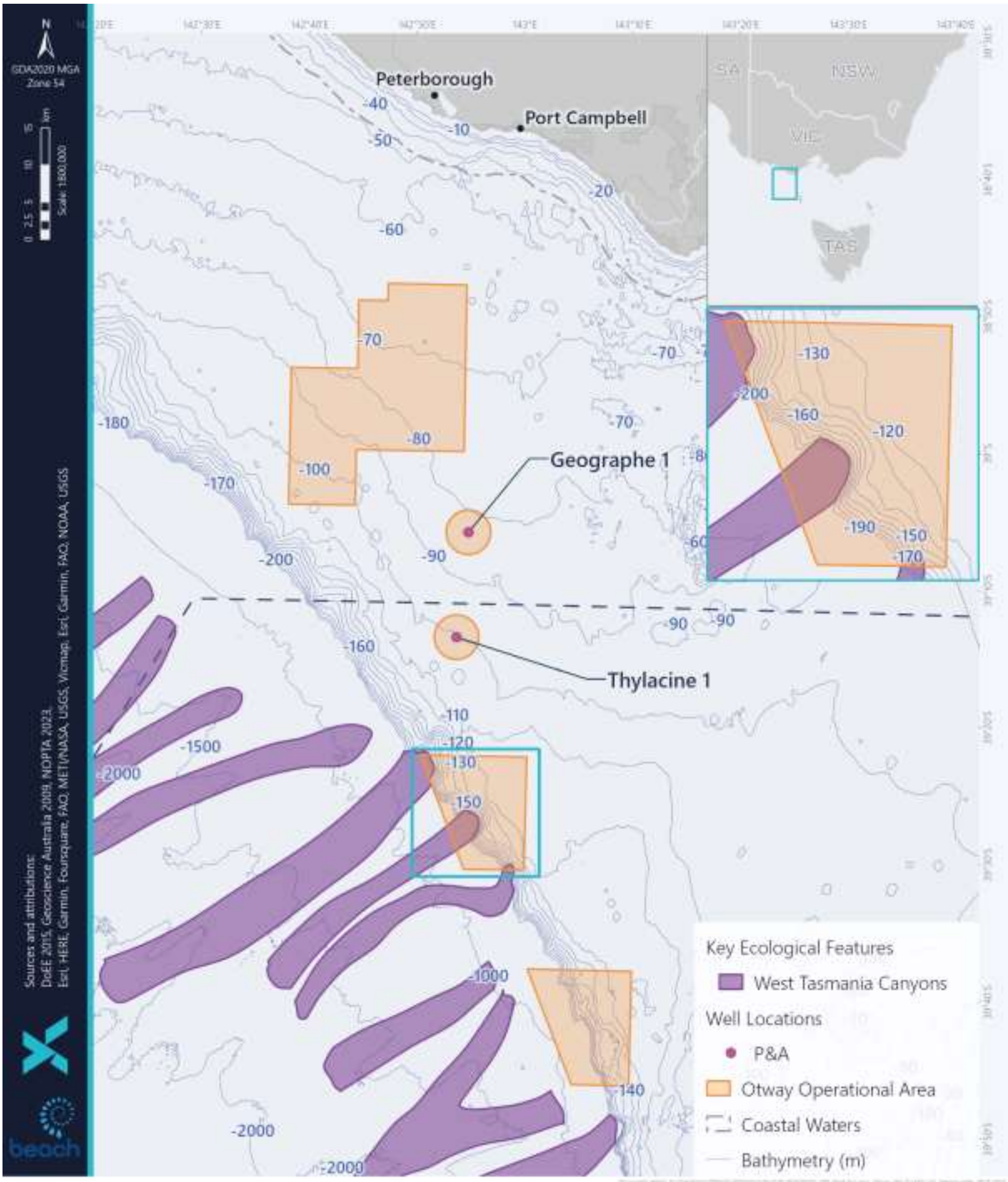

Figure 7-10: Otway Operational Areas and West Tasmania Canyons KEF

Table 7-7: Turtle Underwater Sound Thresholds and Modelled Distances

Marine Turtles	SEL_{24h} threshold	Bass Drilling	Bass Resupply	VIC/P43, VIC/P73, Geographe 1 Drilling	VIC/P43, VIC/P73, Geographe 1 Drilling & Support Vessel	VIC/P43, VIC/P73, Geographe 1 Resupply	Thylacine Drilling	Thylacine Drilling & Support Vessel	Thylacine Resupply	T/30P Drilling	T/30P Drilling & Support Vessel	T/30P Resupply
		R_{max} (km)	R_{max} (km)	R_{max} (km)	R_{max} (km)	R_{max} (km)	R_{max} (km)	R_{max} (km)	R_{max} (km)	R_{max} (km)	R_{max} (km)	R_{max} (km)
PTS	220 dB re 1 µPa²·s	-	0.01	-	-	-	-	-	0.05	-	-	0.05
TTS	200 dB re 1 µPa²·s	0.02	0.09	-	-	-	0.02	0.02	0.10	-	-	0.08

Note: a dash indicates the level was not reached within the limits of the modelling resolution (20 m).

Table 7-8: Fish Underwater Sound Thresholds and Modelled Distances

Fish: Swim bladder involved in hearing	SPL (Lp; dB re 1 µPa)	Bass Drilling	Bass Resupply	VIC/P43, VIC/P73, Geographe 1 Drilling	VIC/P43, VIC/P73, Geographe 1 Drilling & Support Vessel	VIC/P43, VIC/P73, Geographe 1 Resupply	Thylacine Drilling	Thylacine Drilling & Support Vessel	Thylacine Resupply	T/30P Drilling	T/30P Drilling & Support Vessel	T/30P Resupply
		R_{max} (km)	R_{max} (km)	R_{max} (km)	R_{max} (km)	R_{max} (km)	R_{max} (km)	R_{max} (km)	R_{max} (km)	R_{max} (km)	R_{max} (km)	R_{max} (km)
Recoverable injury	170 dB SPL for 48 h	-	0.07	-	-	0.06	-	-	0.05	-	-	0.02
TTS	158 dB SPL for 12 h	0.02	0.09	-	-	0.16	-	-	0.15	-	-	0.11

Note: a dash indicates the level was not reached within the limits of the modelling resolution (20 m).

7.4.8.5 Conservation Values and Sensitivities

The West Tasmania Canyon KEF and Zeehan AMP were identified as conservation values and sensitivities were sound exposure criteria were reached.

West Tasmania Canyon Key Ecological Features
The northern T/30P Operational Area overlaps the West Tasmania Canyons KEF in water depths >150 m (Figure 7-10).

West Tasmania Canyon, a key ecological feature identified for the South-east Marine Region, located on the edge of the continental shelf offshore of the north-west corner of Tasmania (DoE 2015b). As described in Section 6.2.15.6, these canyons are associated with upwellings and high productivity. Sponges are concentrated near the canyon heads, with the greatest diversity between 200 m and 350 m depth. This high productivity area is associated with abundance of fishes, including fish nurseries (blue warehou and ocean perch), foraging seabirds (albatross and petrels), white shark and foraging blue and humpback whales.

The severity of impact to the West Tasmania Canyon KEF from underwater sound is assessed as moderate, based on the potential presence of foraging blue whales, and is of an acceptable level based on:

- Continuous underwater sound has not been identified as an impact to sponges.
- The northern T/30P Operational Area overlaps the West Tasmania Canyons KEF in water depths >150 m (Figure 7-10). Impacts to site attached fish associated with low-relief bryozoan thicket and diverse sponge communities are not predicted based on the:
  - 48 h recoverable injury sound exposure criteria at T/30P is reached at 20 m.
  - 12 h TTS (furthest 160 m) sound exposure criteria at T/30P is reached at 110 m.
- Continuous underwater sound has not been identified as an impact to birds. As detailed in Section 7.4.8.4 predicted impacts to fish are localised and temporary and would not impact on foraging by seabirds such as albatross and petrels.
- As detailed in Section 7.4.8.2, there is the potential for foraging blue whales to be exposed to sound exposure criteria for 24 hr TTS and behavioural response. Thus, Beach will implement a Whale Management Procedure (CM08) that includes whale observation and measures that have proven to be effective at preventing unacceptable impacts to foraging blue whales as per Beach's previous Otway Drilling Campaign.
- Impacts to migrating humpback whales are not predicted as:
  - The furthest distance to the 24 hr PTS sound exposure criteria is 120 m and it would be highly unlikely for a migrating humpback whale to remain within 120 m of the drill rig for 24 hours.
  - The furthest distance to the 24 hr TTS sound exposure criteria for drilling is 390 m resupply ranges from 600 m to 1.48 km depending on the well location. It would be highly unlikely for a migrating humpback whale to remain within these distances of the drill rig for 24 hours based on an average migrating swim speed of 5 – 9 km/hr (Murray n.d).

- Distances to the behavioural response sound exposure criteria for drilling range from 1.17 km to 2.21 km and for resupply from 6.23 km to 19.6 km depending on the location. Within these distances the behavioural response may range from biologically unimportant reactions to moving away from the sound source which is unlikely to significant affect migrating humpback whales based on an average migrating swim speed of 5 – 9 km/hr (Murray n.d).

Zeehan Australian Marine Park

The Zeehan AMP is 1 km from the T/30P Operational Area. Based on the acoustic modelling the following sound exposure criteria could be reached at the Zeehan AMP:

- 24hr TTS sound exposure criteria for VHF cetaceans (1.44 km) for drilling at T/30P.
- 24hr TTS sound exposure criteria for LF cetaceans (1.48 km) for resupply at T/30P.
- 24hr TTS sound exposure criteria for VHF cetaceans (1.53 km) for resupply at T/30P.
- Behavioural response sound exposure criteria for marine mammals for drilling (2.21 km) and resupply (19.6 km) at T/30P.

Noise pollution associated with shipping, other vessels, seismic survey, offshore mining operations and offshore construction is listed as a pressure on the conservation values of the South-east Marine Reserve Network within the South-east Commonwealth Marine Reserves Network Management Plan (2013-2023) (DNP 2013). The Plan requires that potential impacts of allowable activities on the conservation values of the marine reserves network are identified and avoided or mitigated by appropriate assessment and authorisation processes, such as the OPGGS Act. In addition, the Marine Parks Science Atlas (AMP 2024), identifies underwater noise as a key pressure for the Zeehan AMP.

The Zeehan AMP major conservation values (DNP 2013) are:

- Examples of ecosystems, habitats and communities associated with the Tasmania Province, the West Tasmania Transition and the Western Bass Strait Shelf Transition and associated with the seafloor features: abyssal plain/deep ocean floor, canyon, deep/hole/valley, knoll/abyssal hill, shelf, and slope.
- Important migration area for blue and humpback whales.
- Important foraging habitat for black-browed, wandering, and shy albatrosses, and great-winged and cape petrels.

Key values, habitats, and communities (AMP 2024) are:

- Rocky limestone reefs of varying size which support large sponges, sea whips and large soft and hard bryozoans whilst Coarse sediments provide valuable foraging grounds for crustaceans such as giant crabs.

BIAs associated with the Zeehan AMP are:

- Foraging BIAs for albatross (Antipodean, black-browed, Buller's, Campbell, Indian yellow-nosed, shy and wandering), shearwater (short-tailed and wedge-tailed) and petrels (common diving and white-faced storm).

- Pygmy blue whale foraging BIA and southern right whale migration BIA.

The severity of impact to the Zeehan AMP from underwater sound is assessed as moderate, based on the potential presence of foraging blue whales and migrating southern right whales, and is of an acceptable level based on:

- No impacts from sound emissions to ecosystems, habitats and communities associated with the Tasmania Province, the West Tasmania Transition, and the Western Bass Strait Shelf Transition for underwater continuous sound. The furthest distance to a sound exposure criteria for fish is 160 m (Section 7.4.8.4) and as the Operational Area are >1 km from the AMP there will be no impact to fish associated with these ecosystems, habitats, or communities.

- Continuous underwater sound has been identified to potentially impact invertebrates, though no studies have been undertaken specifically on giant crabs (Solé et al. 2023). Impacts have typically been found in laboratory studies (Solé et al. 2023) or in field studies in shallow water (< 15 m) near to major shipping lanes (Day et a. 2020). In both these cases exposures is direct and in shallow water. As the Zeehan AMP is 1 km from the T/30P Operational Area and in water depths ranging from 70 to 6,000 m, impacts to giant crab are not predicted.

- Continuous underwater sound has not been identified as an impact to birds. As detailed in Section 7.4.8.4 predicted impacts to fish are localised and temporary and would not impact on foraging by albatross, petrels, or shearwaters.

- As detailed in Section 7.4.8.2, there is the potential for foraging blue whales and migrating southern right whales to be exposed to sound exposure criteria for 24 hr TTS and behavioural response. Thus, Beach will implement a Whale Management Procedure (CM08) that includes whale observation and measures that have proven to be effective at preventing unacceptable impacts to whales as per Beach's previous Otway Drilling Campaign.

- Impacts to migrating humpback whales are not predicted as:

  - The furthest distance to the 24 hr PTS sound exposure criteria is 120 m and it would be highly unlikely for a migrating humpback whale to remain within 120 m of the drill rig for 24 hours.

  - The furthest distance to the 24 hr TTS sound exposure criteria for drilling is 390 m resupply ranges from 600 m to 1.48 km depending on the well location. It would be highly unlikely for a migrating humpback whale to remain within these distances of the drill rig for 24 hours based on an average migrating swim speed of 5 – 9 km/hr (Murray n.d).

  - Distances to the behavioural response sound exposure criteria for drilling range from 1.17 km to 2.21 km and for resupply from 6.23 km to 19.6 km depending on the location. Within these distances the behavioural response may range from biologically unimportant reactions to moving away from the sound source which is unlikely to significant affect migrating humpback whales based on an average migrating swim speed of 5 – 9 km/hr (Murray n.d).

7.4.8.6 Socio-economic Receptors

There are no direct impacts to socio-economic receptors from underwater sound. Indirect impacts may occur if impacts to fauna that are a value to a socio-economic receptors occur such as fishing and whale watching.

The severity of impact to socio-economic receptors from underwater sound is assessed as minor, and is of an acceptable level based on:

- Impacts to commercial fisheries and recreation fishing are not predicated as impacts to fish are not predicted based on the small distance (20 - 70 m) to the sound impact criteria as detailed in Section 7.4.8.4.
- Impacts to whale and other marine fauna watching or tours are not precited as sound levels above the sound impact criteria are not predicted in nearshore waters or areas where whale watching or other fauna watching occurs (Figure 7-9).

7.4.8.7 Cultural Values and Sensitivities

From Section 6.6.3, the following cultural values and sensitivities have been identified as potentially affect by light and the section where potential impacts have been assessed:

- Eels – see Section 7.4.8.4
- Fish – see Section 7.4.8.4
- Dolphins – see Section 7.4.8.2
- Blue whales – see Section 7.4.8.2
- Southern right whales -– see Section 7.4.8.2
- Orcas - – see Section 7.4.8.2
- Seals - – see Section 7.4.8.2

A summary of those assessment are provided below.

- Impacts to eels that may migrated through the Otway and Bass shelf to deeper waters are not predicted to be impacted as a study by Koster et al. 2021 tracked 16 shortfinned eels found that the average speed was 30.8 ± 7.3 km/day while eels were on the continental shelf and 29.7 ± 11.1 km/day while in deep water. Thus, migrating eels are unlikely based on the small distances to the 48 h recoverable injury (furthest 70 m) and 12 h TTS (furthest 160 m) sound exposure criteria, where migrating eels are unlikely to be present for a duration of time where impacts could occur.
- Impacts to fish are not predicted based on the small distance (20 - 70 m) to the sound impact criteria.
- The PTS and TTS 24 h sound criteria is based on a dolphin being exposed to the sound source over a period of 24 hrs. As the distances to these criteria are small it is highly unlikely that dolphins would stay near the drill rig for up to 24 hrs to experience PTS and TTS from drilling (130 m for 24 hours) or resupply (160 m for 4 hours) as the Sound EMBA is not within an area where they are undertaking biologically important behaviour.
- As detailed in Section 7.4.8.2, there is the potential for foraging blue whales and migrating southern right whales to be exposed to sound exposure criteria for 24 hr TTS and behavioural

response. Thus, Beach will implement a Whale Management Procedure (CM08) that includes whale observation and measures that have proven to be effective at preventing unacceptable impacts to foraging blue whales and migrating southern right whales as per Beach's previous Otway Drilling Campaign.

- The southern right whale reproduction BIA is outside of the sound EMBA and thus no impacts to the BIA are predicted.
- The PTS and TTS 24 h sound criteria is based on a whale being exposed to the sound source over a period of 24 hrs. As the distances to these criteria are small it is highly unlikely that orcas would stay near the drill rig for up to 24 hrs to experience PTS and TTS from drilling (130 m for 24 hours) or resupply (160 m for 4 hours) as the Sound EMBA is not within an area where they are undertaking biologically important behaviour.
- Breeding colonies for Australian fur seal and New Zealand fur seal known to occur along the Victorian coastline, including Deen Maar, and the west side of King Island are outside the sound EMBA.
- The PTS and TTS 24 h sound criteria is based on a seal being exposed to the sound source over a period of 24 hrs. As the distances to these criteria are small it is highly unlikely that seals would stay near the drill rig for up to 24 hrs to experience PTS and TTS from drilling (30 m for 24 hours) or resupply (90 m for 4 hours) as the Sound EMBA is not within an area where they are undertaking biologically important behaviour or within aggregation or haul-out areas.

In addition, continuous underwater sound has not been identified as an impact to submerged cultural heritage.

7.4.9 Demonstration that Impacts will be ALARP

ALARP decision context and justification	**ALARP Decision Context: Type B** Impacts from sound emissions are relatively well understood though there is the potential for uncertainty in relation to the level of impact. Activities are well practised, and there are no conflicts with company values, no partner interests, and no significant media interests. Additional controls may be required to ensure impacts can be managed to an acceptable level.
Adopted Control Measures	**Description**
CM01: Marine Assurance Process	Rig and vessels will have Preventative Maintenance System that provides a status on the maintenance of equipment and detailed manufacturer's specification on maintenance procedures for: • Equipment detail as a control in this EP will be inspected to ensure effective operation. • Power generation and propulsion systems on the MODU and vessels will be inspected to ensure efficient operation.
CM08: Whale Management Procedure	The Whale Management Procedure outlines specific measures to minimise anthropogenic noise threats to relevant species, including the implementation of safe operating distances between vessels and whales, pre-activity surveys for specific activities, night-time and low visibility controls and establishment of safe points for operational activities in accordance with the Safety Case and Well Integrity requirements.
CM05: Seabed Survey	A seabed survey will be undertaken prior to the commencement of the Drilling Program to allow for the consideration of the following in the final selection of well locations and drill rig position and location of mooring equipment: • Seabed habitat type to avoid areas of high relief outcrops, reefs or sponge beds that are likely to be associated with site-attached fish. • Shipwrecks and other maritime archaeological heritage. • Submerged cultural heritage and submerged cultural landscapes.

Additional Controls Assessed

Control	Cost/Benefit Analysis	Control Implemented
Seasonal timing	Beach has determined that the risk to all threatened cetaceans that may be undertaking biologically important behaviour during the period of the Drilling Program cannot be avoided due to variability in timing of environmentally sensitive periods and unpredictable presence of some species, with blue whales potentially present in foraging areas between November to June (McCauley et al. 2018), and southern right whale typically present in the migration BIA from April to October (NCVA 2023h). Therefore, there is no period where avoidance of both species is possible. In addition, Beach is required to meet its requirements under the OPGGS Act and petroleum licence conditions to explore and development gas reserves within their petroleum titles. Titleholders must also P&A suspended wells to comply with the requirements under section 572 of the OPGGS Act to remove all structures, equipment and other property that is neither used nor to be used in connection with operations authorised by the title. To progress these petroleum activities, Beach is planning a rig campaign commencing	No

	no earlier than November 2024 (subject to rig availability). This rig campaign will be shared across Beach's Bass and Otway assets, along with other titleholders who also have drilling activities planned in the region. A rig has been secured by Beach along with three other consortium members operating in the Otway Basin. The driver behind the consortium approach is to realise efficiencies through the execution of multiple wells in one campaign, reducing mobilisation and demobilisation activities and shared use of aviation and shore base support. Being part of a consortium also provides the flexibility to negotiate rig slot sequencing with other operators therefore optimising rig utilisation and minimising down-time. As the Drilling Program could take up to 560 days there will be some overlap with periods when foraging blue whales and migrating southern right whales are in the Otway and Bass. Thus, in order to demonstrate, with a high level of confidence, that requirements of the Conservation Management Plan for the Southern Right Whale (DSEWPaC 2012a), draft National Recovery Plan for the Southern Right Whale (DCCEEW 2022a) and Conservation Management Plan for the Blue Whale (CoA 2015) will be met, Beach has undertaken a well-founded assessment of impacts to foraging blue whales and migrating southern right whales from the Drilling Program and made commitments to implement a Whale Management Procedure (CM08) that includes whale observation and measures that have proven to be effective at preventing unacceptable impacts to blue whales and southern right whales as per Beach's previous Otway Drilling Campaign.	
Anchoring of vessels	This control is not feasible for the support vessels based on: • Vessel standby activities require the vessel to be able to react immediately in the event of an issue on the drill rig and to prevent other marine users entering the 500 m petroleum safety zone. • Resupply operations require the vessel to use DP to maintain position adjacent to the platform to counter wind and current conditions.	No
Do not operate or limit the operation of drill rig thruster assisted mooring system	A review of 33 months of historical operational data from the North Sea indicates thrusters are typically not active (>96% of the time) and utilisation is otherwise limited low loads across a small number of thrusters for short periods, (typically hours) in response to metocean conditions. Evaluation of trade-offs indicates that not using the thruster assist mode increases the likelihood of inability to maintain station, loss of vessel stability due to mooring system fatigue, downtime associated with management of mooring system fatigue, such as anchor relay or conductor replacement, with associated increases in emissions, discharges, seabed impacts and drilling duration. Beach considers that the trade-offs associated with not using the thruster assist mooring system are grossly disproportionate to the benefit gained, being short-term infrequent reductions in variable non-impulsive noise levels.	No
Passive acoustic monitoring (PAM)	PAM can be used to detect marine mammal calls, and support sightings made by MMOs. Currently available PAM technologies are most useful in the detection of odontocetes such as sperm whales and dolphins, known	No

	to emit regular distinctive clicks and high frequency calls during long dives. However, technology development specific to low frequency whale detections is currently underway in Australia but is yet unproven. The cost of a PAM system is high and would require a number of permanent moored systems or multiple gliders around the Operational Area with real-time telemetry and analysis. Beach is working with other operators and acoustic detection companies to determine if it is feasible to use as a control for the Drilling Program but at this stage the technology is not yet ready for deployment.	
Aerial surveys	Aerial surveys were not seen as an effective control for the previous Otway Drilling Campaign due to issues with weather delaying flights. Aerial surveys for detection of whales is not required as monitoring activities can be effectively conducted by the MMO on vessels.	No
Satellite imagery	Satellite imagery can be used to gather oceanographic and biological information to support the understanding of presence of marine mammals in the area. Reliability is likely to be low given meteorological conditions in the area and need for cloudless conditions. Challenges identified with tasking conflicts and data accuracy to support identification to species, with limited additional benefit relative to adopted controls.	No
Drone surveys	Drones could provide a method of increasing the observation distance of MMOs. It is not known if drone surveys have been effectively used as a real-time monitoring method to date due to the physical range of drones being limited to 4 – 5km. In addition, drone operations are sensitive to wind limiting operations in the Otway and Bass. As MMOs will be present on the vessels there is a negligible observation benefit provided by drones. The associated costs, dropped object risk and operational limitations are disproportionate to the negligible environmental benefit.	No
Infra-red systems	Infra-red systems could enhance the ability of MMOs to visually detect the presence of whales within close proximity to the system. Infra-red systems are limited in their effective distance ranges and do not extend out to the distances required to make them effective. Poor performance of infra-red systems has been reported in sea states greater than Beaufort Sea State 4 and conditions such as fog, drizzle, rain limit detections (Verfuss et al. 2018, Smith et al. 2020). Reliability and effectiveness are unknown/ untested and considered lower than direct observations, with limited additional benefit relative to accepted controls.	No
Monitoring upwelling events	Monitoring precursors to upwelling events could inform the level of risk of blue whale encounter. There is a lag between changes in sea surface temperature and increased primary production leading to krill swarms, and the presence of feeding whales. This lag has been identified in some studies on upwelling / krill / blue whale foraging presence as between 1 to 4 months. As such, monitoring sea surface temperature and chlorophyll-a monitoring does not provide a robust prediction of blue whale feeding activity.	No

Consequence rating	Minor (1) to Moderate (2)
Likelihood of occurrence	NA
Residual risk	Low

7.4.10 Demonstration that Impacts will be of an Acceptable Level

Consequence rating	Minor (1) to Moderate (2)
Likelihood of occurrence	NA
Residual risk	NA
Acceptability Assessment	
To meet the principles of ESD	Sound emissions were assessed as having a Minor (1) to Moderate (2) consequence which is not considered as having the potential to result in serious or irreversible environmental damage. There is high confidence in the predicted level of impact as Beach has significant experience operating in the Otway and Bass based on their existing offshore developments and associated activities including the Beach Otway Drilling Campaign in 2021/2022.
Internal context	The proposed management of the impact is aligned with the Beach Environment Policy. The Drilling Program will be undertaken in accordance with the Implementation Strategy (Section 8).
External context	The merits of claims or objections raised by a relevant stakeholder have been adequately assessed and additional controls adopted where appropriate, as detailed in Section 4 Consultation. Impacts to King George whiting spawning and recruitment was raised by a stakeholder (Stakeholder ID 25165861) in relation to the Corner Inlet Fishery. Impacts have been assessed as per Section 7.4.8.4.
Other requirements	Underwater sound will be managed in accordance with legislative requirements. EPBC Regulations 2000 – Part 8 Division 8.1 interacting with cetaceans requirements are implemented as per CM08: Whale Management Procedure. Underwater sound is not listed as a threat in: • Recovery Plan for the Australian Sea Lion (DSEWPaC 2013b) • Recovery Plan for the White Shark (DSEWPaC 2013a) • National Recovery Plan for Albatrosses and Petrels (CoA 2022a) • Wildlife Conservation Plan for Seabirds (CoA 2020a) Underwater sound is listed as a threat in: • Conservation Management Plan for the Blue Whale (CoA 2015) • Conservation Management Plan for the Southern Right Whale (DSEWPaC 2012a) • Draft National Recovery Plan for the Southern Right Whale (DCCEEW 2022a) • Conservation Advice for Fin Whales (TSSC 2015f) • Conservation Advice for Sei Whales (TSSC 2015g) • Recovery Plan for Marine Turtles in Australia (CoA 2017b). • South-east Commonwealth Marine Reserves Network Management Plan (2013-2023) (DNP 2013) Relevant actions from the requirements that list underwater sound as a threat have been met as detailed.

	Actions from the Conservation Management Plan for the Blue Whale (CoA 2015) applicable to the Drilling Program in relation to assessing and addressing anthropogenic noise have been addressed as per: • Assessing the effect of anthropogenic noise on blue whale behaviour. Section 7.4.8.2 assesses the effects of anthropogenic noise from the Drilling Program on blue whale behaviour. • Anthropogenic noise in biologically important areas will be managed such that any blue whale continues to utilise the area without injury and is not displaced from a foraging area. Section 7.4.8.2 demonstrates that the activity can be conducted in a manner that is consistent with the conservation management plan and will not result in injury or displacement of pygmy blue whales from a foraging BIA. Actions from the draft National Recovery Plan for the Southern Right Whale (DCCEEW 2022a) applicable to the activity in relation to assessing and addressing anthropogenic noise have been addressed as per: • Anthropogenic noise in biologically important areas will be managed such that it does not prevent any southern right whale from utilising the area or cause injury (TTS and PTS) and/or disturbance. • Ensure environmental assessments associated with underwater noise generating activities include consideration of national policy (e.g., EPBC Act Policy Statement 2.1) and guidelines related to managing anthropogenic underwater noise and implement appropriate mitigation measures to reduce risks to southern right whales to the lowest possible level. Section 7.4.8.2 assesses the effects of anthropogenic noise from the Drilling Program on southern right whales and includes consideration of national policy and guidelines relevant to the Drilling Program. • Quantify risks of anthropogenic underwater noise to southern right whales, including behavioural disturbance, changes to vocalisations, and physiological effects to whales. Section 7.4.8.2 assesses the effects of anthropogenic noise from the Drilling Program. Management actions from the fin and sei whales conservation advice (TSSC 2015f, TSSC, 2016g) have been addressed as per: • An assessment of the impacts of increasing anthropogenic noise (including from seismic surveys, port expansion, and coastal development) has been undertaken as per Section 7.4.8.2. • The Whale Management Procedure will be implemented for fin and sei whales to ensure their ongoing recovery. As per the Recovery Plan for Marine Turtles in Australia (CoA 2017b), underwater sound is not predicted to impact the recovery of marine turtles as impacts as no marine turtle important habits are located within the area that maybe impacted by underwater sound as detailed in Section7.4.8.3. The South-east Commonwealth Marine Reserves Network Management Plan (2013-2023) (DNP 2013) requires that potential impacts of allowable activities on the conservation values of the marine reserves network are identified and avoided or mitigated by appropriate assessment and authorisation processes, such as the OPGGS Act. This has been addressed by the impact assessment in Section 7.4.8.5 and by the submission of this EP to NOPSEMA for acceptance as required under the OPGGS Act.
Monitoring and reporting	Marine Mammal Sighting Reports (Section 8.3.9).
Acceptability outcome	**Acceptable**

7.5 Physical Presence

7.5.1 Source of Aspect

While the rig is on a well location there will be a 500 m petroleum safety zone (PSZ) around the rig, and the mooring equipment will be located on the seabed out to 2 km from the well location.

The well heads and the PSZ will remain for the production life of the field for the Yolla 7 well and any of the exploration or appraisal wells that are commercially viable and suspended for future development.

If anchors are pre-laid, they may be in place for typically 1 month and up to 3 months prior to the rig being on location. The surface buoys associated with the anchors will be in place until the rig is anchored on location to drill the well. The surface buoys have a navigation light.

7.5.2 Extent and Duration of Aspect

Rig on location	
Extent	500 m petroleum safety zone (PSZ) 2 km caution zone where rig anchors are located
Duration	Drilling: up to 40 days per well. Completion: up to 20 days for one well, Yolla 7. Plug and abandonment: up to 20 days per well.
Permanent wells	
Extent	500 m petroleum safety zone (PSZ)
Duration	Production life of the field
Pre laid anchors	
Extent	2 km caution zone where rig anchors are located
Duration	Up to 3 months

7.5.3 Predicted Environmental Impacts

The physical presence of anchors, anchor surface buoys, rig exclusion zones and permanent well PSZs can result in the displacement of other marine users such as:

- Marine recreation and tourism.
- Petroleum titleholders.
- Commercial shipping.
- Commercial fishing.

The physical presence of rig anchors and permanent wellheads can result in snagging of fishing equipment.

7.5.4 EMBA

Predicted impacts from the physical presence of anchors, anchor surface buoys, rig exclusion zones and permanent well PSZs will be limited to the Operational Area.

Other marine user likely to occur within the Operational Area are:

- Marine recreation and tourism.
- Petroleum titleholders.
- Commercial shipping.
- Commercial fishing.

7.5.5 Predicted Level of Impact

7.5.5.1 Marine Recreation and Tourism

Marine recreation and tourism could be affected by restricted access to an area within the Operational Area. The Bass Operational Area is approximately 42 km from the nearest land and the closest point to the Otway Operational Area is 20 km from the Victorian coast.

Marine recreation and tourism is limited within the Operational Area due to the distances from shore and no issues related to restricted assess have been raised via stakeholder consultation or during Beach's Otway or Bass Operations.

The extent of the impact is predicted to be 500 m from the rig will on location. The consequence is assessed as Minor (1) and is of an acceptable level based on:

- A marine or tourism operator would have to avoid 500 m around the drill rig or suspended well, which is a very small area and will not result in a significantly longer sail time or increase in fuel use.
- The Operational Area has not been identified to contain any tourism areas or significant areas for recreational fishing.
- No issues have been raised to date in relation to exclusion of recreational fishing or marine tourism for Beach's existing offshore operations.
- Notices to Mariners will be issued for the Drilling Program and tourism operators can obtain updates from Beach in relation to the Drilling Program as per Consultation for Implementation of EP (CM03).

7.5.5.2 Petroleum Titleholders

The Otway Operational Area overlaps with the proposed Regia Marine Seismic Survey Activity Planning Area, TGS Marine Seismic Survey Operational Area and potential ConocoPhillips Drilling Operational Area. Beach is engaging with these companies to stay informed of activity timings to ensure activities can be undertaken in a manner that does not interfere with other marine users to a greater extent than is necessary for the exercise of right conferred by the titles granted. Impacts to other petroleum titleholders are not predicted.

Cumulative impacts associated with the seabed surveys and other activities in the Operational Areas are detailed in Section 7.14.

7.5.5.3 Commercial Shipping

The Operational Area includes major and minor shipping routes (Section 6.5.5).

The extent of the impact is predicted to be 500 m from the rig will on location. The consequence is assessed as Minor (1) and is of an acceptable level based on:

- A commercial vessel would have to avoid 500 m around the drill rig or suspended well, which is a very small area and will not result in a significantly longer sail time or increase in fuel use.
- No issues have been raised to date in relation to exclusion of shipping for Beach's existing offshore operations.
- Notices to Mariners will be issued for the Drilling Program and tourism operators can obtain updates from Beach in relation to the Drill Program as per Consultation for Implementation of EP (CM03).

7.5.5.4 Commercial Fishing

Beach commissioned a report by South East Trawl Fishing Industry Association (SETFIA) on fishing activity within the Operational Area (SETFIA 2023). Table 7-9 details the fisheries that overlap the Operational Area with number of vessels, percentage overlap and gear type based on data from the SETFIA report (SETFIA 2023). Note that the SETFIA report Otway Operational Area covers a slightly larger area than the Drilling Program Otway Operational Area.

SETFIA (2023) identified that the main fisheries that could be impacted by permanent exclusion area such as PSZs and well heads are the trawl, rock lobster and giant crab fisheries noting:

- Trawl data from the past twenty years showed that most fishing effort is between the 400 and 1,000 m isobath. This does not significantly impact the North T/30P Operational Area as trawl effort cuts across the south-western corner, however, the South T/30P Operational Area is directly over this relatively high traffic area. It is recommended that Beach avoid depths between the 400 - 1000m isobaths to minimise the impact on fishing.
- If the above is unavoidable then fishers may be due compensation and Beach should develop a policy on this.

Table 7-9: Fisheries that Overlap the Operational Area

Fishery	Operational Area		No Vessels	% Overlap	Gear
	Otway	Bass			
Gillnet Hook Trap Sector Shark Gillnet	✓	✓	Up to 8	0.9%	Demersal gillnet, auto longline, dropline, and demersal longline.
Commonwealth Trawl	✓	-	< 5	0.5%	Bottom otter trawl gear and Danish seine gear.
Southern Squid Jig	✓	-	Up to 5	3.1%	Squid jig.
Victorian Giant Crab	✓	-	Up to 15	81%	Baited pots.
Victorian Southern Rock Lobster	✓	-	Up to 15	4.2%	Baited pots.

The extent of the impact is predicted to be 500 m from the rig will on location for non-trawl fisheries and 2 km from the rig or pre laid anchor buoys for trawl fisheries whilst trawling. The consequence is assessed as Minor (1) and is of an acceptable level based on:

- A fishing vessel would have to avoid 500 m around the drill rig or suspended well, which is a very small area and will not result in a significantly longer sail time or increase in fuel use.
- To date commercial fishers and Beach existing operations have co-existed.
- Rock lobsters live in rocky reefs (VFA 2023b) and rocky reefs are not an appropriate substrate for wells thus it is unlikely for areas where rock lobster live and are caught to be within a PSZ.
- Notices to Mariners will be issued for the Drilling Program and commercial fisheries can obtain updates from Beach in relation to the Drill Program as per Consultation for Implementation of EP (CM03).
- Beach will implement an activity limitation where wells will not be located in water depths >400 m (CM09: Drilling Program). This limitation reduces any potential impact to commercial trawl and giant crab fisheries that were identify by SETFIA (2023) as having most fishing effort between the 400 and 1,000 m isobath.
- Beach will continue to consult with commercial fishers including SETFIA (CM03: Consultation for Implementation of EP) in relation to well locations and the process for compensation if fishing exclusion is unavoidable (CM04: Beach Fair Ocean Access Procedure).

7.5.5.5 Cultural Values and Sensitivities

First Nation cultural activities could be affected by restricted access to an area within the Operational Area.

The extent of the impact is predicted to be 500 m from the rig while on location. The consequence is assessed as Minor (1) and is of an acceptable level based on:

- No First Nation cultural activities have been identified to occur within the Operational Area via stakeholder consultation or during Beach's Otway or Bass Operations.

- Notices to Mariners will be issued for the Drilling Program and First Nation's people or groups can obtain updates from Beach in relation to the Drilling Program as per Consultation for Implementation of EP (CM03).

7.5.6 Demonstration that Impacts will be ALARP

ALARP decision context and justification	ALARP Decision Context: Type A Impacts from physical presence are well understood and there is nothing new or unusual. Good practice is defined, and uncertainty is minimal. There are no conflicts with company values, no partner interests and no significant media interests. Though objections or claims where raised by stakeholders in relation to physical presence they have been managed by additional controls. As the impact consequence is rated as Minor (1) applying good industry practice is sufficient to manage the impact to ALARP.
Adopted Control Measures	**Description**
CM01: Marine Assurance Process	Beach Marine Assurance System ensures that the rig and vessels meet relevant maritime laws and includes pre-commencement rig and vessel inspections of class certification requirements under the Navigation Act 2012 and associated Marine Orders, including but not limited to: • Marine Order 27 Safety of Navigation and Radio Equipment • Marine Order 30 Prevention of Collisions
CM02: Vessel and Rig Operating Procedures	A 500 m radius Petroleum Safety Zone (PSZ) will be published in the Government Notices Gazette for each new well location for the duration of the drilling and will remain in place for those wells which are suspended for future production. A 2 km radius cautionary zone will be in place around the rig when on location and will be monitored by a support vessel. At least one support vessel will accompany the rig when in operation and when safe to do so (e.g. outside of weather event), to manage interactions with other marine users.
CM03: Consultation for Implementation of EP	As per Section 4.1.16 Beach will undertake consultation for the implementation of the EP which will include at a minimum: • Notification to all relevant person regarding acceptance of the EP by NOPSEMA. • Commencement of activities, exclusion zones, vessel details, pre-lay of anchors and buoys, movement of drilling rig to new locations, during activity and cessation notification requirements. • On-water communication processes, including SMS messages and radio communication. • Consultation with relevant First Nations groups (section 6.6.2) regarding identified cultural heritage and cultural landscapes in accordance with CM05: Seabed Survey. • Consultation with commercial fishing associations (and individual commercial fishers where identified) regarding well locations, the ongoing communication of Beach activities to their members, and applying CM04: Beach Fair Ocean Access Procedure. Under the Navigation Act 2012, the Australian Hydrographic Office (AHO) are responsible for maintaining and disseminating hydrographic and other nautical information and nautical publications such as Notices to Mariners. AMSA also issue radio-navigation warnings. Notifications to AMSA and AHO will be undertaken as detailed in Section4.16.

	Relevant details in relation to the pre-laid anchor buoys, drill rig and vessels will be provided to the AHS and AMSA and to relevant stakeholders to ensure the presence of the drill and vessels are known.
CM04: Beach Fair Ocean Access Procedure	Beach's Fair Ocean Access Procedure was developed with input from commercial fishing industry organisations (Bass Strait Scallop Industry Association, Scallop Fisherman's Association of Tasmania, South East Trawl Fishing Industry Association and Tasmanian Seafood Industry Council. The procedure details the process whereby a commercial fisher can claim compensation for an economic loss associated with Beach's offshore activities where impacts cannot be avoided. An information sheet on the procedure is available in Appendix D.
CM06: Drill Rig Mooring Plan	Pre-laid anchors will have a surface buoy with navigation lighting and the position of the buoys will be included in the notification to AHS to be included in the AUSCOAST Warnings. Planned retrieval of all mooring equipment, including transponders, from the sea floor as soon as reasonably practicable within 3 months following the completion of the Drilling Program.
CM09: Drilling Program	Beach will implement an activity limitation where wells will not be located in water depths >400 m. This applies to the T/30P Operational Area where waters depths range from 55 – 992 m (T/30P South OA) and 111 – 578 m (T/30P North OA). Water depths > 400 m have not been fully excluded from the activity as anchors may be required in these waters depths depending on the final well location. This limitation reduces any potential impact to commercial trawl and giant crab fisheries that were identify by SETFIA (2023) as having most fishing effort between the 400 and 1,000 m isobath. SETFIA (2023) recommended that Beach avoid depths between the 400 - 1000m isobaths to minimise the impact on fishing.

7.5.7 Demonstration that Impacts will be of an Acceptable Level

Consequence rating	Minor (1)
Likelihood of occurrence	NA
Residual risk	NA
Acceptability assessment	
To meet the principles of ESD	Physical presence was assessed as having a Minor (1) consequence which is not considered as having the potential to result in serious or irreversible environmental damage. There is high confidence in the predicted level of impact as Beach has significant experience operating in the Otway and Bass based on their existing offshore developments and associated activities including the Beach Otway Drilling Campaign in 2021/2022.
Internal context	The proposed management of the impact is aligned with the Beach Environment Policy. Activities will be undertaken in accordance with the Implementation Strategy (Section 8).
External context	Stakeholder objections or claims have been assessed in relation to physical presence and appropriate controls have been adopted as detailed in Section 7.5.6. SETFIA (Stakeholder ID 1010) raised concerns in relation to impacts from permanent infrastructure in title T/30P on access to trawl and giant crab fisheries. SETFIA recommended that Beach avoid depths between the 400 - 1000m isobaths to minimise the impact on fishing. Beach has implemented an activity exclusion where wells will not be located in water depths > 400 m (CM09 Drilling Program). Seafood Industry Victoria (SIV) ((Stakeholder ID 1008) advised their position on compensation process with regard to displacement, primarily in nearshore lobster fishing areas. The area of displacement is very small and is not a primary lobster fishing area. Beach has implemented an activity exclusion where wells will not be located in water depths > 400 m (CM09 Drilling Program) which will limit impacts to giant crab fisheries. In addition, Beach will continue to consult with commercial fishers including SETFIA (CM03: Consultation for Implementation of EP) in relation to well locations and the process for compensation if fishing exclusion is unavoidable (CM04: Beach Fair Ocean Access Procedure).
Other requirements	Physical presence will be managed in accordance with the applicable legislative requirements such as the Navigation Act 2012 and associated Marine Orders as detailed in Section 7.5.6.
Monitoring and reporting	Monitoring of potential impacts is undertaken via stakeholder consultation as detailed in Section 4.16.
Acceptability outcome	**Acceptable**

7.6 Seabed Disturbance

7.6.1 Source of Aspect

Planned activities that occur during the Drilling Program may result in seabed disturbance through various pathways, as summarised in Table 7-10 below.

Table 7-10: Pathways for seabed disturbance from planned activities

Activity	Description of pathway	Predicted impact footprint	Total for program
Rig mooring and BOP tethering	Anchors will be used to maintain position of the rig during normal operations.	Maximum of 12 anchors and chains. Footprint of up to: • 200 m^2 per anchor and chain. • 36,000 m^2 (15 x 12 x 200) for Drilling Program. Based on 16 wells at 15 locations the wells in T/RL2 will use the same anchor system.	36,000 m^2
	Tethers or suction piles to hold the BOP in place may be required.	Footprint of up to: • 100 m^2 per well. • 1,600 m^2 (16 x 100) for Drilling Program.	1,600 m^2
	Transponder clump weight on seafloor. ~ 8 per well if required. Removed after positioning of rig.	Footprint of up to: • 0.2 m^2 each. • 16 m^2 (5 x 0.2 x 16) for Drilling Program	16 m^2
Drilling and P&A	For new wells: drilling of the surface hole section, including initial penetration of the seabed. For legacy suspended wells: removal of existing wellhead.	Per well: ~ 0.67 m^2 footprint (11 new wells + 5 legacy suspended wells)	10.72 m^2
	Following P&A operations and confirmation of the permanent barriers, the wellhead is cut with the use of a mechanical cutting tool and removed below the mudline (approximately 1.5 m) leaving no remaining well infrastructure on the seabed. The cutting process produces metal shavings (swarf), some of which remain on the seabed.	Swarf is expected to settle immediately and will likely remain within the existing footprint created by top-hole section drilling (surface disturbance is referenced above).	Included in surface hole above
	Drilling and P&A discharges (i.e. cement and drill cuttings) may be present up to 500 m from the well and are described and assessed in Section 7.8.	500 m from the well	Included in surface hole above
P&A	Suspended wells ROV dredging to expose guide bases and guideposts.	Beside the wellhead.	Included in surface hole above
Total for Drilling Program		0.038 km^2	

7.6.2 Extent and Duration of Aspect

Seabed Disturbance	
Extent	Per well: 0.0024 km^2 Drilling Program: 0.038 km^2
Duration	Recovery of seabed habitat within two months.

7.6.3 Predicted Environmental Impacts

Seabed disturbance from the Drilling Program can result in direct and indirect impacts:

- Benthic habitats including:
    - Injury/mortality to fauna from smothering or damage.
    - Change in water quality from sedimentation and turbidity.
    - Permanent or temporary change in habitat.
- Subsea infrastructure including UXO.
- Cultural values and sensitivities.

7.6.4 EMBA

Receptors impacted by seabed disturbance will be limited to the subsea infrastructure, benthic invertebrates, sessile epifauna and associated benthic habitats located at each well location. Wells will be located within the Operational Area.

Benthic habitat within the Otway Operational Area is a mixture of carbonate rich coarse to medium sands with areas of exposed limestone substrate (see Section 6.4.1.2). It is unlikely that extensive areas of rocky reefs or outcrops (where sponges, coral and more diverse fauna may be present) occur within the Otway Operational Area. The presence of wave-sculpted sediment and low-profile limestone pavement reef often inundated by sand has been identified in the Zeehan AMP, located 1 km south of the Otway Operational Area (DNP 2013). Prior to the commencement of the Drilling Program, a seabed survey will be conducted to obtain further information on the benthic habitat and species in the Otway Operational Area.

Benthic habitat within the Bass Operational Area has been recorded as flat and featureless with soft to soft alternating layers of silty carbonate clay and silty sands containing fragile white shell fragments (see Section 6.4.1.1) Prior to the commencement of the Drilling Program, a seabed survey will be conducted to obtain further information on the benthic habitat and species in the Bass Operational Area.

The Bass Strait region is known to consist of numerous marine invertebrates, sessile epifauna and other habitats. Studies by Wilson and Poore (1987) for the Museum of Victoria found the invertebrate diversity to be relatively high in southern Australian waters, despite patchy distribution of species and little evidence of any distinct biogeographic regions.

Ecological receptors likely to be present within the Operational Areas that may be impacted by seabed disturbance include:

- Benthic and filter-feeding epifauna (e.g. sponges, macroalgae, coral, bryozoans, molluscs, ascidians)
- Crustaceans (e.g. giant crabs, rock lobster, shrimp, krill)
- Echinoderms (e.g. urchins, sea cucumbers), and
- Annelids (e.g. polychaete worms).

Further details on benthic habitats and species assemblages are provided in Section 6.4.1.

Benthic habitats (sponges and associated fish species) are values of the West Tasmanian Canyons KEF. The West Tasmanian Canyons KEF overlaps the Otway Operational Area at T/30P. Further details on this KEF are provided in Section 6.2.15.6.

There are two commercially fished marine benthic invertebrate species which are present within the Operational Area which could be indirectly susceptible to seabed disturbance: the giant crab, and the southern rock lobster.

The Superloop Indigo Central telecommunications cable intersects the Otway Operational Area at T/30P. Further details on subsea cables are provided in Section 6.5.3.

As detailed in Section 6.5.4 the Otway Operational Area overlaps UXO Zone 1052 King Island.

First Nations submerged cultural heritage as detailed in Section 6.6.3.6 could be potentially impacted if within the area of seabed disturbance.

7.6.5 Predicted Level of Impact

7.6.5.1 Ecological Receptors

Benthic habitats and associated benthic fauna found within the Operational Area may be vulnerable to seabed disturbance from direct and indirect impacts. Benthic habitats found within the Operational Area include carbonate sands, low relief exposed limestone, sponge beds and unconsolidated sediment supporting bryozoans (IMAS 2017) and are found elsewhere within the region (see Section 6.4.1 for further details).

The biological impacts to benthic habitats and communities depends upon the equipment, footprint, seabed substrate, the frequency and the ecosystem's resilience (Watson et al. 2022). Furthermore, the recovery timeframe following seabed disturbance also varies on several factors, including the species and seabed substrate disturbed (Hiddink et al. 2017), the time of year, larval recruitment, and the local hydrodynamics (Dernie et al. 2003). There is limited information on the recovery of benthic habitats after the removal of anchors and other equipment.

A study on the recovery of seabed following bottom trawling activities identified faster recovery times for coarse-sediment (sand) compared to fine-sediment regions (Hiddink et al. 2017). Dernie et al. (2003) identified that benthic community recovery time following physical disturbance in soft sediment habitats varied from 64 days for low intensity disturbances, up to 208 days following higher intensity disturbance. For Drilling Program activities, it is expected that following the removal of anchors and other equipment, disturbed areas will recolonise quickly as impacted areas are small and the benthic habitat is consistent with the low intensity disturbances recovery period, as identified by Hiddink et al. 2017 and Dernie et al. 2003. Impacts are not expected to cause long-lasting changes to population characteristics.

During anchoring activities and ROV dredging to expose legacy suspended well guide bases and guideposts, there is the potential for soft sediments to be suspended into the water column, which may affect benthic communities by decreasing water quality and/or light penetration near the seabed (NERA 2018). 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 likely 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 and temporary scale, or less, as identified by NERA (2018).

The extent of the impact is predicted to be 0.0024 km^2 per well and up to 0.038 km^2 for the Drilling Program. The consequence is assessed as Minor (1) and is of an acceptable level based on:

- The area of impact is predicted to be small (0.0024 km^2 per well location) compared to the extent of the distribution of the benthic habitats and associated benthic marine fauna found within the Operational Areas.
- The PMST Report did not identify any threatened benthic species or ecological communities, critical habitats or BIAs relevant to the benthic environment within the Operational Areas.
- Impacts are localised, with the impacted area of seabed predicted to return to pre-impacted state with no long-term effects to habitat, population characteristics or productivity.
- Given the hydrodynamics in open ocean areas, disturbed soft sediments would settle out of the water column relatively quickly with a localised and temporary decrease in water quality.
- Studies on benthic habitat and assemblages within the Operational Areas did not identify the area as unique, with similar benthic habitats found elsewhere in the region.
- Seabed surveys will be undertaken prior to the commencement of the Drilling Program to allow for the consideration of seabed habitat type in the final selection of well locations to avoid area of high relief outcrops, reefs or sponge beds.
- Seabed disturbance associated with the Drilling Program is not predicted to impact marine ecosystem integrity or functioning.

7.6.5.2 Conservation Values and Sensitivities

The northern T/30P Operational Area overlaps the West Tasmania Canyons KEF were up to two wells may be drilled. It is unlikely that drilling would occur within the KEF and would only occur after an assessment of the seabed identified a stable and relatively flat well location.

The extent of the impact is predicted to be 0.0024 km^2 per well and 0.0048or km^2 if two wells were drilling in the northern T/30P Operational Area. The consequence is assessed as Minor (1) and is of an acceptable level based on:

- The area of impact is predicted to be small (0.0024 km^2 per well location) compared to the extent of KEF.
- Impacts are localised, with the impacted area of seabed predicted to return to pre-impacted state with no long-term effects to habitat, population characteristics or productivity.
- Given the hydrodynamics in open ocean areas, disturbed soft sediments would settle out of the water column relatively quickly with a localised and temporary decrease in water quality.
- Seabed surveys will be undertaken of the KEF prior to the commencement of the Drilling Program within the KEF to allow for the consideration of seabed habitat type in the final selection of well locations to avoid area of high relief outcrops, reefs or sponge beds.
- Seabed disturbance associated with the Drilling Program is not predicted to impact marine ecosystem integrity or functioning of the KEF.

The Bass Operational Area contains one shipwreck, the SS Albert (Figure 6-5). No wrecks have been recorded within the Otway Operational Areas but as the Cape Otway to Port Fairy is known as the 'Shipwreck Coast' there is the potential for unknown shipwreck to be present in the Operational Area. As a seabed surveys will be undertaken prior to the commencement of the Drilling Program with the aim of detecting any seabed anomalies and the location of the SS Albert is known impacts to historic shipwrecks are not predicted.

7.6.5.3 Socio-economic Environment

Seabed disturbance has the potential to result in a change to benthic habitat and, subsequently, to associated benthic species. There are two commercially fished marine benthic invertebrate species which are present within the Otway Operational Area which could be indirectly susceptible to seabed disturbance: the giant crab, and the southern rock lobster (Section 6.5.13).

The Superloop Indigo Central telecommunications cable intersects the Otway Operational Area at T/30P (Section 6.5.3).

As detailed in Section 6.5.4 the Otway Operational Area overlaps UXO Zone 1052 King Island.

No socio-economic receptors where identified in the Bass Operational Area that would be affected by seabed disturbance.

The extent of the impact is predicted to be 0.0024 km^2 per well and 0.0192 km^2 for the Otway wells. The consequence is assessed as Minor (1) and is of an acceptable level based on:

- Giant crab and southern rock lobster are mobile species and are generally less vulnerable than sessile taxa to sedimentation, as they are able to move to areas with less sediment accumulation or by more efficiently physically removing particles (Fraser et al. 2017).
- The Operational Area intersect 15 of the 200 Victorian and 3 of the 797 Tasmanian southern rock lobster reporting blocks, and 13 of the 48 Victorian giant crab reporting blocks – all of which have recorded vessel activity with the last five years. The Operational Area do not overlap the Tasmanian giant crab reporting blocks.

- The southern rock lobster fishery has a stock status listed as sustainable for Victoria, Tasmania and South Australia (FRDC 2020). The giant crab fishery has a stock status listed as sustainable for Victoria and South Australia and depleted for Tasmania (FRDC 2020; 2020a). The depleted stock status for the Tasmanian giant crab fishery is based on data obtain from 2013-2014, and there has been insufficient data for the fishery since 2013 to determine if the stock is recovering (FRDC 2020a).

- Due to the spatial area of seabed which may be disturbed within the wider extent of available fishing grounds and the short duration of the activity, impacts to benthic species of commercial importance are predicted to be localised and insignificant at a population level.

- As rock lobster live in rocky reefs (VFA 2023b) it is unlikely that their habitat would be disturbed as rocky reefs are not an appropriate substrate for anchoring or drilling of a well.

- Seabed surveys will be undertaken prior to the commencement of the Drilling Program to allow for the consideration of seabed habitat type in the final selection of well locations to avoid area of high relief outcrops, reefs or sponge beds.

- The area of impact is predicted to be small compared to the extent of the available and utilised commercial fishing area for both the Victorian and Tasmanian giant crab and southern rock lobster fisheries.

- Via stakeholder consultation it was identified that the location of wells within T/30P could reduce the area available for fishing for giant crab and trawling (SETFIA Stakeholder ID 1010). Up to two wells may be drilled in T/30P with a disturbance area of up to 0.0048 km^2 which is a very small area of exclusion. As per CM03: Consultation for Implementation of EP, Beach will continue to consult with commercial fishers including SETFIA in relation to well locations and the process for compensation if fishing exclusion is unavoidable (CM04: Beach Fair Ocean Access Procedure).

- A seabed survey will be undertaken prior to the commencement of the Drilling Program (CM05) to identify the location of the Superloop Indigo Central telecommunications cable with the location included in the Drill Rig Mooring Plan (CM06) and Drilling Program (CM09) for wells in T/30P.

- The Otway Operational Area overlaps UXO Zone 1052 King Island which is within the 'slight potential' category', meaning there is confirmed history of military activities that may have resulted in numerous residual hazardous munitions, components, or constituents, but where confirmed UXO affected areas cannot be defined (DoD 2022). Beach undertook site surveys ahead of the Otway Drilling Campaign in 2021/2022, with no UXO identified. No UXO zones have been identified within the Bass Operational Area.

- A seabed survey will be undertaken prior to the commencement of the Drilling Program (CM05) to identify any UXO with any known locations included in the Drill Rig Mooring Plan (CM06) and Drilling Program (CM09) to avoid any impacts.

7.6.5.4 Cultural Values and Sensitivities

As detailed in Section 6.6 no First Nations underwater cultural heritage has been identified in the Operational Areas. As per the draft Guidelines for Working in the Near and Offshore Environment to Protect Underwater Cultural Heritage (DCCEEW 2023b) Beach has consulted with First Nations groups and relevant underwater culture heritage researchers and organisations to understand what data could be obtained from the seabed survey that will be undertaken prior to the Drilling Program to identify First Nations submerged cultural heritage and submerged cultural landscapes (CM05). Data from seabed surveys will be provided to an appropriately qualified underwater archaeologist to identify submerged cultural heritage. Should any submerged cultural heritage be identified, Beach will consult with the relevant First Nations groups (see Section 6.6.2) and determine any exclusion areas or further cultural heritage management procedures that may be required. Thus, impacts to First Nations underwater cultural heritage are not predicted.

7.6.6 Demonstration that Impacts will be ALARP

Control, ALARP and acceptability assessment: Benthic disturbance	
ALARP decision context and justification	ALARP Decision Context: Type A Impacts from benthic disturbance are well understood and there is nothing new or unusual. Good practice is defined, and uncertainty is minimal. There are no conflicts with company values, no partner interests and no significant media interests. Though objections or claims where raised by stakeholders in relation to seabed disturbance they have been managed by additional controls. As the impact consequence is rated as Minor (1) applying good industry practice is sufficient to manage the impact to ALARP.
Adopted Control Measures	**Description**
CM03: Consultation for Implementation of EP	As per Section 4.16 Beach will undertake consultation for the implementation of the EP which will include at a minimum: • Consultation with relevant First Nations groups (section 6.6.2) regarding identified cultural heritage and cultural landscapes in accordance with CM05: Seabed Survey. • Consultation with commercial fishing associations (and individual commercial fishers where identified) regarding well locations, the ongoing communication of Beach activities to their members, and applying CM04: Beach Fair Ocean Access Procedure.
CM06: Drill Rig Mooring Plan CM09: Drilling Program	The following will be considered in the final selection of well locations, drill rig position and location of mooring equipment: • Seabed habitat type to avoid areas of high relief outcrops, reefs or sponge beds that are likely to be associated with site-attached fish. • Shipwrecks and other maritime archaeological heritage. • Submerged cultural heritage. • Location of the Superloop Indigo Central telecommunications cable for wells in T/30P to avoid any impacts to the cable. • Location of unexploded ordinances.
CM05: Seabed Survey	A seabed survey will be undertaken prior to the commencement of the Drilling Program to allow for the consideration of the following in the final selection of well locations and drill rig position and location of mooring equipment: • Seabed habitat type to avoid areas of high relief outcrops, reefs or sponge beds that are likely to be associated with site-attached fish. • Shipwrecks and other maritime archaeological heritage. • Submerged cultural heritage and cultural landscapes. • Location of the Superloop Indigo Central telecommunications cable for wells in T/30P to avoid any impacts to the cable. • Location of unexploded ordinances.

	Data from seabed surveys will be provided to an appropriately qualified underwater archaeologist to identify submerged cultural heritage and landscapes and provide an Underwater Cultural Heritage Report to Beach. Beach will assess the report and identify any areas of overlap and potential risks from proposed activities defined in this EP. Beach will share relevant information and assessments from the Seabed Survey, relevant to submerged cultural heritage and landscapes with relevant First Nations groups as identified in Section 6.6.2. Should any submerged cultural heritage be identified, Beach will report the findings in accordance with the *Underwater Cultural Heritage Act* 2018, and will consult with the relevant First Nations groups (as identified in Section 6.6.2) and determine any exclusion areas or further cultural heritage management procedures that may be required. Should any potential submerged cultural landscapes be identified, in consultation with the qualified underwater archaeologist, Beach will assess the report and identify any areas of overlap and potential risks from proposed activities defined in this EP. Beach will also consult with relevant First Nations groups (see 6.6.2) and determine any exclusion areas or further cultural heritage management procedures that may be required. The findings of Munkura v Santos will be applied in the assessment and consultation processes set out above.

Additional Controls Assessed		
Control	**Cost/Benefit Analysis**	**Control Implemented**
No anchoring, i.e. use of drill rig with Dynamic Positioning (DP) systems only (i.e. no anchors).	No anchoring of rig and support vessels within Operational Areas eliminates seabed disturbance from anchor and chain drag/ placement. Anchoring is required to position the drill rig. Evaluation of trade-offs indicates use of DP alone for maintaining station is feasible, however, would lead to disproportionately higher continuous noise impacts to sensitive receptors.	No
Use less or smaller anchors to reduce seabed disturbance	Minimises contact with seabed and resultant disturbance. The number and size of anchors used will be determined by the rig contractor, metocean conditions and safety risks as evaluated in the mooring plan. Reducing the recommended number of anchors represents an unacceptable HSE trade-off that is grossly disproportionate to the benefit gained.	No

7.6.7 Demonstration that Impacts will be of an Acceptable Level

Consequence rating	Minor (1)
Likelihood of occurrence	NA
Residual risk	NA
Acceptability assessment	
To meet the principles of ESD	Seabed disturbance was assessed as having a Minor (1) consequence which is not considered as having the potential to result in serious or irreversible environmental damage. There is high confidence in the predicted level of impact as Beach has significant experience operating in the Otway and Bass based on their

	existing offshore developments and associated activities including the Beach Otway Drilling Campaign in 2021/2022.
Internal context	The proposed management of the impact is aligned with the Beach Environment Policy. Activities will be undertaken in accordance with the Implementation Strategy (Section 8).
External context	The merits of claims or objections raised by a relevant stakeholder have been adequately assessed and additional controls adopted where appropriate, as detailed in Section 4 Consultation. Department of Defence (Stakeholder ID 1521) raised that UXO maybe present in the area. This has been assessed in this Section and the a seabed survey will be undertaken prior to the commencement of the Drilling Program (CM05) to identify any UXO with any known locations included in the Drill Rig Mooring Plan (CM06) and Drilling Program (CM09) to avoid any impacts. A meeting was held with First Peoples - State Relations (Victoria) (Stakeholder ID 1458) and Heritage Victoria (Stakeholder ID 1561) to obtain advice to inform the seabed survey acquisition and subsequent proposed drilling and completions activities, to be able to identify underwater cultural heritage artifacts and features. Based on information from that consultation Beach has engaged a contractor who specialises in cultural mapping of submerged archaeology and landscapes to provide expertise in relation to identifying underwater cultural heritage. Beach will assess the findings of the survey in accordance with CM05 Seabed Survey and undertake further consultation in accordance with CM03 Consultation for Implementation of EP. SETFIA (Stakeholder ID 1010) raised concerns in relation to impacts from permanent infrastructure in title T/30P on access to trawl and giant crab fisheries. SETFIA recommended that Beach avoid depths between the 400 - 1000m isobaths to minimise the impact on fishing. Beach has implemented an activity exclusion where wells will not be located in water depths > 400 m (CM09 Drilling Program). Seafood Industry Victoria (SIV) (Stakeholder ID 1008) advised their position on compensation process with regard to displacement, primarily in nearshore lobster fishing areas. The area of displacement is very small and is not a primary lobster fishing area. Beach has implemented an activity exclusion where wells will not be located in water depths > 400 m (CM09 Drilling Program) which will limit impacts to giant crab fisheries. In addition, Beach will continue to consult with commercial fishers including SETFIA and SIV (CM03: Consultation for Implementation of EP) in relation to well locations and the process for compensation if fishing exclusion is unavoidable (CM04: Beach Fair Ocean Access Procedure).
Other requirements	Legislative requirement: Section 572 of the OPGGS Act details the requirements for removal of property will be met for the Drilling Program.
Monitoring and reporting	A seabed survey will be undertaken prior to the commencement of the Drilling Program (CM05) to allow for the consideration of seabed disturbance in the final selection of well locations and drill rig position and location of mooring equipment.
Acceptability outcome	**Acceptable**

7.7 Planned Marine Discharges – Rig and Vessels

7.7.1 Source of Aspect

While undertaking the Drilling Program the rig and vessels will discharge the following to the marine environment:

- Brine, a by-product of the desalinisation process whereby dissolved salts and minerals are removed from seawater to produce purified freshwater.
- Putrescible waste, being organic waste materials that are prone to decomposition and decay.
- Cooling water, used to remove heat from equipment or processes to preventing overheating and maintain optimal operating conditions.
- Bilge water, a combination of various liquids, such as seawater, rainwater and water from various onboard sources including leaks, condensation, and wastewater.
- Grey water, wastewater generated from sources such as sinks, showers, bathtubs, and washing machines.
- Sewage from toilets.

Quantities of planned rig and vessels discharges are calculated based on the number of people on board (POB) and are provided in Table 7-11.

Table 7-11: Estimated Drill Rig and Vessel Discharges

Discharge Type	Quantity Rig (approx.) 140 POB	Quantity per vessel (approx.) 15 POB
Putrescible waste	280 kg / day (1-2 kg pp/day)	30 kg / day (1-2 kg pp/day)
Sewage & Grey water	63 m^3 / day (0.45 m^3 pp/day)	7 m^3 / day (0.45 m^3 pp/day)
Cooling Water	4,800 m^3/d combined (Rig + single vessel)	
RO Brine	170 m^3/day combined (Rig + single vessel)	

7.7.2 Extent and Duration of Aspect

Vessel and Drill Rig Operations - Drilling	
Extent	Operational Area Based on the furthest distance of impact.
Duration	560 days Operational marine discharges will be generated by the rig and vessels for the duration of the Drilling Program.

7.7.3 Predicted Environmental Impacts

Rig and vessel discharges have the potential to result in an impact to receptors in the marine environment from changes in water quality such as increased temperature, salinity, nutrients and the addition of chemicals and hydrocarbons.

As a result of a change in water quality, further impacts may include:

- Injury/mortality to fauna through toxicity.
- Behavioural changes if fauna habituate to putrescible waste as a food source.
- Changes to the functions, interests, or activities of other users.
- Changes to changes to aesthetic, and conservation values.

7.7.4 EMBA

Predicted impacts from rig and vessel marine discharges will be limited to the Operational Area.

Receptors potentially affected include:

- Water quality
- Ecological receptors, including plankton, fish, turtles, seabirds, and marine mammals.
- Conservation values and sensitivities.
- Cultural values and sensitivities.

7.7.5 Predicted Level of Impact

7.7.5.1 Water Quality

Rig and vessel discharges to the marine environment have the potential to alter water quality within the Operational Areas. Impacts to water quality will occur from:

- Intermittently elevated nutrient levels from sewage, putrescible waste, and grey water discharges, limited to 500 m from the rig and vessels based on discharges from a conservative 400 POB fixed facility (NERA 2017).
- Elevated water temperature from cooling water discharges, predicted to be less than 11°C above ambient within 100 m (horizontally) of the discharge point, and 10 m vertically (Woodside 2014).
- Elevated salinity levels and chemical additives from brine discharges, modelled by the US EPA as diluted 40-fold within 4 m with no ocean current (Woodside 2014).
- Intermittently elevated hydrocarbon levels within 100 m of bilge water discharge (Shell 2009), from engine oil, lubricants, fuel residues and other petroleum-based substances that may have leaked or spilled into the bilge.

The extent of the impact is predicted to be 500 m from the well. The consequence is assessed as Minor (1) and is of an acceptable level based on:

- Discharges will be of low toxicity with controls such as treatment and chemical assessment in place.
- Discharges will be intermittent and of a low volume and as the discharges are discharged into an open oceanic environment, they are predicted to mix rapidly with the surrounding waters returning to a pre-impacted state without any long-term impacts to water quality.
- Cumulative impacts from planned rig and vessel discharges may occur for short periods when support vessels are within 500 m of the rig, i.e. during resupply activities. The small quantities involved, and intermittent nature of the discharges are not predicted to increase the impact extent beyond 500 m based on discharges from a conservative 400 POB fixed facility (NERA 2017).

7.7.5.2 Ecological Receptors

Changes to water quality as a result of rig and vessel discharges could result in injury / mortality or a change in behaviour of plankton, fish, turtles, seabirds, and marine mammals within 500 m of the rig and vessels.

The extent of the impact is predicted to be 500 m from the well. The consequence is assessed as Minor (1) and is of an acceptable level based on:

- Early life stages of fish (embryos, larvae) and plankton would be most susceptible to toxic exposure from chemicals in discharges, as they are less mobile and therefore can become exposed at the discharge point. However, negligible effects are expected given previous studies on wastewater discharges which show no elevation in levels above background concentrations in proximity to the discharge point (Woodside 2008; 2014; Shell 2009). Therefore, considering the naturally high mortality of plankton and the rapid replacement of the species (Richardson et al. 2017) any impacts from short term exposure to low toxicity discharges are not expected have lethal effects to plankton that are ecologically significant or result in impacts along the food-chain, for example to foraging marine species.
- A distribution BIA for the white shark has been identified within the Operational Areas. Marine discharges from the rig or vessels are not identified as a threat in the Recovery Plan for the White Shark (Carcharodon carcharias) (DSEWPaC 2013a). Sharks will be transient through the area thus impacts are not predicted due to the low toxicity of discharges and rapid dilution as a result of oceanic conditions.
- No BIAs or protected habitat were identified for other fish species within the Operational Areas. Although a variety of fish species, including commercial species, maybe be present in the area, impacts are not predicted due to the low toxicity of discharges and rapid dilution as a result of oceanic conditions. In addition, the sporadic discharge of macerated food scraps over short durations and are not predicted to result in habituation to this food source.
- No BIAs or critical habitat were identified for marine turtles within the Operational Areas although some species may occur. Chemical and terrestrial discharge are identified as a threat in the Recovery Plan for Marine Turtles in Australia (CoA 2017b). However, due to the low toxicity of planned discharges and their rapid dilution as a result of oceanic conditions, along with the transient nature of these species within the area, impacts are not predicted to occur.

- The Operational Areas also overlap foraging BIAs for albatross, petrel, and shearwater species. As impacts to plankton and fish species are not predicted due to the low toxicity of planned discharges and their rapid dilution as a result of oceanic conditions, impacts to foraging seabirds are not predicted. In addition, the sporadic discharge of macerated food scraps over short durations and are not predicted to result in habituation to this food source.

- The Operational Areas are within pygmy blue whale foraging BIAs. Marine discharges from the rig or vessels are not identified as a threat to the recovery of pygmy blue whales within the Conservation Management Plan for the Blue Whale (DoE 2015). Marine pollution by acute and chronic chemical discharge is identified as a threat that has minor consequences to the population by only affecting individuals (DoE 2015). Due to the low toxicity of planned discharges and their rapid dilution as a result of oceanic conditions, impacts are not predicted to occur to foraging blue whales or krill that they forage on.

- The Operational Areas are within the southern right whale migration BIA. Marine discharges from the rig or vessels are not identified as a threat to the southern right whale recovery within the Conservation Management Plan for the Southern Right Whale (DSEWPaC 2012a). Marine pollution by acute and chronic chemical discharge is identified as a threat that has minor consequences to the population by only affecting individuals (DSEWPaC 2012a). Chemical pollution from sewage and other discharges is identified as a threat to the species, particularly within coastal BIAs where regular exposure may occur. However, due to the low toxicity of planned discharges and their rapid dilution as a result of oceanic conditions, along with the transient nature of these species within the area, impacts are not predicted to occur.

7.7.5.3 Conservation Values and Sensitivities

The Zeehan AMP is 1 km from the Operational Area therefore impacts from rig or vessels wastewater discharges are not predicted.

The northern T/30P Operational Area overlaps the West Tasmania Canyons KEF in water depths >150 m (Figure 7-10). Based on the low toxicity of planned discharges and their rapid dilution as a result of oceanic conditions impacts to the West Tasmania Canyons KEF productivity and biodiversity from canyon upwellings is not predicted.

7.7.5.4 Cultural Values and Sensitivities

As described in Section 6.6, Sea Country connection extends far beyond the current coastline and includes the Operational Areas. Vessel and rig discharges will be intermittent, low toxicity and of a low volume with the discharges predicted to mix rapidly with the surrounding waters returning to a pre-impacted state without any long-term impacts to water quality. In addition, impacts to eels and southern right whales that have cultural value to First Nations people (see Section 6.6.3) are not predicted. Thus, for rig and vessel discharges the consequence is assessed as Minor (1) to water quality and ecological receptors and therefore is assessed as Minor (1) for associated cultural values.

7.7.6 Demonstration that Impacts will be ALARP

ALARP decision context and justification	ALARP Decision Context: Type A Impacts from vessel and rig marine discharges are well understood and there is nothing new or unusual. Good practice is defined, and uncertainty is minimal. There are no conflicts with company values, no partner interests, and no significant media interests. As the impact consequence is rated as Minor (1) applying good industry practice (as defined in Section 2.7.2.1) is sufficient to manage the impact to ALARP.
Adopted Control Measures	**Source of good industry practice control measures**
CM01: Marine Assurance Process	The Protection of the Sea (*Prevention of Pollution from Ships Act* 1983) regulates Australian vessels with respect to ship-related operational activities and invokes certain requirements of the MARPOL Convention relating to discharge of noxious liquid substances including oil, sewage, putrescible waste, garbage, air pollution etc. These requirements are enacted through Marine Orders. Beach Marine Assurance System ensures that the rig and vessels meet relevant maritime laws and includes pre-commencement rig and vessel inspections of class certification requirements under the Navigation Act 2012 and associated Marine Orders, including but not limited to: • Marine Order 91 Marine Pollution Prevention – Oil. • Marine Order 95 Marine Pollution Prevention – Garbage. • Marine Order 96: Marine Pollution Prevention – Sewage.
	Rig and vessels will have Preventative Maintenance System that provides a status on the maintenance of equipment and detailed manufacturer's specification on maintenance procedures for: • Equipment detail as a control in this EP will be inspected to ensure effective operation. • Power generation and propulsion systems on the MODU and vessels will be inspected to ensure efficient operation.
CM12: Chemical Management Procedure	All chemicals that will or could be discharged to the marine environment must be assessed prior to use to ensure the lowest toxicity, most biodegradable and least accumulative chemicals are selected which meet the technical requirements of the application as per the Beach Chemical Management Procedure described in Section 8.5.3.

7.7.7 Demonstration that Impacts will be of an Acceptable Level

Consequence rating	Minor (1)
Likelihood of occurrence	NA
Residual risk	NA
Acceptability assessment	
To meet the principles of ESD	Planned marine discharges were assessed as having a Minor (1) consequence which is not considered as having the potential to result in serious or irreversible environmental damage. There is high confidence in the predicted level of impact as Beach has significant experience operating in the Otway and Bass based on their existing offshore developments and associated activities including the Beach Otway Drilling Campaign in 2021/2022.
Internal context	The proposed management of the impact is aligned with the Beach Environment Policy. Activities will be undertaken in accordance with the Implementation Strategy (Section 8).
External context	There have been no stakeholder objections or claims regarding planned marine discharges.
Other requirements	Planned marine discharge will be managed in accordance with legislative requirements. As per the impact assessment vessel and rig marine discharges will not: • Impact on the recovery of marine turtles as per the Recovery Plan for Marine Turtles in Australia (CoA 2017b). • Impact the recovery of the white shark as per the Recovery Plan for the White Shark (*Carcharodon carcharias*) (DSEWPaC 2013a). • Impact the recovery of the Australian sea lion as per the Recovery Plan for the Australian Sea Lion (DSEWPaC 2013b). • Impact the long-term survival and recovery of albatross and giant petrel populations breeding and foraging as per the National Recovery Plan for Albatrosses and Petrels 2022 (CoA 2022a). • Impact the conservation of listed seabirds in Australia and beyond as per the Wildlife Conservation Plan for Seabirds (CoA 2020a). • Impact the recovery of the blue whale as per the Conservation Management Plan for the Blue Whale (CoA 2015). • Impact the recovery of the southern right whale as per the Conservation Management Plan for the Southern Right Whale (DSEWPaC 2012a) or Draft National Recovery Plan for the Southern Right Whale (DCCEEW 2022a). • Impact sei or fin whales, covered by Conservation Advice for Fin Whales (TSSC 2015f) and Conservation Advice for Sei Whales (TSSC 2015g). • Impact the Zeehan AMP values as per the South-east Commonwealth Marine Reserves Network Management Plan (2013-2023) (DNP 2013).
Monitoring and reporting	Monitoring and reporting of vessel and rig discharges will be undertaken as detailed in Section 8.3.8.
Acceptability outcome	**Acceptable**

7.8 Planned Marine Discharges – Drilling and P&A

7.8.1 Source of Aspect

Drilling and P&A conducted during the Drilling Program will result in planned drilling discharges to the marine environment. Table 7-12 details the indicative drilling discharge per well.

In addition, barite, bentonite, and cement remaining at the end of the rig consortium campaign may be discharged to the marine environment by the last titleholder (which could potentially be Beach) using the rig. The Transocean Equinox bulk barite, bentonite and cement capacity is ~ 340 m^3, though the full volume would not be discharged as inventories will be minimised to as low as reasonably practicable during the final well(s) in the program taking into account well integrity and rig safety considerations.

Table 7-12: Indicative Drilling and P&A Discharges per Well

Discharge	Seabed	Surface
Blow-out Preventer (BOP)		
Potable water with 3 % water soluble control (hydraulic) fluid released every 7 days during function testing	2.2 m^3	-
Drilling		
Drill cuttings with seawater & PHG sweeps	393 m^3	-
Drill cuttings with residual water based drill fluids (WBDF)	-	185 m^3
Seawater & PHG sweeps	2,500 m^3	-
WBDF	-	1,500 m^3
Cement and Dry Bulk Material		
Cement discharge riserless section	40 m^3	-
Cement from testing, cementing and spoils	-	70 m^3
Completions – Yolla 7 only		
Completion fluids	-	400 m^3
Excess packer fluid	-	16 m^3
Excess suspension fluid	-	8 m^3
P&A Legacy Wells		
Calci-wash	2 m^3	
Insitu - inhibited water and brine		150 m^3
WBDF – drill out cement plug		250 m^3

7.8.2 Extent and Duration of Aspect

Drilling and P&A Discharge	
Extent	500 m Based on the furthest distance of impact.
Duration	Discharges will occur intermittingly during drilling and P&A.

7.8.3 Predicted Environmental Impacts

Planned drilling and P&A discharges have the potential to result in an impact to receptors in the marine environment from:

- Changes in water quality.
- Changes in sediment quality.
- Changes in benthic habitat composition.

As a result of changes in water and sediment quality and benthic habitat composition, further impacts may include:

- Injury /mortality to fauna through toxicity or physical smothering.

7.8.4 EMBA

Predicted impacts from drilling and P&A discharges will be limited to the Operational Area. Receptors potentially affected are:

- Water quality
- Sediment quality
- Benthic habitat
- Plankton, fish, turtles, and marine mammals.

Benthic habitats and ecological receptors are values of the following within the Operational Area:

- Conservation values and sensitivities
- Socio economic receptors
- Cultural values and sensitivities

7.8.5 Predicted Level of Impact – Blow-out Preventer Fluids

Planned discharges of BOP hydraulic fluids to the marine environment have the potential to change water quality near the discharge point.

Hydraulic fluids will be discharged to the marine environment during BOP installation and function testing every 7 days. Tests are expected to release 2200 L (2.2 m^3) of potable water with 3 % water soluble control fluid (hydraulic fluid). Additionally, smaller volumes will be released as the result of latching and unlatching the BOP at the start/end of each well.

Diluted hydraulic control fluids in potable water are water-based, low toxicity and readily biodegradable. Neff (2005) indicates that within well-mixed ocean waters, consistent with the Otway and Bass Operational Areas, fluids will have diluted by over 100-fold within 10 m of the discharge point. The extent within which the BOP hydraulic fluids would disperse is estimated to be within 100 m of the well location (Neff 2010).

The extent of the impact is predicted to be 100 m from the well. The consequence is assessed as Minor (1) and is of an acceptable level based on:

- Toxicity effects to water quality, sediment quality, benthic habitats, ecological receptors such as plankton, fish, turtles, and marine mammals, and commercial fisheries are not predicted based on diluted hydraulic control fluids in potable water are water-based, low toxicity and readily biodegradable.

- Impacts to the closest marine protected area, Zeehan AMP, at 1 km from the T/30P Operational Area are not predicted.

- The northern T/30P Operational Area overlaps the West Tasmania Canyons KEF in water depths >150 m (Figure 7-10). Impacts to key features such as low-relief bryozoan thicket, diverse sponge communities and associated fish species are not predicted based on the localised area of impact for a short period of time as the discharge disperses and that diluted hydraulic control fluids in potable water are water-based, low toxicity and readily biodegradable.

- Impacts to First Nations values and sensitivities such as whales, dolphins, seals, fish, and eels are not predicted based on the localised area of impact for a short period of time as the discharge disperses and that diluted hydraulic control fluids in potable water are water-based, low toxicity and readily biodegradable.

- Impacts to submerged cultural heritage are not predicted based on a seabed survey will be undertaken prior to the Drilling Program to identify First Nations underwater cultural heritage (CM05). Data from seabed surveys will be provided to an appropriately qualified underwater archaeologist to identify submerged cultural heritage. Should any submerged cultural heritage be identified, Beach will consult with the relevant First Nations groups (see Section 6.6.2) and determine any exclusion areas or further cultural heritage management procedures that may be required.

7.8.6 Predicted Level of Impact – Drill Cuttings and Fluids

Drill cuttings are the rock and sediment brought to the surface during drilling. These cuttings can include a mixture of clay, silt, sand, and rock, and can also contain small amounts of water-based drilling fluids. For the Drilling Program the top-hole sections will be drilled with seawater and pre-hydrated gel sweeps, with discharge to the seabed. Gel sweeps are typically comprised of seawater with high viscosity pre-hydrated bentonite. The seawater may be treated with caustic soda (NaOH) and/or soda ash (Na_2CO_3) to increase pH and alkalinity. The intermediate and reservoir-hole sections will be drilled with water based drilling fluid (WBDF). Seawater is the major component of WBDF to which bentonite clay, barite, brine and/or gellants (such as guar gum or xanthan gum) are added. Cuttings and associated drill fluids from these sections are routed back to the drill rig via the riser and processed by solids control equipment (shale shakers and centrifuges), where the WBDF is separated from the cuttings and recirculated in to the system for further use. The cuttings and remaining adhered WBDF discharged from the rig below the water surface.

It is standard practice within Australia to discharge drill cuttings and water-based drilling fluids overboard due to their low toxicity.

Drilling fluids will be discharged intermittently in batches ranging from around 1 m^3 to 400 m^3 and, depending on volume, may be discharged over a matter of minutes or over several hours.

During drilling of the top-hole section, discharges will occur at the seabed, resulting in a localised increase in turbidity immediately around the well. The cuttings and fluids will settle rapidly within proximity to the wellhead, with finer particles (approx. 10% of the discharge volume) dispersing further within ocean currents (Hinwood et al. 1994).

For the cuttings discharge below the sea surface Hinwood et al. (1994) indicates that larger particles of cuttings and adhered muds (90-95%) discharged from the surface fall to the seabed within close proximity to the release point. Larger particles, representing approximately 90% of the mass of mud solids discharged to the marine environment will form a plume which settles swiftly on the seafloor (or until the plume entrains enough seawater to reach neutral buoyancy). The remaining 10% of the mass forms another plume in the upper water column which drifts with prevailing currents away from the source and is diluted rapidly in the water column (Neff 2005 2010). In well-mixed oceans, drilling cuttings and fluid plume is diluted by more than 100-fold within 10 m of the discharge (Neff 2005), with drilling fluid concentration falling to below acute toxicity threshold of 10,000 ppm within 100 m of the discharge source (Neff 2010).

Field studies summarised by International Association of Oil & Gas Producers (IAOGP) (2016), found that cuttings and adhered WBDF could be detected either visually or through increases in barium concentrations within 10 – 150 m of the source. Maximum height of the cuttings pile was usually <50 cm. When cuttings were discharged from the rig (i.e. at the surface), the increased depth allows small particles to disperse over greater distances, leaving thinner layers of cuttings near the well site – for example, WBDF cuttings discharged from a single well in >300 m water may disperse so widely they may not be detectable in sediments at any distance from the well.

Metals present in drilling fluids generally resemble that of marine sediments, albeit with concentrations of some metals higher than clean marine sediments (Neff 2005). Metals associated with WBDF drill cuttings have been shown to have a low bioavailability as they tend to remain in a non-ionic form, remaining bound to other compounds, presenting a low toxicity risk to marine fauna (Neff 2005). Other metals present in drilling wastes, mainly as salts, may originate from formation cuttings or from impurities in barite and other mud components. Barite used during the Drilling Program will have very low concentrations of mercury (Hg) and cadmium (Cd) (less than 1 mg/kg and 3 mg/kg respectively). A study investigating barite solubility and the release of trace metal compounds recorded that <1% of the mercury and 15% of the cadmium dissolved from the barite after one-week exposure to the marine environment (Crecelius et al. 2007). Further, these do not contribute to sediment toxicity due to their low bioavailability (Schaanning et al. 2002). Studies at three continental slope locations where drilling was undertaken in water depths between 37 and 119 m found that within a year, concentrations of barium and chemicals from WBDF and SBDF discharges reduced by 2.4 to 80% for barium and 65 to 99% for chemicals within 100 m of the discharge source (IAOGP 2016).

A study on the impacts of drilling in Bass Strait, where the Drilling Program will be conducted, by Terrens et al. (1998) observed biological effects within 100 m of the drilling site shortly after drilling; recovery of seabed communities across the area were reported within four months. This study found that after 11 months SBDF was not detectable in sediments, indicating that recovery of the seabed is through a combination of dispersion and biodegradation. Neff (2010) found that recolonisation of SBDF mud-cuttings piles in cold-water marine environments began within one to two years of ceasing discharges once the hydrocarbon component of the cutting piles biodegraded. Thus, for WBDF recolonisation would be faster as there is no hydrocarbon component.

A recent study on the Northwest Shelf (Jones et al. 2021), where in-situ surveys were undertaken during a drilling campaign, suggest a zone of high impact surrounding the drill centre up to 50–75 m in all directions which would have been caused by cuttings and fluid discharges from the drill rig.

Outside this zone was an area of medium impact up to approximately 200 m where there were clear losses of epifauna, but nevertheless sponges and soft corals were still observed.

Marine fauna that are exposed in the laboratory or field to cuttings in sediments do not bioaccumulate significant quantities of metals (Hartley et al. 2003). There is some evidence of a limited bioavailability of a few metals, such as lead and zinc, which are present in cuttings piles; however, doubt remains that metal bioaccumulation in marine fauna from cuttings piles is sufficient to cause harmful effects in marine fauna living on or near cuttings piles (OSPAR 2019). Neff (2010) concludes that, due to a lack of toxicity and low bioaccumulation potential of drilling fluids, the effects of drilling discharges are highly localised and are not expected to spread through the food web.

Hinwood et al. (1994) explain that the main environmental disturbance from discharging drilling cuttings and fluids is associated with the smothering and burial of sessile benthic and epibenthic fauna. Many studies have shown that the effects on seabed fauna and flora from the discharge of drilling cuttings with water-based muds are minimal, although the presence of drilling fluids in the seabed close to the drilling location (<500 m) can usually be detected chemically (e.g. Cranmer 1988, Neff et al. 1989, Hyland et al. 1994, Daan & Mulder 1996, Currie and Isaacs 2005, OSPAR 2009, Bakke et al. 2013).

Pre- and post-drilling ROV surveys which documented physical smothering effects from WBDF cuttings within 100 m of the well were compared and found that outside the area of smothering, fine sediment was visible on the seabed up to 250 m from the well (Jones et al. 2006, 2012). After three years, there was significant removal of cuttings particularly in the areas with relatively low initial deposition (Jones et al. 2012). The area impacted by complete cuttings cover had reduced from 90 m to 40 m from the drilling location, and faunal density within 100 m of the well had increased considerably and was no longer significantly different from conditions further away.

The extent of the impact is predicted to be 500 m from the well. The consequence is assessed as Minor (1) and is of an acceptable level based on:

- Toxicity effects to water quality, sediment quality, benthic habitats, and ecological receptors such as plankton, fish, turtles, and marine mammals are not predicted based on:
    - WBDF have been shown to have little or no toxicity to marine organisms due to the inert / PLONOR (Poses Little or No Risk to the Environment) nature of its components (Jones et al. 1996, Neff 2005). One, insoluble, component of water-based mud discharges is barite (or Barium sulphate) which has been widely shown to accumulate in sediments following drilling (reviewed by Hartley 1996) and is of low bioavailability and toxicity to benthic organisms.
    - All chemicals used in the drill fluids will be rated Gold/Silver/D or E through Oslo and Paris Conventions (OSPAR) and Offshore Chemical Notification Scheme (OCNS) or have a complete risk assessment.
    - Barite used during the Drilling Program will have very low concentrations of mercury (Hg) and cadmium (Cd) (less than 1 mg/kg and 3 mg/kg respectively) as recommended by the International Finance Corporation (IFC) EHS Guidelines Offshore Oil and Gas Development – Drilling Fluids and Drilled Cuttings Guidance (IFC 2015).
    - In well-mixed oceans, comparable to Otway and Bass Operational Area, drilling cuttings and fluid plume is diluted by more than 100-fold within 10 m of the discharge (Neff 2005), with

drilling fluid concentration falling to below acute toxicity threshold of 10,000 ppm within 100 m of the discharge source (Neff 2010). Neff (2005) states that planned drilling discharges are unlikely to cause harm to communities of water column plants and animals due to the rapid mixing and dilution of the drilling mud and cuttings plume.

  - Marine fauna exposed in the laboratory or field to cuttings in sediments did not bioaccumulate significant quantities of metals (Hartley et al. 2003).

  - Neff (2010) concludes that, due to a lack of toxicity and low bioaccumulation potential of drilling fluids, the effects of drilling discharges are highly localised and are not expected to spread through the food web.

- Smothering and burial of sessile benthic and epibenthic fauna may occur out to 100 m of the well with recovery of seabed communities within four months to 3 years based on Jones et al. (2012), Terrens et al. (1998) and Neff (2010). No threatened ecological communities have been identified within the Operational Areas and seabed surveys will be undertaken prior to the commencement of the Drilling Program to allow for the consideration of seabed habitat type in the final selection of well locations to avoid area of high relief outcrops, reefs or sponge beds. Thus, impacts are predicted to be localised and not impact marine ecosystem integrity or functioning.

- Impacts to the closest marine protected area, Zeehan AMP, at 1 km from the T/30P Operational Area are not predicted.

- The northern T/30P Operational Area overlaps the West Tasmania Canyons KEF in water depths >150 m (Figure 7-10). Impacts to key features such as low-relief bryozoan thicket, diverse sponge communities and associated fish species are not predicted based on the localised area of impact for a short period of time as the discharge disperses and that diluted hydraulic control fluids in potable water are water-based, low toxicity and readily biodegradable.

- Impacts to First Nations values and sensitivities such as whales, dolphins, seals, fish, and eels, and submerged cultural heritage are not predicted based on the localised area of impact for a short period of time as the discharge disperses and that diluted hydraulic control fluids in potable water are water-based, low toxicity and readily biodegradable.

- Impacts to First Nations values and sensitivities such as whales, dolphins, seals, fish, and eels are not predicted as toxicity effects to fish including eels and marine mammals such as whales, dolphins and seals are not predicted. Changes to water quality will be localised within 500 m of the well and temporary as any discharged fluids will rapidly disperse.

- Impacts to submerged cultural heritage are not predicted based on a seabed survey will be undertaken prior to the Drilling Program to identify First Nations underwater cultural heritage (CM05). Data from seabed surveys will be provided to an appropriately qualified underwater archaeologist to identify submerged cultural heritage. Should any submerged cultural heritage be identified, Beach will consult with the relevant First Nations groups (see Section 6.6.2) and determine any exclusion areas or further cultural heritage management procedures that may be required.

7.8.7 Predicted Level of Impact – Cement and Dry Bulk Materials

Cement is listed as a substance that is considered to pose little or no risk to the environment (OSPAR 2021).

It is estimated that approximately 40 m^3 of cement will be discharged to the seabed per well which has the potential to smother and permanently alter the benthic substrate. Cement discharged at the seabed is not expected to disperse as it is designed to set in a marine environment and will therefore set in-situ. BP (2013) modelled a 200 t (~83 m^3) cement discharge at the seabed and found changes to the benthic environment were limited to 10 m.

Cement discharged at the sea surface is expected to be a combination of cement slurry and wash water and will be a maximum of 70 m^3 per well, and an additional 25 m^3 at the final well location. The surface discharge of cement can cause increased turbidity in the water column and result in a temporary change in surface water quality. However, cement particles are expected to disperse under the action of metocean conditions and eventually settle out of the water column.

Modelling of surface cement discharges of approximately 78 m^3 over one hour, conducted for BP (2013), resulted in a suspended solid concentration between 0.005-0.05 mg/m^3 within the extent of the plume (approximately 150 m horizontal and 10 m vertical) over two hours. Four hours post-discharge concentrations were <0.005 mg/m^3. The volume modelled is slightly greater than the maximum surface discharge volume predicted for the Drilling Program, therefore it is predicted that the concentration of suspended sediments would be lower.

The extent of the impact is predicted to be 150 m from the well. The consequence is assessed as Minor (1) and is of an acceptable level based on:

- Cement is inert and considered to pose little or no risk to the environment (OSPAR 2021). Thus toxicity impacts to benthic habitats and ecological receptors such as plankton, fish, turtles, and marine mammals are not predicted.
- Seabed impacts are predicted to be limited to within 10 m of the well location. No threatened ecological communities have been identified within the Operational Areas and seabed surveys will be undertaken prior to the commencement of the Drilling Program to allow for the consideration of seabed habitat type in the final selection of well locations to avoid area of high relief outcrops, reefs or sponge beds.
- Turbidity impacts from the surface discharge of cement or other dry bulk materials are predicted to last less than four hours and be restricted to with approximately 150 m horizontal and 10 m vertical.
- Cement, bentonite and barite are listed as a substance that is considered to pose little or no risk to the environment (OSPAR 2021).
- Jenkins and McKinnon (2006) reported that levels of suspended sediments greater than 500 mg/l are likely to produce a measurable impact upon larvae of most fish species and levels of 100 mg/l where exposure occurs for greater than 96 hours may also affect the larvae of some species. Jenkins and McKinnon (2006) further indicate that levels of 100 mg/l may affect the larvae of several marine invertebrate species. It is understood that the egg and larval stages are more vulnerable to suspended particles than other life stages. Modelling conducted by BP (2013)

detailed that particulate concentrations within the cement discharge plume 2 hours after the start of discharge were in the 5-50 mg/l and 4 hours after the start of the discharge, the modelling indicates that the plume will have completely dispersed to particulate concentrations of less than 5 mg/l. Thus, impacts to fish including eggs and larva are not predicted.

- Impacts to the closest marine protected area, Zeehan AMP, at 1 km from the T/30P Operational Area are not predicted.

- The northern T/30P Operational Area overlaps the West Tasmania Canyons KEF in water depths >150 m (Figure 7-10). At the predicted particulate concentrations of 5-50 mg/l after 2 hours and 5 mg/l after 4 hours particulate concentrations of less than 5 mg/l. Total suspended solids (TSS) measured as part of the Otway Seabed Survey detailed that TSS at the closest sample point (Thylacine) to the West Tasmania Canyons KEF ranged from 2.4 mg/l to 9.7 mg/l (Ramboll 2020). As cement discharge TSS may be elevate above background levels for up to 4 hours within a distance of 150 from the well and a maximum of two wells may be undertaken within T/30P smothering impacts to sponges associated with the canyon heads are highly unlikely.

- Impacts to First Nations values and sensitivities such as whales, dolphins, seals, fish, and eels are not predicted as cement is inert and considered to pose little or no risk to the environment (OSPAR 2021) and the turbidity plume is temporary and suspended sediments are below levels where measurable impact upon larvae of most fish species which are likely to be more sensitive than eels and whales, dolphins and seals may be present.

- Impacts to submerged cultural heritage are not predicted based on a seabed survey will be undertaken prior to the Drilling Program to identify First Nations underwater cultural heritage (CM05). Data from seabed surveys will be provided to an appropriately qualified underwater archaeologist to identify submerged cultural heritage. Should any submerged cultural heritage be identified, Beach will consult with the relevant First Nations groups (see Section 6.6.2) and determine any exclusion areas or further cultural heritage management procedures that may be required.

7.8.8 Predicted Level of Impact – Completion Fluids

For the scope of this EP, well completions will be undertaken for Yolla 7 in the Bass Basin. Fluids are used to run well completions and to ensure that the wellbores and casings are clear of solids, debris, and other containments. Completion, packer, and suspension fluids will consist of brines (chlorides of calcium, potassium or sodium, or a bromide solution) and or water with additives that may include:

- Biocide, oxygen scavenger, corrosion inhibitor and pH buffer (soda ash or caustic soda).
- Bromides.
- Hydrate inhibitor (methanol, monoethylene glycol (MEG).
- Viscosifier and surfactants.

The base case is to unload the Yolla 7 well to the gas plant, with clean up to the rig a contingency option. If clean up to the gas plant is not deemed feasible, then the completion fluids will be discharged to sea. If there is the potential for oil to be present from any formation water or condensate present in the wellbore, the completion fluids will be tested and discharged only if the oil in water content is below 30 ppm. Fluid not meeting this criterion will be stored for onshore disposal.

The extent of the impact is predicted to be within 10 m from the well. The consequence is assessed as Minor (1) and is of an acceptable level based on:

- Completion, packer, and suspension fluids mainly consist of inert brine/or water which are on the OSPAR List of Substances Used and Discharged Offshore which Are Considered to Pose Little or No Risk to the Environment (PLONOR). In addition chemical additives such as soda ash, methanol and MEG are also classed as PLONOR.

- Other chemicals used in the fluids will be rated Gold/Silver/D or E through Oslo and Paris Conventions (OSPAR) and Offshore Chemical Notification Scheme (OCNS) or have a complete risk assessment. Thus, toxicity impacts to marine fauna are not predicted.

- Pelagic marine fauna and plankton may be exposed to low-level (30 ppm at point of discharge) concentrations of formation hydrocarbons via the discharge of completion brine at the Yolla 7 well location. OSPAR (2014) details that the predicted no effect concentration (PNEC) for marine organisms exposed to dispersed oil is 70.5 ppb which is significantly less than 30 ppm that will be potentially discharged if formation hydrocarbons are present. Additionally, the PNEC value is based upon no observed effect concentrations after exposure to certain concentrations for an extended period that was greater than 7 days (OSPAR 2014). The discharge of treated brine and formation water during well completion activities are both intermittent and short in duration.

- Modelling by Beach (AECOM 2020) for the produced formation water discharge at the Yolla Platform indicates that upon discharge, hydrocarbon and other chemical concentrations are rapidly diluted and reach the no observable effect concentration (i.e., no observable impact, noting this is a higher level of protection than the 99% species protection level) in the range of 1.5 - 7.3 m from the discharge point across a range of flow rates and ocean currents. The volume of formation hydrocarbons associated with the completion brine would be significantly less than the produced formation water discharge (100 – 300 m^3/day), the completion brine and any hydrocarbons would be rapidly diluted close to the discharge point.

- Toxicity effects to water quality, sediment quality, benthic habitats, ecological receptors such as plankton, fish, turtles, and marine mammals, and commercial fisheries are not predicted based on the rapid dilution of discharge completions brine and any associated hydrocarbons.

- There are no marine parks or key ecological features within or adjacent to the Yolla 7 well.

- Impacts to First Nations values and sensitivities such as whales, dolphins, seals, fish, and eels are not predicted based on the rapid dilution of discharge completions brine and any associated hydrocarbons.

- Impacts to submerged cultural heritage are not predicted based on a seabed survey will be undertaken prior to the Drilling Program to identify First Nations underwater cultural heritage (CM05). Data from seabed surveys will be provided to an appropriately qualified underwater archaeologist to identify submerged cultural heritage. Should any submerged cultural heritage be identified, Beach will consult with the relevant First Nations groups (see Section 6.6.2) and determine any exclusion areas or further cultural heritage management procedures that may be required.

During the P&A of the five legacy suspended wells, discharges will occur from cleaning of wellhead equipment, if required, insitu fluids within the wells, and WBDF from the drilling out of the existing cement plugs.

Wellhead cleaning may be required to access the wellhead. A product such as calci-wash which consists of <0.05% CaCl in water may be used to dissolve calcareous marine growth.

Insitu fluids differ between wells, as detailed in Table 3-4, but includes a mixture of WBDF and inhibited brine (KCl or NaCl). Inhibitor chemicals include corrosion inhibitor, biocide, and oxygen scavenger. As the legacy wells have not been completed or used for hydrocarbon production, hydrocarbons are unlikely to be present in the existing suspension fluids. It is estimated that insitu fluids discharges could be up to ~150 m^3 for each legacy suspended well.

WBDF discharges from drilling out of the existing cement plugs is estimated to be ~250 m^3 for each legacy suspended well.

The extent of the impact is predicted to be within 500 m from the well. The consequence is assessed as Minor (1) and is of an acceptable level based on:

- Toxicity effects to water quality, sediment quality, benthic habitats, and ecological receptors such as plankton, fish, turtles, and marine mammals are not predicted based on:
  - Calci-wash which consists of <0.05% CaCl is listed as on the OSPAR List of Substances Used and Discharged Offshore which Are Considered to Pose Little or No Risk to the Environment (PLONOR).
  - Insitu fluids are WBDF and inert brine, and chemicals used in the fluid will be rated Gold/Silver/D or E through Oslo and Paris Conventions (OSPAR) and Offshore Chemical Notification Scheme (OCNS) or have a complete risk assessment. This, toxicity impacts to marine fauna are not predicted.
  - As detailed in Section 7.8.6, WBDF have been shown to have little or no toxicity to marine organisms due to the inert / PLONOR (Poses Little or No Risk to the Environment) nature of its components (Jones et al. 1996, Neff 2005). One, insoluble, component of water-based mud discharges is barite (or Barium sulphate) which has been widely shown to accumulate in sediments following drilling (reviewed by Hartley 1996) and is of low bioavailability and toxicity to benthic organisms.
  - All chemicals used in the drill fluids will be rated Gold/Silver/D or E through Oslo and Paris Conventions (OSPAR) and Offshore Chemical Notification Scheme (OCNS) or have a complete risk assessment.
  - Barite used during the Drilling Program will have very low concentrations of mercury (Hg) and cadmium (Cd) (less than 1 mg/kg and 3 mg/kg respectively) as recommended by the International Finance Corporation (IFC) EHS Guidelines Offshore Oil and Gas Development – Drilling Fluids and Drilled Cuttings Guidance (IFC 2015).
  - In well-mixed oceans, comparable to Otway and Bass Operational Area, drilling cuttings and fluid plumes diluted by more than 100-fold within 10 m of the discharge (Neff 2005), with drilling fluid concentration falling to below acute toxicity threshold of 10,000 ppm within 100

m of the discharge source (Neff 2010). Neff (2005) states that planned drilling discharges are unlikely to cause harm to communities of water column plants and animals due to the rapid mixing and dilution of the drilling mud and cuttings plume.

- Marine fauna exposed in the laboratory or field to cuttings in sediments did not bioaccumulate significant quantities of metals (Hartley et al. 2003).
- Neff (2010) concludes that, due to a lack of toxicity and low bioaccumulation potential of drilling fluids, the effects of drilling discharges are highly localised and are not expected to spread through the food web.

- Smothering and burial of sessile benthic and epibenthic fauna may occur out to 100 m of the well with recovery of seabed communities within four months to 3 years based on Jones et al. (2012), Terrens et al. (1998) and Neff (2010). No threatened ecological communities have been identified within the Operational Areas and seabed surveys will be undertaken prior to the commencement of the Drilling Program to allow for the consideration of seabed habitat type in the final selection of well locations to avoid area of high relief outcrops, reefs, or sponge beds. Thus, impacts are predicted to be localised and not impact marine ecosystem integrity or functioning.
- Impacts to the closest marine protected area Apollo AMP, are not predicted as the nearest P&A well is ~ 50 km from the AMP.
- Impacts to the West Tasmania Canyons KEF are not predicted as the nearest P&A well is ~17 km from the KEF.
- Impacts to First Nations values and sensitivities such as whales, dolphins, seals, fish, and eels are not predicted as toxicity effects to fish including eels and marine mammals such as southern right whales are not predicted. Changes to water quality will be localised within 500 m of the well and temporary as any discharged fluids will rapidly disperse.
- Impacts to submerged cultural heritage are not predicted based on a seabed survey will be undertaken prior to the Drilling Program to identify First Nations underwater cultural heritage (CM05). Data from seabed surveys will be provided to an appropriately qualified underwater archaeologist to identify submerged cultural heritage. Should any submerged cultural heritage be identified, Beach will consult with the relevant First Nations groups (see Section 6.6.2) and determine any exclusion areas or further cultural heritage management procedures that may be required.

7.8.9 Demonstration that Impacts will be ALARP

ALARP decision context and justification	ALARP Decision Context: Type A Impacts from planned drilling and P&A discharges are well understood and there is nothing new or unusual. Good practice is defined, and uncertainty is minimal. There are no conflicts with company values, no partner interests, and no significant media interests. As the impact consequence is rated as Minor (1) applying good industry practice (as defined in Section 2.7.2.1) is sufficient to manage the impact to ALARP.
Adopted Control Measures	**Description**
CM01: Marine Assurance Process	Rig and vessels will have Preventative Maintenance System that provides a status on the maintenance of equipment and detailed manufacturer's specification on maintenance procedures for: • Equipment detail as a control in this EP will be inspected to ensure effective operation. • Power generation and propulsion systems on the MODU and vessels will be inspected to ensure efficient operation.
CM05: Seabed Survey	A seabed survey will be undertaken prior to the commencement of the Drilling Program to allow for the consideration of the following in the final selection of well locations and drill rig position and location of mooring equipment: • Seabed habitat type to avoid areas of high relief outcrops, reefs or sponge beds that are likely to be associated with site-attached fish. • Shipwrecks and other maritime archaeological heritage. • Submerged cultural heritage and submerged landscapes.. Data from seabed surveys will be provided to an appropriately qualified underwater archaeologist to identify submerged cultural heritage and landscapes and provide an Underwater Cultural Heritage Report to Beach. Beach will assess the report and identify any areas of overlap and potential risks from proposed activities defined in this EP. Beach will share relevant information and assessments from the Seabed Survey, relevant to submerged cultural heritage and landscapes with relevant First Nations groups as identified in Section 6.6.2. Should any submerged cultural heritage be identified, Beach will report the findings in accordance with the *Underwater Cultural Heritage Act* 2018, and will consult with the relevant First Nations groups (as identified in Section 6.6.2) and determine any exclusion areas or further cultural heritage management procedures that may be required. Should any potential submerged cultural landscapes be identified, in consultation with the qualified underwater archaeologist, Beach will assess the report and identify any areas of overlap and potential risks from proposed activities defined in this EP. Beach will also consult with relevant First Nations groups (see 6.6.2) and determine any exclusion areas or further cultural heritage management procedures that may be required. The findings of Munkura v Santos will be applied in the assessment and consultation processes set out above.
CM06: Drill Rig Mooring Plan CM09: Drilling Program	A seabed survey will be undertaken prior to the commencement of the Drilling Program to allow for the consideration of the following in the

	final selection of well locations, drill rig position and location of mooring equipment: • Seabed habitat type to avoid areas of high relief outcrops, reefs or sponge beds that are likely to be associated with site-attached fish. • Shipwrecks and other maritime archaeological heritage. • Submerged cultural heritage.
CM09: Drilling Program	Only water based drilling fluids will be used for the Drilling Program. Solids control equipment consisting of shale shakers and centrifuges will be used once the riser is in place to reduce the concentration of drilling fluid on cuttings prior to discharge, thereby reducing the total volume of drilling fluid discharged to sea. The shale shakers will be fitted with screens that meet American Petroleum Institute (API) standards for particle size cut points. Centrifuges will be used as required to remove additional finer drilled cuttings/solids that are too small for the shale shakers. Barite will have low concentrations of mercury and cadmium (less than 1 mg/kg and 3 mg/kg respectively). Residual water based drill fluids, brine, completion fluids, cement, barite and bentonite will be used for subsequent wells, and provided to the next operator at the end of the rig consortium campaign, or if these options are not feasible, discharged to the marine environment. Inventories will be minimised towards the end of the rig consortium sequence to ensure minimum required inventory (considering minimum contingencies and well control requirement) for the last well in the sequence to reduce discharges to as low as practically possible. This control addresses adherence to international best practice standards: • Environmental, Health, and Safety Guidelines Offshore Oil and Gas Development (IFC 2015) – Drilling Fluids and Drilled Cuttings Guidance Number 53 requires consideration of discharges of drilling fluids including chemical content. • Environmental, Health, and Safety Guidelines Offshore Oil and Gas Development (IFC 2015) – Drilling Fluids and Drilled Cuttings Guidance Number 59 requires that environmental hazards related to residual chemical additives on discharged cuttings are reduced through the drilling fluid selection.
CM12: Chemical Management Procedure	All chemicals that will or could be discharged to the marine environment must be assessed prior to use to ensure the lowest toxicity, most biodegradable and least accumulative chemicals are selected which meet the technical requirements of the application as per the Beach Chemical Management Procedure described in Section 8.5.3. This control addresses adherence to: Environmental, Health, and Safety Guidelines Offshore Oil and Gas Development (IFC 2015) – Drilling Fluids and Drilled Cuttings Guidance Number 59 that requires operators to carefully select drilling fluid additives, considering their concentration, toxicity, bioavailability, and bioaccumulation potential.

Additional Controls Assessed		
Control	**Cost/Benefit Analysis**	**Control Implemented**
Skip and ship drilling/cement waste to shore	Eliminates discharges to sea therefore reducing potential impacts to the marine environment. Evaluation of trade-offs indicates that the implementation of skip and ship – i.e. additional storage space for containment of waste, increased transfers to vessels/shore base, increased fuel usage, increased crane movements and increased HSE risks – would introduce significant cost and effort that is grossly disproportionate to the benefit.	No
Riserless Mud Recovery System	Riserless Mud Recovery System recirculates drill cuttings and fluids from the top-hole of the well eliminating discharge to the seabed (when applied in conjunction with containment and transfer to shore). Riserless Mud Recovery System may also be implemented where shallow hazards are anticipated. Given that low to no toxicity water-based fluids will be used for riserless drilling sections and shallow hazards are not anticipated, there is limited technical benefit in utilising this system and it would introduce significant cost and effort that is grossly disproportionate to the benefit.	No
Additional solids control equipment	Additional equipment such as thermal desorption and thermomechanical cleaning are used to reduce the volume of oil on cuttings when synthetic based drill fluids are used. As water-based drill fluids are to be used for the Drilling Program there is no environmental benefit of using this equipment.	No
Not discharging remaining bulk barite, bentonite, or cement at the end of campaign, blowback into vessel.	Bulk barite, bentonite or cement that remains in rig tanks is typically required to be removed by rig contractor prior to end of contract. Bulk materials 'pumped back' or 'blown back' into trucks has high risk of injury and explosive force due to the pressure. Many suppliers do not permit blowback operations into their trucks due to major safety concerns. Discharge of bulk materials, if not taken by the next operator at the end of the rig consortium campaign, will be discharged as a campaign one off activity. Inventory will be minimised as per CM09.	No

7.8.10 Demonstration that Impacts will be of an Acceptable Level

Consequence rating	Minor (1)
Likelihood of occurrence	NA
Residual risk	NA
Acceptability assessment	
To meet the principles of ESD	Planned drilling and P&A discharges were assessed as having a Minor (1) consequence which is not considered as having the potential to result in serious or irreversible environmental damage. There is high confidence in the predicted level of impact as Beach has significant experience operating in the Otway and Bass based on their existing offshore developments and associated activities including the Beach Otway Drilling Campaign in 2021/2022.

Internal context	The proposed management of the impact is aligned with the Beach Environment Policy. Activities will be undertaken in accordance with the Implementation Strategy (Section 8).
External context	There have been no stakeholder objections or claims regarding drilling and P&A discharges.
Other requirements	Drilling and P&A discharges will be managed in accordance with legislative requirements. The Minamata Convention covers all aspects of the life cycle of mercury, controlling and reducing mercury across a range of products, processes, and industries. Australia ratified the Minamata Convention on 7 December 2021. Countries that have ratified the Convention are bound by international law to put controls in place to manage emissions, releases and disposal of mercury and mercury compounds. At present there are no specific guidelines regarding acceptable levels of mercury waste in drilling fluids. The discharge of drill fluids and cuttings to the marine environment is considered to be standard practice in industry. For the Drill Program barite mercury and cadmium concentrations will be managed in accordance with IFC EHS Guidelines – Offshore Oil and Gas Development (2015) that represent good international industry practice. As per the impact assessment drilling marine discharges will not: • Impact on the recovery of marine turtles as per the Recovery Plan for Marine Turtles in Australia (CoA 2017b). • Impact the recovery of the white shark as per the Recovery Plan for the White Shark (*Carcharodon carcharias*) (DSEWPaC 2013a). • Impact the recovery of the Australian sea lion as per the Recovery Plan for the Australian Sea Lion (DSEWPaC 2013b). • Impact the long-term survival and recovery of albatross and giant petrel populations breeding and foraging as per the National Recovery Plan for Albatrosses and Petrels 2022 (CoA 2022a). • Impact the conservation of listed seabirds in Australia and beyond as per the Wildlife Conservation Plan for Seabirds (CoA 2020a). • Impact the recovery of the blue whale as per the Conservation Management Plan for the Blue Whale (CoA 2015). • Impact the recovery of the southern right whale as per the Conservation Management Plan for the Southern Right Whale (DSEWPaC 2012a) or Draft National Recovery Plan for the Southern Right Whale (DCCEEW 2022a). • Impact sei or fin whales, covered by Conservation Advice for Fin Whales (TSSC 2015f) and Conservation Advice for Sei Whales (TSSC 2015g). • Impact the Zeehan AMP values as per the South-east Commonwealth Marine Reserves Network Management Plan (2013-2023) (DNP 2013).
Monitoring and reporting	Monitoring and reporting of drilling discharges will be undertaken as detailed in Section 8.3.8.
Acceptability outcome	**Acceptable**

7.9 Establishment of Invasive Marine Species

7.9.1 Source of Aspect

The introduction of invasive marine species (IMS) could occur during rig and vessel operations as a result of:

- Discharge of ballast water from rig or vessels containing foreign species.
- Translocation of species through biofouling of:
  - Rig pontoons and anchors.
  - Vessel hull and niches such as sea chests, bilges, and strainers.

Successful IMS invasion requires the following three steps:

- Colonisation and establishment of the marine pest on a vector (e.g., vessel 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., Operational 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.

7.9.2 Extent and Duration of Aspect

Extent	Operational Areas Introduction of IMS could occur within the Operational Areas when the rig and vessels are present.
Duration	560 days Introduction of IMS during the Drilling Program.

7.9.3 Predicted Environmental Impact

IMS may become established where conditions are suitable, and these species may have impacts on local ecological and economic values. However, establishment of IMS is mostly likely to occur in shallow waters in areas where large numbers of vessels are present and are stationary for an extended period.

If the risk of establishment of IMS is realised this could result in a change in ecosystem dynamics which may include a reduction in native marine species diversity and abundance, displacement of native marine species, socio-economic impacts on commercial fisheries, and changes to conservation values of protected areas and First Nations cultural values and sensitivities.

7.9.4 EMBA

The risk of introduction of IMS could occur within the Operational Areas. Receptors potentially directly affected marine invertebrates and benthic habitats, within indirect affect to commercial fisheries, conservation values of protected areas and First Nations cultural values and sensitivities.

7.9.5 Predicted Level of Risk

Successful translocation and establishment of IMS into a new environment depends on several factors. Water currents, upwellings, habitat type, water depth, wave exposure, water temperature, salinity and the distance from the coast are all natural dispersion barriers which have been shown to limit the successful establishment and reproduction of IMS populations (Forrest et al. 2009).

More than 250 marine species have been introduced into Australian waters from around the world. Many of these species remain inconspicuous, but a few have established large populations and become pests. It is estimated that one in each six to 10 introduced marine species will become a pest (DCCEEW 2024l). Typical habitats of the species currently listed on the Marine Pest website (DAFF 2024) are shallow marine water areas for example Portland and Port Phillip Bay.

The risk of an IMS being able to successfully establish itself will depend on depth, distance from the coast, water movement and latitude. 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 risk of an IMS being able to successfully establish itself will depend on depth, distance from the coast, water movement and latitude. The probability of successful IMS settlement and recruitment will decrease in well mixed, deep ocean waters away from coastal habitats (Geiling 2014) such as the Operational Areas. In addition, an IMS travelling through several latitudes will also have to survive significant temperature and salinity changes.

In the event of an IMS being introduced to the marine environment, successful colonisation is dependent upon suitable substrate availability. The Operational Areas do not present a location conducive to marine pest survival as they are primarily in water depths greater than 50 m and in an open-water environment.

The probability of successful IMS settlement and recruitment decreases in well-mixed, deep ocean waters away from coastal habitats. IMS colonisation also requires a suitable habitat in which to establish itself, such as rocky and hard substrates or subsea infrastructure. The Australian Government Bureau of Resource Sciences (BRS) established that the relative risk of an IMS becoming established around Australia decreases with distance from the coast. Modelling conducted by BRS (BRS 2007) estimates: 33% chance of colonisation at 3 nm, 8% chance at 12 nm, and 2% chance at 24 nm.

The Operational Areas do not present a benthic habitat that is typically favourable to IMS survival. The Bass Operational Area is approximately 23 nm from the nearest land and the at the closest point the Otway Operational Area is 11 nm from the Victorian coast.

The introduction of IMS has the potential to result in changes to the functions, interest, or activities of other users such as tradition, recreational and 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.

Given the impact of a successful IMS colonisation has the ability to significantly impact local species and thus change local epifauna and infauna populations permanently, which could also impact State and Commonwealth fisheries, the consequences have been evaluated as Serious. However, it is considered such an event is Remote due to the implementation of the Beach Domestic IMS Biofouling Risk Assessment Process and unfavourable conditions within the Operational Areas required for colonisation. In addition, there has been no IMS introductions from Beach's previous Otway Drilling Campaign and ongoing activities in the area.

7.9.6 Demonstration that Risk will be ALARP

ALARP decision context and justification	ALARP Decision Context: Type B The risk of IMS is well understood and there is nothing new or unusual. On the basis of the impact assessment completed, Beach considers the control measures identified are appropriate to manage the risks associated with the risk of introduction and establishment of IMS.
Adopted Control Measures	**Source of good practice control measures**
CM19: Beach Domestic IMS Biofouling Risk Assessment Process	Drill rig and support vessels mobilised from domestic waters to undertake activities within the Operational Areas will complete the Beach Domestic IMS Biofouling Risk Assessment Process as detailed in the Beach Introduced Marine Species Management Plan (S400AH719916) prior to the initial mobilisation into the Operational Areas. The Beach Domestic IMS Biofouling Risk Assessment Process: • Validates compliance with regulatory requirements (Commonwealth and State) in relation to biosecurity prior to engaging in activities within the Operational Areas. • Identifies the potential IMS risk profile of vessels and submersible equipment prior to deployment within the Operational Areas. • Identifies potentially deficiency of IMS controls prior to entering the Operational Areas. • Identifies additional controls to manage IMS risk. • Prevents the translocation and potential establishment of IMS into non-affected environments (either to or from the Operational Areas).

Additional Control Measures Assessed

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

7.9.7 Demonstration that Risks will be of an Acceptable Level

Consequence rating	Serious (3)
Likelihood of occurrence	Remote (1)
Residual risk	Low
Acceptability assessment	
To meet the principles of ESD	The risk of the establishment of IMS was assessed as Low and the consequence was assessed as Serious (3) which has the potential to result in serious or irreversible environmental damage. However, this is assessed as acceptable based on: • There is little uncertainty associated with this aspect as the activities are well known, the cause pathways are well known, and activities are well regulated and managed. • The implementation of controls make it a remote likelihood that IMS will be introduced from the activity resulting in a low residual risk. • It is not considered that there is significant scientific uncertainty associated with this aspect. Therefore, the precautionary principle has not been applied. There is high confidence in the predicted level of risk as Beach has significant experience operating in the Otway and Bass based on their existing offshore developments and associated activities including the Beach Otway Drilling Campaign in 2021/2022.
Internal context	The proposed management of the impact is aligned with the Beach Environment Policy. Activities will be undertaken in accordance with the Implementation Strategy (Section 8).
External context	There have been no stakeholder objections or claims regarding the introduction or establishment of IMS in relation to the activity.
Other requirements	The impact will be managed in accordance with legislation requirements and guidance, including: • Offshore Installations - Biosecurity Guide (DAFF 2023a) • National Biofouling Management Guidance for the Petroleum Production and Exploration Industry (MPSC 2018) • Australian Ballast Water Management Requirements (CoA 2020) and Australian Biofouling Management Requirements (DAWE 2022) gives effect to the Biosecurity Act 2015 and associated regulations; International Convention for the Control and Management of Ships' Ballast Water and Sediments (Ballast Water Convention) and relevant guidelines or procedures adopted by the Marine Environment Protection Committee of the International Maritime Organization (IMO) • IMO Biofouling Guidelines There are no EPBC management plans (management plans, recovery plans or conservation advice) which relate specifically to IMS introduction and establishment as a threat. The South-east Commonwealth Marine Reserves Network Management Plan 2013-23 (DNP 2013) identifies IMS, and diseases translocated by shipping, fishing vessels and other vessels as a threat to the AMP network. The implementation of the controls make it remote that IMS will be introduced from the Drilling Program and spread to AMPs.
Monitoring and reporting	Impacts as a result of the introduction of IMS will be reported in accordance with the Section 8.3.1.

Acceptability outcome	Acceptable

7.10 Fauna Interaction

7.10.1 Source of Aspect

The presence of moving rig, vessels and helicopter may result in unplanned interactions with marine fauna, such as vessel and aircraft collisions.

Collision with marine fauna may occur as a result of:

- Rig transit, towing and positioning.
- Vessel operations.
- Helicopter operations.

7.10.2 Extent and Duration of Aspect

Extent	Operational Areas Interactions with marine fauna could occur within the Operational Area when the rig, vessels and helicopter are present.
Duration	560 days Unplanned Interactions with marine fauna may occur during the Drilling Program.

7.10.3 Predicted Environmental Imapcts

Interaction with marine fauna can result in environmental impacts including:

- Injury / mortality.
- Change in behaviour.

7.10.4 EMBA

Predicted impacts resulting from rig, vessel and/or helicopters movements will be limited to the Operational Areas.

Ecological receptors potentially at risk from rig, vessel and/or helicopters movements are:

- Sharks, seals, seabird, turtles, and marine mammals.

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

- Conservation values and sensitivities
- Cultural values and sensitivities

Receptors which are the most susceptible to vessel collisions are typically characterised as large or slow-moving marine fauna that commonly dwell near the surface and frequent areas associated with a high level of vessel traffic. Species which have either a limited, threatened or geographically concentrated population are also a concern. Cetaceans and marine turtles have been identified as vulnerable to vessel collisions within the National Strategy for Mitigating Vessel Strike of Marine Megafauna (DoEE 2017). However, other species such as pinnipeds and sharks can also be at risk of a vessel collision. Birds moving through the Operational Areas may be at risk of interaction with rig infrastructure, such as the derrick, or a collision with helicopter when in use.

7.10.5 Predicted Level of Risk

7.10.5.1 Ecological Receptors

The National Strategy for Reducing Vessel Strike on Cetaceans and other Marine Megafauna identifies that the consequence of a vessel strike can range from low impact to extreme depending on the circumstance (DoEE 2017). Injuries sustained from vessel collisions are not always lethal. However, many incidents which may not result in direct mortality often result in injuries to the back of the animal and the dorsal fin, resulting in a loss of blood, possible infection, and reduced swimming efficiency, eventually causing an overall reduction in fitness of the individual (van Waerebeek et al. 2006). Jensen and Silber (2003) analysed 292 reported incidents with large cetaceans and identified only seven individuals which appeared to have no signs of injury (Jensen and Silber 2004).

Studies have found that the overall impact and potential fauna mortality in the event of a vessel strike is directly linked to vessel speed, with studies demonstrating an escalation in speed to cause an increase in injury severity to large cetaceans (Vanderlaan and Taggart 2007). Slower moving vessels provide greater opportunity for both fauna and vessel to avoid collision. The most severe injuries have been identified to be caused by vessels travelling faster than 14 knots (Jensen and Silber 2004, Laist et al. 2001). Furthermore, large vessels (>80 m) with modern hull shapes are also correlated with increased injury severity (Laist et al. 2001). Vessel speed may also result in animals, including large whales, being drawn laterally towards the hull of the vessel (Silber et al. 2010).

The behavioural traits of certain species can also make them more vulnerable to vessel and aircraft strike such as slow swimming or flying speed, and the habituation and general lack of awareness of vessel or aircraft noise and the associated danger posed. Some species spend more time at the surface when resting, foraging, or mating making them more vulnerable to vessel strike (DoEE 2017).

White Shark

The Operational Areas intersect with the distribution BIA for the white shark which is listed as vulnerable. There is limited data regarding strikes to shark species such as white sharks, likely due to lack of collisions being noticed and lack of reporting (Peel et al. 2016).

The extent of the area of risk of interaction with the white shark is within the Operational Area and the risk could occur while the Drilling Program is undertaken. The consequence is assessed as Minor (1) and likelihood as highly unlikely, and the risk is of an acceptable level based on:

- Collisions are not listed as a threat within the Recovery Plan for the White Shark (DSEWPaC 2013a).
- A vessel strike to a shark is considered highly unlikely as it has not happened to date in 15 years of Beach's activities within the Otway and Bass.
- Rig and vessel movements in the Operational Areas will be low (≤ 10 knots as per CM02: Vessel and Rig Operating Procedures) which affords protection to fauna as the most severe injuries have been identified to be caused by vessels travelling faster than 14 knots (Jensen and Silber 2004, Laist et al. 2001).

- A marine mammal observer will be present on each support vessel to detect the presence of marine fauna and provide instruction to avoid collisions where feasible as per CM08: Whale Management Procedure.
- The consequence of a strike on a single animal is not predicted to affect the overall population or recovery of the white shark.

Marine Reptiles

The Operational Area PMST Report (Appendix E. 1) identified three marine turtle species are likely or may occur within the Operational Areas though no BIAs or habitat critical to the survival of the species were identified. No biologically important behaviours were identified.

Vessel strikes have been identified as a threat to marine turtles within the Recovery Plan for Marine Turtles in Australia (CoA 2017b). However, there is a limited amount of available data regarding vessel strike to fauna such as marine turtles; potentially due to a lack of vessel collisions being noticed, and a lack of reporting (Peel et al. 2016).

Marine turtles are most vulnerable to vessel collisions when they are either resting or returning to the surface to breathe. Studies have demonstrated that marine turtles spend limited time at the sea surface, approximately 3% to 6%, with dive times recorded from 15 to 60 minutes (Milton and Lutz 2003). A study on green turtles by Hazel (2009) found that individuals only exposed the dorsal-anterior part of the head above the water surface, and for never longer than two seconds.

Turtles can detect sound in water and will generally move from anthropogenic noise-generating sources, such as vessels, within their detection range (Popper et al. 2014). Studies have shown that the ability of turtles to respond and avoid vessels greatly depends on the speed of the vessel. In general, marine turtles are not able to avoid vessels when they are travelling faster than 4 km/h (2.2 knots) (Hazel 2009). The propagation characteristics of sound within the marine environment make it difficult for marine turtles to identify the direction of the source of vessel noise. Furthermore, individual noise from a vessel may be masked within areas of high vessel and other noise -generating activities use, which is likely to limit the ability of marine turtles to identify and avoid approaching vessels (Hazel 2009).

The extent of the area of risk of interaction with marine turtles is within the Operational Area and the risk could occur while the Drilling Program is undertaken. The consequence is assessed as Minor (1) and likelihood as highly unlikely, and the risk is of an acceptable level based on:

- The Recovery Plan for Marine Turtles in Australia (CoA 2017b) identifies vessel disturbance as a key threat but details that although the outcome can be fatal for individual turtles, boat strike (as a standalone threat) has not been shown to cause stock level declines.
- Three marine turtle species may occur within the Operational Areas, though no BIAs or habitat critical to the survival of the species were identified, and the presence of turtle species is expected to be of a transitory nature only.
- A vessel strike to a turtle is considered highly unlikely as it has not happened to date in 15 years of Beach’s activities within the Otway and Bass.

- A marine mammal observer will be present on each support vessel to detect the presence of marine fauna and provide instruction to avoid collisions where feasible as per CM08: Whale Management Procedure.
- The consequence of a strike on a single animal is not predicted to affect the overall population or recovery of marine turtles.

Birds

The PMST Report for the Operational Area (Appendix E. 1) identified a number of seabird species that may be present in the Operational Area. Table 7-13 identified those species with biologically important behaviour and/or BIAs within the Operational Area and hence are more likely to be present in larger numbers and less transitory. In addition, Viola (2023) identified the following species that landed on a support vessel for the Beach Otway Drilling Campaign from March until 5 April 2022 and from 29 April until 31 May 2022:

- Australasian Pipit
- Brush bronzewing
- Galah
- Grey fantail
- Nankeen kestrel
- Rock dove
- Satin flycatcher
- Silvereye

No species were recorded as injured and all left the vessel within<24 h after arrival (Viola 2023).

Table 7-13: Birds Species with Biologically Important Behaviour and/or BIAs within the Operational Area

Receptor	Biologically Important Behaviour
Albatross	
Antipodean albatross	Foraging, feeding or related behaviour likely to occur within area
	Foraging BIA
Black-browed albatross	Foraging, feeding or related behaviour likely to occur within area
	Foraging BIA
Buller's albatross, Pacific albatross	Foraging, feeding or related behaviour likely to occur within area
	Foraging BIA
Campbell albatross, Campbell black-browed albatross	Foraging, feeding or related behaviour likely to occur within area
	Foraging BIA
Gibson's albatross	Foraging, feeding or related behaviour likely to occur within area

Receptor	Biologically Important Behaviour
Indian yellow-nosed albatross	Foraging BIA
Northern Buller's albatross	Foraging, feeding or related behaviour likely to occur within area
Northern royal albatross	Foraging, feeding or related behaviour likely to occur within area
Salvin's albatross	Foraging, feeding or related behaviour likely to occur within area
Shy albatross	Foraging, feeding or related behaviour likely to occur within area
	Foraging BIA
Southern royal albatross	Foraging, feeding or related behaviour likely to occur within area
Wandering albatross	Foraging, feeding or related behaviour likely to occur within area
	Foraging BIA
White-capped albatross	Foraging, feeding or related behaviour known to occur within area
Petrels	
Common diving-petrel	Foraging BIA
Northern giant petrel	Foraging, feeding or related behaviour likely to occur within area
Southern giant-petrel	Foraging, feeding or related behaviour likely to occur within area
White-faced storm-petrel	Foraging BIA
Shearwaters	
Flesh footed shearwater	Foraging, feeding or related behaviour likely to occur within area
Short-tailed shearwater	Foraging BIA
Wedge-tailed shearwater	Foraging BIA
Other	
Australian fairy tern	Foraging, feeding or related behaviour likely to occur within area
White-fronted tern	Foraging, feeding or related behaviour likely to occur within area
Orange-bellied parrot	Migration route likely to occur within area

Helicopter, rig and vessels within the Operational Areas have the potential to cause injury / mortality and a change in behaviour to seabirds and migratory birds, specifically species which fly through the Operational Areas, or spend extended periods of time on the water surface in high vessel traffic areas. The Wildlife Conservation Plan for Seabirds (CoA 2020a) recognises that seabirds are known to aggregate around oil and gas platforms in above average numbers due to night lighting, flaring, food concentrations and other visual cues (Wiese et al. 2001). While most interactions are harmless, some can be detrimental and may cause injury or death e.g. from collision or indirectly from depleted body reserves (Ronconi et al. 2015). Bird mortality has been documented due to collision with structures, and interactions with flaring activities (Wiese et al. 2021).

The risk of bird collision with helicopter operations is a safety consideration for flights to and from the rig. The consequence of a helicopter bird strike varies and is influenced by the individual’s seasonal distribution, body mass, flocking and flight behaviour, while the probability of a strike is related to the abundances of different bird species on or near the rig.

The extent of the area of risk of interaction with birds is within the Operational Area and the risk could occur while the Drilling Program is undertaken. The consequence is assessed as Minor (1) and likelihood as possible, and the risk is of an acceptable level based on:

- The National Recovery Plan for Albatrosses and Petrels (2022) (CoA 2022a) classifies marine infrastructure interactions including those associated with artificial light as having no risk category priority and affecting 'Nil' species in Australian jurisdiction.
- The National Recovery Plan for the Orange-bellied Parrot (DELWP 2016) identified as Critically Endangered, lists illuminated structures, and illuminated boats as potential barriers to migration and movement as a main threat (See Section 7.2 for the impacts of light emissions). As detail in the assessment of light impacts (Section 7.2) a Light Management Plan (CM07) will be implemented to minimise light impacts which will also minimise the likelihood of bird species such as the Orange-bellied parrot potentially being attracted to the rig or vessel where a collision could occur. In 15 years of Beach's activities within the Otway and Bass an Orange-bellied parrot has not been reported on a vessel, rig, or platform.
- Albatross, petrels, shearwaters, and terns) were identified to have foraging BIAs or foraging behaviour likely within the Operational Areas. As detail in the assessment of light impacts (Section 7.2) a Light Management Plan (CM07) will be implemented to minimise light impacts which will also minimise the likelihood of bird species such as albatross, shearwaters, petrels, and terns potentially being attracted to the rig or vessel where a collision could occur. In 15 years of Beach's activities within the Otway and Bass an albatross, shearwater or petrel has not been reported on a vessel, rig or platform.
- The consequence of a strike on a single bird is not predicted to affect the overall population.

Marine Mammals

The Operational Area PMST Report (Appendix E. 1) 27 cetacean species that may or are likely to occur within the Operational Area and two fur-seal species that may occur within the Operational Area. Table 7-14 details marine mammals that have biologically important areas and/or biologically important behaviours within the Operational Area.

Table 7-14: Marine Mammals with Biologically Important Behaviours within the Operational Area

Species	Biologically Important Behaviour
Blue whale	Foraging, feeding or related behaviour known to occur within area.
	Otway - foraging (annual high use area) and known foraging area. Bass – foraging BIA

Fin whale	Foraging, feeding or related behaviour likely to occur within area.
	No BIAs
Pygmy right whale	Foraging, feeding or related behaviour may to occur within area.
	No BIAs
Sei whale	Foraging, feeding or related behaviour likely to occur within area.
	No BIAs
Southern right whale	Species or species habitat known to occur within area
	Migration BIA

Vessel collisions have the potential to result in injury/mortality to marine mammals, such as cetaceans and pinnipeds. Cetaceans and pinnipeds are naturally inquisitive species which are often attracted to offshore vessels, for example dolphins are commonly reported to 'bow ride'. The reaction of cetaceans to an approaching vessel is variable and unpredictable. Often species remain motionless whilst in the vicinity of a vessel, whereas others have been known to be curious, often approaching ships which have stopped or are slow moving. In general they do not approach, and sometimes actively avoid, faster moving vessels (Richardson et al. 1995). For example, humpback whales have been shown to frequently change course to avoid a vessel after detection (WDCS 2006).

Vessel collisions with cetaceans occur more frequently in areas where high vessel traffic and cetacean habitat coincide (WDCS 2006). Peel et al. (2016) analysed the number of vessel collisions with cetaceans within Australian waters, stating at least 109 vessel collisions have been reported since 1840. However, the paper emphasises a lack of reporting as an issue in confirming exact numbers. Recorded instances of cetacean deaths due to vessel strikes indicate that they are much more likely to be associated with container ships and fast ferries (WDCS 2006). When vessels are stationary or slow moving, the risk of collision with cetaceans is extremely low, as the vessel's size and underwater noise 'footprint' will alert cetaceans to its presence and thus elicit avoidance.

The extent of the area of risk of interaction with marine mammals is within the Operational Area and the risk could occur while the Drilling Program is undertaken. The consequence is assessed as Minor (1) and likelihood as highly unlikely, and the risk is of an acceptable level based on:

- Minimising vessel collision is ranked as a high priority action within the Conservation Management Plans for the blue whale and southern right whale, and within the Conservation Advice for fin and sei whales.
- The foraging BIA for the pygmy blue whale intersects with the Operational Areas. The Conservation Management Plan for the Blue Whale (CoA 2015) details that vessel collisions will impede the recovery of blue whale populations if a sufficient number of individuals in the population lose reproductive fitness or are killed. A vessel strike to a whale is considered highly unlikely as it has not happened to date in 15 years of Beach's activities within the Otway and Bass. It is further reduced by there being a marine mammal observer on each support vessel to detect the presence of marine fauna and provide instruction to avoid collisions where feasible (CM08: Whale Management Procedure).
- The Operational Areas are within a migration BIA of the southern right whale. The Conservation Management Plan for the Southern Right Whale (DSEWPaC 2012a) and the Draft National

Recovery Plan for the Southern Right Whale (DCCEEW 2022a) lists vessel strike collisions as a high-risk threat. The plan does not identify any actions relevant to the Drilling Program but does note that reducing ship strike mortality can be most easily done either by reducing vessel speed or by separating vessels and whales. As both these controls will be implemented, with the rig and vessels being either stationary or operating at slow speeds (≤ 10 knots as per CM02: Vessel and Rig Operating Procedures) and vessels when transiting maintaining a distance of 300 m from a whale (CM08: Whale Management Procedure), reducing the likelihood of a strike. A marine mammal observer will be present on each support vessel to detect the presence of marine fauna and provide instruction to avoid collisions where feasible (CM08: Whale Management Procedure).

- The Listing Advice for the Humpback Whale (DAWE 2022a) details that the species is no longer listed as Vulnerable and identifies vessel strike as a current impact not threatening or preventing population growth.
- The Recovery Plan for the Australian Sea-lion (DSEWPaC 2013c) identifies the need to investigate and mitigate other potential threats including vessel strike, to ensure that anthropogenic activities do not hinder the recovery of the species. A marine mammal observer will be present on each support vessel to detect the presence of marine fauna and provide instruction to avoid collisions where feasible (CM08: Whale Management Procedure).
- Peel et al. (2016) reviewed vessel strike data (2000-2015) for marine species in Australian waters and identified that there were no vessel interaction reports during the period for Australia sea-lions, Australian or New Zealand fur- seals. There have been incidents of seals being injured by boat propellers, however all indications are rather than ‘boat strike’ these can be attributed to the seal interacting/playing with a boat, with a number of experts indicating the incidence of boat strike for seals is very low.
- A vessel strike to a marine mammal is considered highly unlikely as it has not happened to date in 15 years of Beach’s activities within the Otway and Bass.
- Rig and vessel movements in the Operational Areas will be low (≤ 10 knots as per CM02: Vessel and Rig Operating Procedures) which affords protection to fauna as the most severe injuries have been identified to be caused by vessels travelling faster than 14 knots (Jensen and Silber 2004, Laist et al. 2001).
- A marine mammal observer will be present on each support vessel to detect the presence of marine fauna and provide instruction to avoid collisions where feasible as per CM08: Whale Management Procedure.
- Given the expected low likelihood of vessel strike, and if it did occur it will not affect the long-term recovery of marine mammal species in accordance with relevant conservation plans and advice.

7.10.5.2 Conservation Values and Sensitivities

The northern T/30P Operational Area overlaps the West Tasmania Canyons KEF in water depths >150 m. The values associated with the West Tasmania Canyon KEF are fish associated with sponges near canyon heads described in Section 6.2.15.6. As fish are not known to be impacted by vessel collision impacts to the West Tasmania Canyons KEF are not predicted.

7.10.5.3 Cultural Values and Sensitivities

From Section 6.6.3, the following cultural values and sensitivities have been identified as potentially at risk from rig, vessel and/or helicopters movements and the section where potential risks have been assessed:

- Birds – see Section 7.10.5.1
- Marine mammals: dolphins, whales, seal - see Section 7.10.5.1

Noting that eels and fish are not identified at risk from rig or vessel movements.

A summary of the assessment for birds and marine mammals is provided below.

- A Light Management Plan (CM07) will be implemented to minimise light impacts which will also minimise the likelihood of bird species such as orange-bellied parrot, albatross, shearwaters, petrels, and terns potentially being attracted to the rig or vessel where a collision could occur. In 15 years of Beach's activities within the Otway and Bass an orange-bellied parrot, albatross, shearwater, or petrel has not been reported on a vessel, rig or platform.
- The consequence of a helicopter strike on a single bird is not predicted to affect the overall population.
- A vessel strike to marine mammals is considered highly unlikely as it has not happened to date in 15 years of Beach's activities within the Otway and Bass.
- Rig and vessel movements in the Operational Areas will be low (≤ 10 knots as per CM02: Vessel and Rig Operating Procedures) which affords protection to fauna as the most severe injuries have been identified to be caused by vessels travelling faster than 14 knots (Jensen and Silber 2004, Laist et al. 2001).
- A marine mammal observer will be present on each support vessel to detect the presence of marine fauna and provide instruction to avoid collisions where feasible as per CM08: Whale Management Procedure.
- Given the expected low likelihood of vessel strike, and if it did occur it will not affect the long-term recovery of marine mammal species in accordance with relevant conservation plans and advice.

7.10.6 Demonstration that Risks will be ALARP

ALARP decision context and justification	ALARP Decision Context: Type A The risk of fauna interaction is well understood and there is nothing new or unusual. On the basis of the impact assessment completed, Beach considers the control measures identified are appropriate to manage the risk associated with fauna interaction.
Adopted Control Measures	**Description**
CM01: Marine Assurance Process	The rig and vessels will meet relevant maritime laws and includes pre-commencement rig and vessel inspections of class certification requirements under the Navigation Act 2012 and associated Marine Orders, including but not limited to MO 30 - Prevention of Collisions

	which details the requirements for navigation equipment, watchkeeping, radar and lighting requirements. Marine Order 57: Helicopter Operations ensures the obstacles on the helideck including birds are clear before approach and landing.
CM02: Vessel and Rig Operating Procedures	Vessel speeds within the Operational Area will be restricted to ≤ 10 knots.
CM07: Light Management Plan	Beach will contract a suitably qualified specialist to develop and support the implementation of a Light Management Plan as per the National Light Pollution Guidelines for Wildlife (CoA 2023). Once safety navigational lighting requirements are met (as per vessel class), the Light Management Plan will detail additional mitigations to ensure artificial lighting is reduced to minimum levels based on the information in the Seabird Light Mitigation Toolbox (CoA 2023) wherever practicable, whilst maintaining safe working conditions and navigation. Specifically, outwards facing lighting will be reduced to minimum levels, wherever practicable.
CM08: Whale Management Procedure	The Whale Management Procedure (Appendix H) outlines specific measures to minimise anthropogenic noise threats to relevant species, including the implementation of safe operating distances between vessels and whales, pre-activity surveys for specific activities, night-time and low visibility controls and establishment of safe points for operational activities in accordance with the Safety Case and Well Integrity requirements.

7.10.7 Demonstration that Risks will be of an Acceptable Level

Consequence rating	Minor (1)
Likelihood of occurrence	Highly Unlikely (B)
Residual risk	Low
Acceptability assessment	
To meet the principles of ESD	The risk of fauna interaction was assessed as Low to Medium, and the consequence was assessed as Minor (1) which is not considered as having the potential to result in serious or irreversible environmental damage. There is high confidence in the predicted level of risk as Beach has significant experience operating in the Otway and Bass based on their existing offshore developments and associated activities including the Beach Otway Drilling Campaign in 2021/2022.
Internal context	The proposed management of the risk is aligned with the Beach Environment Policy. Activities will be undertaken in accordance with the Implementation Strategy (Section 8).
External context	There have been no stakeholder objections or claims regarding fauna interaction.
Other requirements	Fauna interactions will be managed in accordance with legislative requirements. EPBC Regulations 2000 – Part 8 Division 8.1 interacting with cetaceans requirements are implemented as per CM08: Whale Management Procedure.

	As per the impact assessment, rig, vessel, and helicopters movements will not:
	• Impact the recovery of the white shark as per the Recovery Plan for the White Shark (*Carcharodon carcharias*) (DSEWPaC 2013a).
	• Impact on the recovery of marine turtles as per the Recovery Plan for Marine Turtles in Australia (CoA 2017b).
	• Impact the long-term survival and recovery of albatross and petrel populations as per the National Recovery Plan for Albatrosses and Petrels (CoA 2022a).
	• Impact the conservation of listed seabirds as per the Wildlife Conservation Plan for Seabirds (CoA 2020a). Applicable actions associated with the plan have been addressed as per:
	  ◦ Implementing a comprehensive monitoring program of impacts of these offshore platforms should include nature, timing and extent of bird mortality caused by these structures. CM07: Light Management Plan includes recording any injury/deaths of bird species associated with the rig, vessel or helicopters and reporting is detailed in Section 8.3.1.
	• Impact the long-term survival and recovery of the orange-bellied parrot as per the National Recovery Plan for the Orange-bellied Parrot (DELWP 2016).
	• Impact the recovery of the Australian sea lion as per the Recovery Plan for the Australian Sea Lion (DSEWPaC 2013b).
	• Impact the recovery of the blue whale as per the Conservation Management Plan for the Blue Whale (CoA 2015). Actions from the Conservation Management Plan for the Blue Whale (CoA 2015) applicable to the activity to minimise vessel collisions have been addressed as per:
	  ◦ Ensure all vessel strike incidents are reported in the National Ship Strike Database. Vessel collision with protected marine fauna are required to be reported as detailed in Section 8.3.1.
	  ◦ Ensure the risk of vessel strikes on blue whales is considered when assessing actions that increase vessel traffic in areas where blue whales occur and, if required, appropriate mitigation measures are implemented. Section 7.10.5.1 details the impact assessment and mitigation measures (controls) to be implemented to ensure impacts are of an acceptable level and ALARP.
	• Impact the recovery of the southern right whale as per the Conservation Management Plan for the Southern Right Whale (DSEWPaC 2012a) and National Recovery Plan for the Southern Right Whale (DCCEEW 2022a). Actions from the draft National Recovery Plan for the Southern Right Whale (DCCEEW 2022a) applicable to the activity to minimise vessel collisions have been addressed as per:
	  ◦ Assess risk of vessel strike to southern right whales in BIAs. Section 7.10.5.1 details the impact assessment and mitigation measures (controls) to be implemented to ensure impacts are of an acceptable level and ALARP.
	  ◦ Ensure environmental impact assessments and associated plans consider and quantify the risk of vessel strike and associated potential cumulative risks in BIAs. Section 7.10.5.1 details the impact assessment and mitigation measures (controls) to be implemented to ensure impacts are of an acceptable level and

	ALARP. As detailed in the assessment vessel collision to southern right whales have not been recorded from oil and gas activities off Victoria and as only one drill rig and vessels will be present in Otway and Bass for the Drilling Program cumulative impacts are not predicted. ◦ Ensure all vessel strike incidents are reported in the National Ship Strike Database managed through the Australian Marine Mammal Centre, Australian Antarctic Division. Vessel strikes to marine fauna will be reported in the National Ship Strike Database as per Section 8.3.1 • Impact the recovery of sei or fin whales, covered by conservation advice.
Monitoring and reporting	Vessel strikes to protected marine fauna area required to be reported as detailed in Section 8.3.1.
Acceptability outcome	**Acceptable**

7.11 Loss of Materials or Waste

7.11.1 Source of Aspect

Small quantities of hazardous and non-hazardous materials are used during routine vessel and rig operations, and consequently result in waste generation which requires handling and storage on vessels and the rig. Non-hazardous materials could be accidentally dropped or blown overboard due to overfull bins, crane incidents or improper storage or handling. Hazardous waste may be accidentally dropped or lost overboard as a result of leaks, overfilling of tanks or emergency disconnection of hoses. Spill to the marine environment are covered in Section 7.12.

7.11.2 Predicted Environmental Impacts

In the event of a loss of material or waste overboard, injury/mortality to fauna could occur.

7.11.3 EMBA

Loss of material or waste overboard could occur within the Operational Areas potentially impacting:

- Sharks, seabirds, turtles, and marine mammals.

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

- Conservation values and sensitivities
- Cultural values and sensitivities

7.11.4 Predicted Level of Risk

7.11.4.1 Ecological Receptors

The Threat Abatement Plan for the Impacts of Marine Debris on Vertebrate Wildlife of Australia's Coasts and Ocean (CoA 2018) details harmful marine debris impacts on a range of marine life, including protected species of birds, sharks, turtles, and marine mammals. Harmful marine debris refers to all plastics and other types of debris from domestic or international sources that may cause harm to vertebrate marine wildlife. This includes land sourced plastic garbage (e.g. bags, bottles, ropes, fibreglass, piping, insulation, paints, and adhesives), derelict fishing gear from recreational and commercial fishing activities and ship-sourced, solid non-biodegradable floating materials lost or disposed of at sea.

Solids 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.

A distribution BIA for the white shark has been identified within the Operational Area. The Recovery Plan for the White Shark (DSEWPaC 2013a) does not identify waste or marine debris as a threat. White shark presence within the Operational Areas is expected to be transitory in nature.

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 (CoA 2017b) identified marine debris as a threat.

The Operational Area also overlaps foraging BIAs for albatross, petrel, and shearwater species. Marine debris is identified as a threat in the National Recovery Plan for Albatrosses and Petrels 2022 (CoA 2022a).

Twenty-seven cetaceans species (or species habitat) may or likely to occur within the Operational Area. Foraging behaviours were identified for some species (blue, fin, pygmy right and sei whales); no other important behaviours were identified. The Operational Area intersects foraging BIAs for the pygmy blue whale and migration BIA for the southern right whale.

The Conservation Management Plan for the blue whale (CoA 2015) and for the southern right whale (DSEWPaC 2012a) and Conservation Advice for the sei whale (TSSC 2015g) and fin whale (TSSC 2015f) do not identify marine debris as threat. The draft National Recovery Plan for the Southern Right Whale (DCCEEW 2022a) identifies marine debris as a threat, specifically vessel-sourced, solid, non-biodegradable floating materials disposed of or lost at sea. It details that ingestion of marine debris, however, is thought to be unlikely for southern right whales in Australian coastal waters given whales are less likely to be feeding. No actions from the recovery plan were identified specific to vessel debris.

The PMST Report for the Operational Area did not identify any threatened marine invertebrate species or benthic habitats.

The extent of the area of impact is adjacent to the rig or support vessels within the Operational Area. The consequence to ecological receptors is assessed as Minor (1) and likelihood as unlikely, and the risk is of an acceptable level based on:

- Rig and vessel management systems addressing dropped object, waste storage and chemical handling and storage are well practiced, well understood and will be subject to regular audit for effectiveness and compliance during the Drilling Program.
- An unplanned release of waste will be of a very low volume if an incident occurred, and impacts would be restricted to individual fauna and would not impede the recovery of a protected species.
- Where possible material lost overboard would be recovered.
- The Threat Abatement Plan for the Impacts of Marine Debris on Vertebrate Wildlife of Australia's Coasts and Ocean (CoA 2018) suggests that most marine plastic debris are associated to shipping and fishing activities (fishing gear, balloons and plastic bags).
- Waste will be handled in accordance with AMSA Discharge Standards and respective rig and vessel Garbage Management Plans. Given this, any waste lost overboard would be in minimal quantities.
- The likelihood of losing waste or other materials overboard is unlikely with the rig and vessels management systems in place. The consequence of a loss of material or waste overboard would be limited to individuals and not affect an entire population.

7.11.4.2 Socio-economic Receptors

In the event a buoyant object is accidentally released and cannot be recovered by a vessel, the buoyant object may present a navigation or entanglement hazard to commercial fishers and other marine users. Further the buoyant object may become non-buoyant overtime and sink to the seabed, where it may present a snagging hazard on the seafloor for commercial trawling activities.

The extent of the area of impact is adjacent to the rig or support vessels within the Operational Area. The consequence to socio-economic receptors is assessed as Minor (1) and likelihood as unlikely, and the risk is of an acceptable level based on:

- Rig and vessel management systems addressing dropped object, waste storage and chemical handling and storage are well practiced and well understood.
- An unplanned release of waste will be of a very low volume if an incident occurred, and impacts would be restricted to individual marine users or individual fishers.
- Where possible material lost overboard would be recovered.
- Waste will be handled in accordance with AMSA Discharge Standards and respective rig and vessel Garbage Management Plans. Given this, any waste lost overboard would be in minimal quantities.
- The likelihood of losing waste or other materials overboard is unlikely with the rig and vessels management systems in place. The consequence of a loss of material or waste overboard would be restricted to impacts to individual marine users or individual fishers.

7.11.4.3 Cultural Values and Sensitivities

From Section 6.6.3, the following cultural values and sensitivities have been identified as potentially at risk from a loss of waste or other materials overboard and the section where potential risks have been assessed:

- Seabirds and marine mammals – see Section 7.11.4.1.

A summary of the assessment for birds and marine mammals is provided below.

- Rig and vessel management systems addressing dropped object, waste storage and chemical handling and storage are well practiced and well understood.
- An unplanned release of waste will be of a very low volume if an incident occurred, and impacts would be restricted to individual fauna and would not impede the recovery of a protected species.
- Where possible material lost overboard would be recovered.
- The Threat Abatement Plan for the Impacts of Marine Debris on Vertebrate Wildlife of Australia's Coasts and Ocean (CoA 2018) suggests that most marine plastic debris are associated to shipping and fishing activities (fishing gear, balloons and plastic bags).
- Waste will be handled in accordance with AMSA Discharge Standards and respective rig and vessel Garbage Management Plans. Given this, any waste lost overboard would be in minimal quantities.

- The likelihood of losing waste or other materials overboard is unlikely with the rig and vessels management systems in place. The consequence of a loss of material or waste overboard would be limited to individuals and not affect an entire population.

7.11.5 Demonstration that Risks will be ALARP

ALARP decision context and justification	ALARP Decision Context: Type A The risk of loss of materials or waste is well understood and there is nothing new or unusual. On the basis of the impact assessment completed, Beach considers the control measures identified are appropriate to manage the risk associated with loss of materials or waste.
Adopted Control Measures	**Description**
CM01: Marine Assurance Process	The rig and vessels will meet relevant maritime laws and includes pre-commencement rig and vessel inspections of class certification requirements under the Navigation Act 2012 and associated Marine Orders, including but not limited to: • Marine Order Part 95 (Marine pollution prevention - garbage) which gives effect to MARPOL Annex V including waste with potential to be windblown shall be stored in covered containers. • Marine Order 42 (Carriage, stowage and securing of cargoes and containers) 2016, where relevant, to ensure cargo is packed, loaded, stowed, and secured throughout each voyage.
CM02: Vessel and Rig Operating Procedures	All lifting gear used for deployment and retrieval of equipment over the rig and vessels is load rated for the working load.
	If deemed safe and effective to do so, support vessels can assist in the recovery of lost materials or waste.
	The recording and reporting of incidents, including those associated with loss of waste or materials overboard is standard in the industry. AMSA JRCC and other marine users will be notified in the event of loss of materials with potential to affect safe navigation.

7.11.6 Demonstration that Risks will be of an Acceptable Level

Consequence rating	Minor (1)
Likelihood of occurrence	Unlikely (C)
Residual risk	Low
Acceptability assessment	
To meet the principles of ESD	The risk of loss of materials or waste was assessed as Low and the consequence was assessed as Minor (1) which is not considered as having the potential to result in serious or irreversible environmental damage. There is high confidence in the predicted level of risk as Beach has significant experience operating in the Otway and Bass based on their existing offshore developments and associated activities including the Beach Otway Drilling Campaign in 2021/2022.
Internal context	The proposed management of the risk is aligned with the Beach Environment Policy.

	Activities will be undertaken in accordance with the Implementation Strategy (Section 8).
External context	There have been no stakeholder objections or claims regarding loss of materials or waste overboard.
Other requirements	Materials and waste on board the rig vessels will be managed in accordance with legislative requirements. As per the impact assessment a loss of materials or waste overboard will not As per the impact assessment, rig, vessel, and helicopters movements will not: • Impact the recovery of the white shark as per the Recovery Plan for the White Shark (*Carcharodon carcharias*) (DSEWPaC 2013a). • Impact on the recovery of marine turtles as per the Recovery Plan for Marine Turtles in Australia (CoA 2017b). • Impact the long-term survival and recovery of albatross and petrel populations as per the National Recovery Plan for Albatrosses and Petrels (CoA 2022a). • Impact the conservation of listed seabirds as per the Wildlife Conservation Plan for Seabirds (CoA 2020a). • Impact the long-term survival and recovery of the orange-bellied parrot as per the National Recovery Plan for the Orange-bellied Parrot (DELWP 2016). • Impact the recovery of the Australian sea lion as per the Recovery Plan for the Australian Sea Lion (DSEWPaC 2013b). • Impact the recovery of the blue whale as per the Conservation Management Plan for the Blue Whale (CoA 2015). • Impact the recovery of the southern right whale as per the Conservation Management Plan for the Southern Right Whale (DSEWPaC 2012a) and National Recovery Plan for the Southern Right Whale (DCCEEW 2022a). • Impact sei or fin whales, covered by Conservation Advice for Fin Whales (TSSC 2015f) and Conservation Advice for Sei Whales (TSSC 2015g).
Monitoring and reporting	Loss of materials or waste overboard is required to be reported as per Section 8.3.1.
Acceptability outcome	**Acceptable**

7.12 Loss of Containment

7.12.1 Source of Aspect

Activities associated with the Drilling Program have the potential to result in a loss of containment of hydrocarbons.

Guidance on the identification of worst-case credible spill scenarios is given in AMSA's Technical Guidelines for Preparing Contingency Plans for Marine and Coastal Facilities (AMSA 2015) and Technical Report on Calculation of Worst-Case Discharge (SPE 2016). These documents were used to identify potential hydrocarbon spill scenarios for the Drilling Program as detailed in Section 7.12.4 and Table 7-15.

Beach has assessed the potential spill risk to existing Beach infrastructure from the Drilling Program and did not identify any credible spill risk. This assessment and outcome is detailed in the Rig Safety Case.

Table 7-15: Loss of Containment Resulting in a Hydrocarbon Spill Scenarios

Scenario	Description	Worst-case release volume and rate
Loss of Containment – hazardous substances stored on drill rig and vessels	Routine operation of the drill rig and vessels includes handling, use and transfer of hydrocarbons and chemicals with the following were identified as potentially leading to a loss of containment event: • Use, handling and transfer of hydrocarbons and chemicals on board. • Hydraulic line failure from equipment.	Hydraulic line failure and use of hazardous materials onboard are associated with small volume spill events – with the maximum volume based upon the loss of an intermediate bulk container ~1 m^3.
Loss of containment – marine diesel oil (MDO)	Collision between a Beach contracted vessel and a third-party vessel.	Based on the expected vessels, the largest externally exposure fuel tank size is $350m^3$.
Loss of well containment – condensate	Loss of containment as a result of well integrity failure.	The rig will only be at one well location at a time therefore the effect of the below is not cumulative. The maximum loss of well containment for representative wells in Otway Basin is: • T/30P – 7,106bbl/day (1,129.7 m^3/day) condensate. • Vic/P43 – 5,055bbl/day (803.7 m^3/day) condensate. The maximum loss of well containment for representative well in Bass Basin is: • 13,692 bbl/day (2,177 m^3/day) condensate.

7.12.2 Extent and Duration of Aspect

Drilling, Vessel operations	
Extent	Maximum extent of hydrocarbon exposure to surface, in-water and shoreline exposure thresholds is called the Planning Area, which consists of the Otway and Bass Planning Areas (Figure 6-1), and is based on a combination of diesel and condensate loss of containment scenarios.
Duration	86 days based on the time to take to drill a relief well.

7.12.3 Predicted Environmental Impacts

The known and potential environmental impacts of a hydrocarbon spill are:

- Change in water quality.

As a result of a change in water quality, further impacts may occur, which include:

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

7.12.4 Hydrocarbon Spill Modelling

Beach commissioned RPS Australia West Pty Ltd (RPS) to conduct quantitative spill modelling for a loss of diesel from a vessel collision and a loss of containment (condensate) whilst drilling. Three locations were selected as representative locations based on proximity to receptors, metocean conditions and loss of containment volume to ensure that the spill locations were representative of the potential spill scenarios, volumes, and Operational Areas where the Drilling Program will occur.

Table 7-17 details the volumes and location modelled and reasoning for the location selection. Figure 7-11 details the oil spill modelling locations.

The quantitative spill modelling assessment was undertaken for two distinct periods, defined by the unique prevailing wind and general current conditions: summer (November–April) and winter (May–October).

For the condensate loss of containment scenarios, Beach has a high degree of confidence in the estimated release rates and timing used for the modelling as they are based on known reservoir properties and flow rates. Release rates and volumes are based on a total loss of containment which assumes the failure of multiple control systems. The modelled duration of 86 days represents the time determined to implement a full dynamic well kill via the drilling of a relief well at any of the well locations.

For the MDO scenarios, the surface release represents a loss of inventory from the largest fuel tank on a support vessel due to a hypothetical vessel collision incident and aligns with the methodology recommended in the AMSA Technical guidelines for preparing contingency plans for marine and coastal facilities (AMSA 2015). Modelling has been undertaken for a larger tank volume size (603.7 m^3) than the expected maximum tank size (350 m^3).

7.12.4.1 Hydrocarbon Characteristics

The hydrocarbon characteristics used for the quantitative spill modelling conducted by RPS are detailed in Table 7-16.

Table 7-16: Hydrocarbon Characteristics of the Hydrocarbons modelled for Otway and Bass Basins

Hydrocarbon Type	API	Density (kg/m^3)	Viscosity (cP)	Volatiles (%) (BP < 180°C)	Semi-volatiles (%) (180°C < BP < 265°C)	Low-volatiles (%) (265°C < BP < 380°C)	Persistent (%)
Otway Condensate	44.3	804.6 at 15ºC	0.87	64.0	19.0	16.0	1.0
Bass Condensate	46.7	794.1 at 15ºC	0.14	41.9	30.2	16.95	11
Marine Diesel Oil	37.6	829.1 at 25ºC	4.0	6	34.6	54.4	5

Table 7-17: Worst-case Credible Hydrocarbon Scenarios Modelled

Location	Hydrocarbon Type	Volume (m^3)	Release Duration	Reasoning	Report
Subsurface release scenarios					
T/30P (Bellerive)	Condensate	97,172 (611,192 bbl)	86 days	Furthest southern proposed well location. Largest flow rate for T/30P wells. Worse case for impacts to Tasmania and King Island.	RPS 2023a
Vic/P43 (Doris)	Condensate	69,120 (434,752 bbl)	86 days	Furthest northern proposed well location. Largest flow rate for Vic/P43 and Vic/P73 wells. Worse case for impacts to Victoria.	RPS 2023a
Bass (Bass 4)	Condensate	187,207 (1,177,496 bbl)	86 days	Largest flow rate for the Bass wells. Worse case for impacts to Tasmania. No significant difference in distance for impacts to King Island or Victoria compared to other Bass well locations.	RPS 2023b
Surface release scenarios					
T/30P (Bellerive)	Marine Diesel Oil	603.7	6 hours	Furthest southern proposed well location. Worse case for impacts to Tasmania and King Island.	RPS 2023a
Vic/P43 (Doris)	Marine Diesel Oil	603.7	6 hours	Furthest northern proposed well location. Worse case for impacts to Victoria.	RPS 2023a
Bass (Bass 4)	Marine Diesel Oil	603.7	6 hours	Worse case for impacts to Tasmania. No significant difference in distance for impacts to King Island or Victoria compared to other Bass well locations.	RPS 2023b

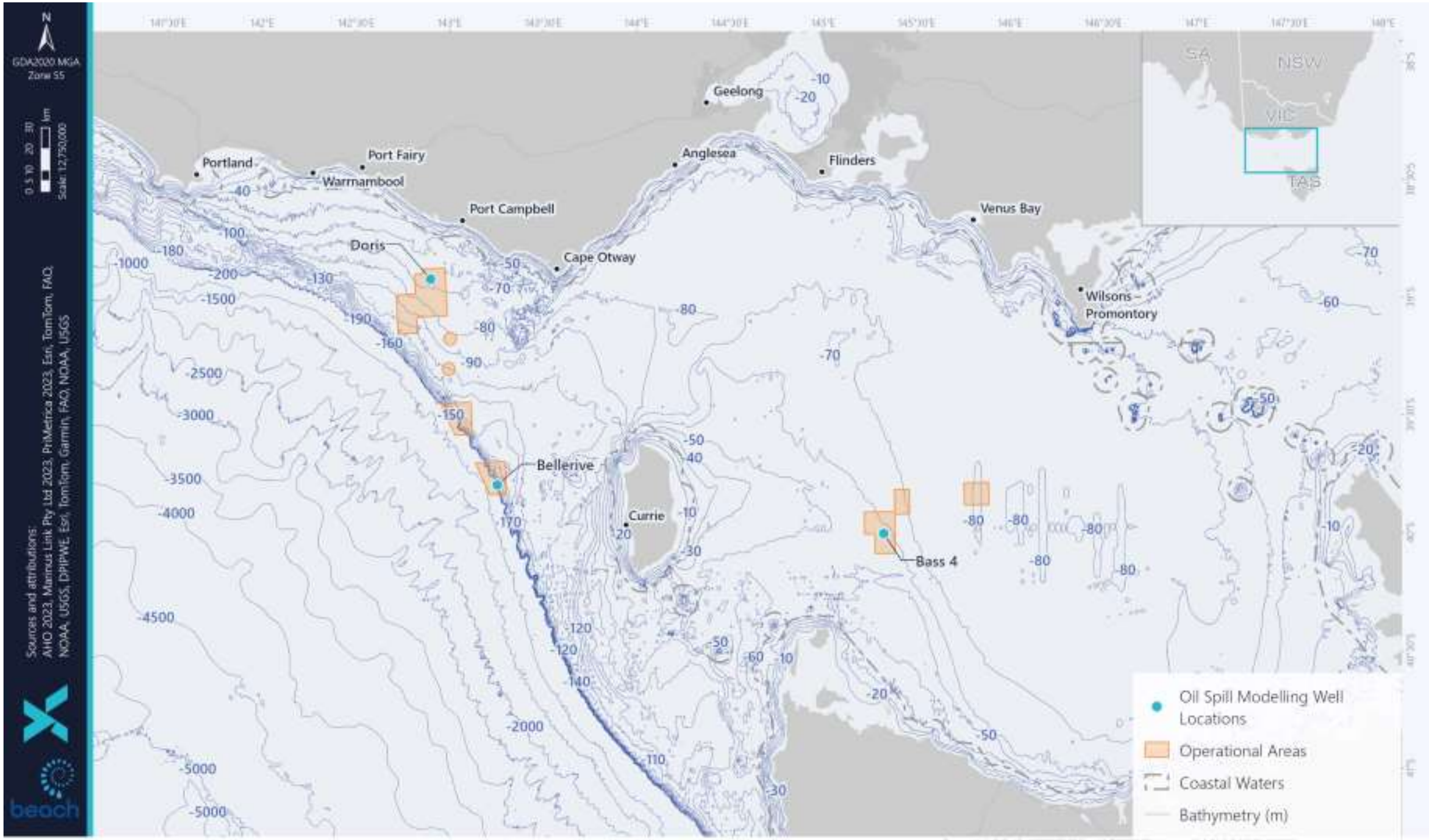

Figure 7-11: Oil Spill Modelling Locations

7.12.4.2 Hydrocarbon Exposure Thresholds

A basic foundation for meaningful oil spill modelling is the selection of appropriate oil exposure thresholds. These thresholds are used to interpret the oil spill modelling and inform the risk evaluation, spill response and oil spill monitoring.

The hydrocarbon exposure thresholds used for the spill modelling are based on the NOPSEMA Bulletin: Oil Spill Modelling (NOPSEMA 2019) and are detailed in Table 7-18. Further information on the thresholds is provided in the spill modelling reports (Appendix I).

The following thresholds have been used to:

- Predict potential hydrocarbon exposure at conservative (low exposure) concentrations to develop the Planning Area which is used to inform the description of the environment (Section 6) and oil spill monitoring plan (OSMP) (Section 8.4.3 and OSMP). Figure 6-1 details the Planning Area.
- Inform the oil spill impact and risk evaluation based on the area that may be affected (Section 7.12.5).
- Inform oil spill response planning (Section 7.13 and OPEP) based on the actionable thresholds of:
  - Surface moderate exposure (50 g/m^2).
  - Shoreline moderate exposure (100 g/m^2).

The Spill Response Planning Areas are detailed in Figure 7-12 for diesel and Figure 7-13 for condensate.

Table 7-18: Hydrocarbon Exposure Thresholds

	Threshold	Description
Surface		
Low exposure	1 g/m^2	Approximates range of socioeconomic effects and establishes planning area for scientific monitoring.
Moderate exposure	10 g/m^2	Approximates lower limit for harmful exposures to birds and marine mammals.
High exposure	50 g/m^2	Approximates surface oil slick and informs response plan.
Shoreline		
Low exposure	10 g/m^2	Predicts potential for some socio-economic impact.
Moderate exposure	100 g/m^2	Loading predicts area likely to require clean-up effort.
High exposure	1000 g/m^2	Loading predicts area likely to require intensive clean-up effort.
In water (Dissolved)		
Low exposure	10 ppb	Establishes planning area for scientific monitoring based on potential for exceedance of water quality triggers.
Moderate exposure	50 ppb	Approximates potential toxic effects, particularly sublethal effects to sensitive species.

	Threshold	Description
High exposure	400 ppb	Approximates toxic effects including lethal effects to sensitive species
In-water (Entrained)		
Low exposure	10 ppb	Establishes planning area for scientific monitoring based on potential for exceedance of water quality triggers.
High	100 ppb	As appropriate given oil characteristics for informing risk evaluation.

7.12.4.3 Extent of Hydrocarbon Exposure – Marine Diesel

Below is a summary of the quantitative spill modelling results conducted by RPS for the worst-case credible surface loss of containment release scenario for each of the three drilling locations identified for the Drilling Program. Refer to the RPS Reports in Appendix I for further details.

Otway - T/30P

- The maximum distance from the release location to the low (1–10 g/m^2), moderate (10–50 g/m^2) and high (>50 g/m^2) surface exposure zones was 57 km (south-southeast) during winter conditions, 48 km (south-southeast) during winter conditions and 8 km (south-southeast) during both seasons respectively.
- The probability of accumulation to any shoreline at, or above, the low level (10 g/m^2) threshold was 7% during summer conditions and 47% during winter conditions. The minimum time before shoreline accumulation above the low threshold was 8 days during summer conditions and 4 days during the winter conditions predicted for King Island.
- At the depths of 0-10 m, during summer and winter, the maximum dissolved aromatic concentration at any given receptor was predicted to be 187 ppb and 178 ppb, respectively.
- Outside of the receptors that the release location resides within, the maximum dissolved hydrocarbon exposure during summer and winter was 100 ppb and 105 ppb, respectively.
- At the depths of 0-10 m, during summer and winter, the maximum entrained concentration at any given receptor was predicted to be 16,927 ppb and 15,779 ppb, respectively. Outside of the receptors that the release location resides within, the maximum dissolved hydrocarbon exposure during summer and winter was 4,867 ppb and 5,489 ppb, respectively.

Otway – Vic/P43

- The maximum distance from the release location to the low (1–10 g/m^2), moderate (10–50 g/m^2) and high (>50 g/m^2) surface exposure zones was 54 km (east) during winter conditions, 19 km (south-southeast) during winter conditions and 10 km (north-northwest in summer and east in winter).
- The probability of accumulation to any shoreline at, or above, the low level (10 g/m^2) threshold was 28% during summer conditions and 26% during winter conditions. The minimum time before

shoreline accumulation above the low threshold was 4 days during summer conditions and 2 days during the winter conditions predicted for Colac Otway and Colac Otway West.

- At the depths of 0-10 m, during summer and winter, the maximum dissolved aromatic concentration at any given receptor was predicted to be 151 ppb and 156 ppb, respectively. Outside of the receptors that the release location resides within, the maximum dissolved hydrocarbon exposure during summer and winter was 45 ppb and 31 ppb, respectively.

- At the depths of 0-10 m, during summer and winter, the maximum entrained concentration at any given receptor was predicted to be 13,567 ppb and 12,277 ppb, respectively. Outside of the receptors that the release location resides within, the maximum dissolved hydrocarbon exposure during summer and winter was 801 ppb and 1,326 ppb, respectively.

Bass:

- The maximum distance from the release location to the low (1–10 g/m^2), moderate (10–50 g/m^2) and high (>50 g/m^2) surface exposure zones was 42 km (west-southwest) during winter conditions, and 25 km (west-southwest) during summer conditions and 11 km (west) during winter conditions respectively.

- The probability of accumulation to any shoreline at, or above, the low level (10 g/m^2) threshold was 11% during summer conditions and 3% during winter conditions. The minimum time before shoreline accumulation above the low threshold was 5 days predicted for Circular Head and Hunter Island (during summer) and 4 days at Hunter Island (during winter).

- At the depths of 0-10 m, during summer and winter, the maximum dissolved aromatic concentration at any given receptor was predicted to be 217 ppb and 189 ppb, respectively. Outside of the receptors that the release location resides within, the maximum dissolved hydrocarbon exposure during summer and winter was 53 ppb and 36 ppb, respectively.

- At the depths of 0-10 m, during summer and winter, the maximum entrained concentration at any given receptor was predicted to be 15,877 ppb and 117,097 ppb, respectively. Outside of the receptors that the release location resides within, the maximum dissolved hydrocarbon exposure during summer and winter was 695 ppb and 623 ppb, respectively.

7.12.4.4 Extent of Hydrocarbon Exposure – Condensate

Below is a summary of the quantitative spill modelling results conducted by RPS for the worst-case credible subsea loss of well containment scenario for each of the three drilling locations identified for the Drilling Program. Refer to the RPS Reports in Appendix I for further details.

Otway - T/30P

- The maximum distance from the release location to the low (1–10 g/m^2), moderate (10–50 g/m^2) and high (>50 g/m^2) surface exposure zones was 79 km (east-southeast) during winter conditions, 20 km (southeast) during summer conditions and 1 km (west-southwest) during summer and winter conditions, respectively.

- The probability of accumulation to any shoreline at, or above, the low level (10 g/m^2) threshold was 89% during summer conditions and 100% during winter conditions. The highest probability of shoreline accumulation for the moderate level 100 g/m^2 was predicted King Island (37% during summer and 91% during winter).

- At the depths of 0-10 m, during summer and winter, the maximum dissolved aromatic concentration at any given receptor, including the receptors outside where the release location resides in, was predicted to be 1,904 ppb and 1,665 ppb, respectively.
- At the depths of 0-10 m, during summer and winter, the maximum entrained concentration at any given receptor was predicted to be 4,558 ppb and 5,104 ppb, respectively. Outside of the receptors that the release location resides within, the maximum dissolved hydrocarbon exposure during summer and winter was 1,454 ppb and 1,464 ppb, respectively.

Otway – Vic/P43

- The maximum distance from the release location to the low (1–10 g/m^2) and moderate (10–50 g/m^2) surface exposure zones was 53 km (east) during summer conditions and 12 km (south-southeast) during winter conditions, respectively. For the high threshold (> 50 g/m^2), the maximum distance from the release location was 1 km southeast (summer) and northwest (winter).
- The probability of accumulation to any shoreline at, or above, the low level (10 g/m^2) threshold was 100% during summer conditions and 98% during winter conditions. The highest probability of shoreline accumulation for the moderate level 100 g/m^2 was predicted Colac Otway (72% during summer and 54%), and the largest shoreline accumulation was 96 m^3 and 94 m^3, respectively.
- At the depths of 0-10 m, during summer and winter, the maximum dissolved aromatic concentration at any given receptor was predicted to be 1,796 ppb and 1,709 ppb, respectively. Outside of the receptors that the release location resides within, the maximum dissolved hydrocarbon exposure during summer and winter was 1,396 ppb and 1,410 ppb, respectively.
- At the depths of 0-10 m, during summer and winter, the maximum entrained concentration at any given receptor was predicted to be 4,243 ppb and 4,004 ppb, respectively. Outside of the receptors that the release location resides within, the maximum dissolved hydrocarbon exposure during summer and winter was 378 ppb and 332 ppb, respectively.

Bass

- The maximum distance from the release location to the low (1–10 g/m^2), moderate (10–50 g/m^2) and high (>50 g/m^2) surface exposure zones was 307 km (south), 88 km (southwest) and 17 km (north-northwest) all during winter conditions, respectively.
- The probability of accumulation to any shoreline at, or above, the low level (10 g/m^2) threshold was 89% during summer conditions and 85% during winter conditions. The highest probability of shoreline accumulation for the moderate level 100 g/m^2 was predicted at Hunter Island (1% during summer and 2%).
- At the depths of 0-10 m, during summer and winter, the maximum dissolved aromatic concentration at any given receptor was predicted to be 2,636 ppb and 2,279 ppb, respectively.

Outside of the receptors that the release location resides within, the maximum dissolved hydrocarbon exposure during summer and winter was 1,392 ppb and 1,157 ppb, respectively.

- At the depths of 0-10 m, during summer and winter, the maximum entrained concentration at any given receptor was predicted to be 22,471 ppb and 25,575 ppb, respectively. Outside of the receptors that the release location resides within, the maximum dissolved hydrocarbon exposure during summer and winter was 1,758 ppb and 1,360 ppb, respectively.

7.12.5 Predicted Level of Risk

The potential environmental impacts to receptors from hydrocarbon exposure from a loss of containment of condensate and marine diesel are discussed in the following sections.

7.12.5.1 Benthic Habitats

Macroalgae

<table>
<tr><th colspan="2">Macroalgae</th></tr>
<tr><td>Predicted Hydrocarbon Exposure</td><td>✘ Surface ✔ In-water ✘ Shoreline</td></tr>
<tr><td>Relevant Exposure Thresholds</td><td>Moderate Exposure Thresholds (Dissolved)
High Exposure Thresholds (Entrained)</td></tr>
<tr><td>Condensate</td><td>MDO</td></tr>
<tr><td>Macroalgae communities may be present within the area exposed to in-water hydrocarbons at moderate (dissolved) and high (entrained) thresholds following a LOWC of condensate. The worst-case scenario modelled predicted exposure to nearshore areas at moderate (50 ppb) thresholds of dissolved, with some sites predicted to be exposed to high thresholds of both dissolved (400 ppb) and entrained (100 ppb) (RPS 2023).
The modelling predicted moderate exposure thresholds for dissolved (50 ppb) and high exposure thresholds for entrained (100 ppb) in-water hydrocarbons for both Victorian and Tasmanian state waters for the worst-case scenario modelled (RPS 2023). Therefore, macroalgae communities, such as the Durvillaea potatorum communities found within the shallow waters of King Island and along Victorian Otway coastline (see Section 6.4.1.5) may be impacted.
The shallow waters of King Island and Albatross Island were the only nearshore areas predicted to be exposed to high exposure levels of dissolved and entrained in-water hydrocarbons for the worst-case scenario modelled (RPS 2023).</td><td>Macroalgae communities may be present within the area exposed to in-water hydrocarbons at moderate (dissolved) and high (entrained) thresholds following a vessel LOC of MDO.
The modelling predicted exposure to some nearshore areas at high thresholds of entrained (100 ppb) hydrocarbons. No nearshore areas were predicted to be impacted by moderate (50 ppb) or high (400 ppb) thresholds of dissolved hydrocarbons (RPS 2023).
The nearshore waters of Tasmania and Victoria were identified to be exposed to thresholds of entrained hydrocarbons at the high threshold (100 ppb), however, at relatively low probabilities (2% and 7%, respectively).
The potential exposure area for MDO is located entirely within the potential exposure area for condensate LOWC (RPS 2023) thus the impact assessment is based on the larger condensate area of exposure.</td></tr>
<tr><td colspan="2">Predicted Environmental Impact</td></tr>
<tr><td colspan="2">In-water</td></tr>
<tr><td colspan="2">In-water exposure (entrained and dissolved) at the relevant exposure thresholds is only predicted to occur within the upper 0 – 10 m of the water column; therefore, benthic habitats, such as macroalgae, only have the potential to be exposed within intertidal or shallow nearshore waters.
Intertidal macroalgal beds are more prone to oil spills than subtidal beds because, although the mucous coating of the macroalgae prevents oil adherence, oil that is trapped in the upper canopy may be more persistent, which impacts site-attached species. Additionally, when oil sticks to dry fronds on the shore, they can become heavy and break as a result of wave action (IPIECA 2002).</td></tr>
</table>

Macroalgae
The physical effects of smothering, fouling and asphyxiation has been documented from oil contamination in marine plants (Blumer 1971, Cintron et al. 1981). In macroalgae, oil can act as a physical barrier for the diffusion of CO_2 across cell walls (O'Brien and Dixon 1976). The effect of hydrocarbons, however, is largely dependent on the degree of direct exposure and how much of the hydrocarbon adheres to algae, which will vary depending on the oils physical state and relative 'stickiness'. The morphological features of macroalgae, such as the presence of a mucilage layer or the presence of fine 'hairs' will influence the amount of hydrocarbon that will adhere to the algae. A review of field studies conducted after spill events by Connell et al. (1981) indicated a high degree of variability in the level of impact, but in all instances, the algae appeared to be able to recover rapidly from even very heavy oiling. The rapid recovery of algae was attributed to the fact that for most algae, new growth is produced from near the base of the plant while the distal parts (which would be exposed to the oil contamination) are continually lost. Other studies have indicated that kelp beds oiled by crude oil had a 90% recovery within 3-4 years of impact, however full recovery to pre-spill diversity may not occur for long periods after the spill (French- McCay 2004). The toxicity of hydrocarbons to macroalgae varies for the different macroalgal life stages, with water-soluble hydrocarbons more toxic (Van Overbeek and Blondeau 1954, Kauss et al. 1973; cited in O'Brien and Dixon 1976). Toxic effect concentrations for hydrocarbons and algae have varied greatly among species and studies, ranging 0.002–10,000 ppm (Lewis and Pryor 2013). The sensitivity of gametes, larva and zygote stages, however, have all proven more responsive to oil exposure than adult growth stages (Thursby and Steele 2004; Lewis and Pryor 2013). Experiments verified the susceptibility of *Nereocystis luetkeana* (bull kelp – north America) tissue to the direct exposure to several petroleum types. Antrim et al (1995) showed that petroleum treatments resulted in visible tissue damage, with a distinct bleached line being the most visible indication of plant contact with the petroleum. Moderate to heavy colour loss, which was generally followed by rapid decay of tissue, was most pronounced in 24 h exposures to unweathered and weathered diesel. The study did not look at how this would affect the productivity of bull kelp. Entrained hydrocarbon within the water column can also affect light qualities and the ability of macrophytes, including seagrasses and macroalgae, to photosynthesise.
Predicted Level of Impact
Based on the extent and duration of potential exposure, predicted level of impact is based on the condensate LOWC scenarios. The potential impacts detailed above are typically based on oils of a heavier nature than condensate and diesel that are less likely to smother or adhere to macroalgae. In addition the maximum residency time for exposure in Victorian or Tasmanian waters, where macroalgae are present is < 1 day for dissolved hydrocarbons at the moderate and above exposure threshold and up to 4 days for entrained hydrocarbons at the high threshold State waters. Given the restricted range of exposure (shallow nearshore and intertidal waters only), the predicted presence of hydrocarbons at relevant exposure thresholds expected to be in these waters, the anticipated weathering on the condensate (modelling predicted between approximately 70-82% of the volume to evaporate and between 0-22% to entrain within the first 24 hours, depending on the wind conditions (RPS 2023), any impact to macroalgae is not expected to result in long-term or irreversible damage. Consequently, the potential consequence to macroalgae from hydrocarbon exposure at relevant thresholds is considered to be **Moderate (2)** as they could be expected to result in minor, short-term damage not affecting ecosystem function.

Seagrass

<table>
<tr><th colspan="2">Seagrass</th></tr>
<tr><td>Predicted Hydrocarbon Exposure</td><td>✘ Surface ✓ In-water ✘ Shoreline</td></tr>
<tr><td>Relevant Exposure Thresholds</td><td>Moderate Exposure Thresholds (Dissolved)
High Exposure Thresholds (Entrained)</td></tr>
<tr><td>Condensate</td><td>MDO</td></tr>
<tr><td>Seagrass meadows may be present within the area exposed to in-water hydrocarbons at moderate (dissolved) and high (entrained) thresholds following a LOWC of condensate. The worst-case scenario modelled predicted exposure to nearshore areas at moderate (50 ppb) thresholds of dissolved, with some sites predicted to be exposed to high thresholds of both dissolved (400 ppb) and entrained (100 ppb) (RPS 2023).
The modelling predicted at, or above, moderate exposure thresholds for dissolved and high exposure thresholds for entrained in-water hydrocarbons for both Victorian and Tasmanian state waters for the worst-case scenario modelled (RPS 2023).
Therefore, known seagrass meadows, such as those identified at Corner Inlet, Port Phillip Bay and Western Port Bay along the Victorian bay may be exposed. There are less known seagrass communities identified for Tasmanian coastlines (see Section 6.4.1.4).</td><td>Seagrass meadows may be present within the area exposed to in-water hydrocarbons at moderate (dissolved) and high (entrained) thresholds following a LOC of MDO. The worst-case scenario modelled predicted exposure to some nearshore areas at high thresholds of entrained (100 ppb) hydrocarbons. No nearshore areas were predicted to be impacted by moderate (50 ppb) or high (400 ppb) thresholds of dissolved hydrocarbons (RPS 2023).
Both the nearshore waters of Tasmania and Victoria were identified to be exposed to thresholds of entrained (100 ppb) hydrocarbons, however, at relatively low probabilities (2% and 7%, respectively).
The potential exposure area for MDO is located entirely within the potential exposure area for condensate LOWC (RPS 2023).</td></tr>
<tr><td colspan="2">Predicted Environmental Impact</td></tr>
<tr><td colspan="2">In-water</td></tr>
<tr><td colspan="2">In-water exposure (dissolved or entrained) at the relevant exposure thresholds is only predicted to occur within the upper 0–10 m of the water column; therefore, benthic habitat, such as seagrass, only have the potential to be exposure within intertidal or shallow nearshore waters.
Intertidal and subtidal seagrass ecosystems can be damaged in a number of ways. Direct mortality from smothering can occur, however, sub-lethal impacts from smothering are more likely to occur than lethal impacts because much of seagrasses' biomass is underground in their rhizomes and less likely to be exposed to hydrocarbons (Zieman et al. 1984). However, exposure also can take place via uptake of hydrocarbons through plant membranes and seeds may be affected by contact with oil contained within sediments (NRDA 2012). Petroleum fractions absorbed into the seagrass tissues, can also lower the organism's tolerance to other stressors and reduce growth rates (Zieman et al. 1984) (Runcie et al. 2010).
Studies of offshore benthic seaweeds in the northwest Gulf of Mexico prior to and after the Macondo well blowout at Sackett and Ewing banks (in water depths of 55–75 m) found a dramatic die-off of seaweeds after the spill (60 species pre-spill compared with 10 species post-spill) (Felder et al. 2014). However, these banks are exposed to</td></tr>
</table>

Seagrass
influences from Mississippi River discharges that vary year to year, so definitive links to the oil spill were not possible. Petroleum residues were observed on Ewing Bank and it is possible that this may have caused localised mortalities. Entrained hydrocarbon within the water column can affect light qualities and the ability of macrophytes, including seagrasses and macroalgae, to photosynthesise.
Predicted Level of Impact
Based on the extent and duration of potential exposure, predicted level of impact is based on the condensate LOWC scenarios. Given the restricted range of exposure (shallow nearshore and intertidal waters only), the predicted presence of hydrocarbons at relevant exposure thresholds expected to be in these waters, the anticipated weathering on the condensate (modelling predicted between approximately 70-82% of the volume to evaporate and between 0-22% to entrain within the first 24 hours, depending on the wind conditions (RPS 2023)), any impact to seagrass is not expected to result in long-term or irreversible damage. Consequently, the potential consequence to seagrass is considered to be **Minor (1)**, as they could be expected to result in localised low-level impacts.

Soft Corals

Soft Corals	
Predicted Hydrocarbon Exposure	✘ **Surface** ✓ **In-water** ✘ **Shoreline**
Relevant Exposure Thresholds	**Moderate Exposure Thresholds (Dissolved)** **High Exposure Thresholds (Entrained)**
Condensate	**MDO**
Soft corals may be present within the area exposed to in-water hydrocarbons at relevant exposure thresholds following a LOWC of condensate. The worst-case scenario modelled predicted exposure at moderate (50 ppb) thresholds of dissolved, and high thresholds of both dissolved (400 ppb) and entrained (100 ppb) (RPS 2023). Corals are not identified as a dominant habitat type within the area predicted to be exposed to hydrocarbons at relevant exposure thresholds; their presence has been recorded in isolated areas such as Wilsons Promontory National Park and Cape Otway. 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 (see Section 6.4.1.6). In-water exposure (dissolved or entrained) at relevant exposure thresholds is only predicted to occur within the upper 0–10 m of the water column, therefore, soft corals found in water depths below 10m are not anticipated to be impacted by in-water hydrocarbon exposure.	Soft corals may be present within the area exposed to in-water hydrocarbons at relevant exposure thresholds following a vessel LOC of MDO. The worst-case scenario modelled predicted exposure at moderate (50 ppb) thresholds of dissolved, and high thresholds of both dissolved (400 ppb) and entrained (100 ppb) (RPS 2023). The potential exposure area for MDO is located entirely within the potential exposure area for condensate LOWC (RPS 2023).
Predicted Environmental Impact	
In-water	
Exposure of entrained hydrocarbons to shallow subtidal corals has the potential to result in lethal or sublethal toxic effects, resulting in acute impacts or death at moderate to high exposure thresholds (Shigenaka 2001). Contact with corals may lead to reduced growth rates, tissue decomposition, and poor resistance and mortality of sections of reef (NOAA 2010).	
Predicted Level of Impact	
Based on the extent and duration of potential exposure, predicted level of impact is based on the condensate LOWC scenarios. Given the lack of coral reef formations, and the sporadic cover of hard or soft corals in mixed nearshore reef communities along the Victorian and Tasmanian coast, any impacts that may occur are anticipated to be limited to isolated corals. Consequently, the potential consequence to soft corals are considered to be **Minor (1)**, as they could be expected to result in localised low-level impacts.	

Mangroves

Mangroves	
Predicted Hydrocarbon Exposure	✓ **Surface** ✓ **In-water** ✓ **Shoreline**
Relevant Exposure Thresholds	**Surface: Moderate Exposure Threshold** **In-water: Moderate Exposure Threshold (Dissolved) and High Exposure Threshold (Entrained)** **Shoreline: Moderate Exposure Threshold**
Condensate	**MDO**
Mangroves are not a dominant habitat found within the area potentially exposed to hydrocarbons at relevant exposure thresholds. The mangroves found within this south-east region are the most southerly extent of mangroves found in the world. The mangroves within Victoria are located mostly along sheltered sections of the coast within inlets or bays, such as Western Port and Corner Inlet. Tasmania has a few scattered strands of mangroves, predominantly located in nature reserves, such as the Lavinia Nature Reserve on the East coast of King Island. A patchy distribution of mangroves are found in estuaries and inlets along the NSW coastline (see Section 6.4.2). The modelling predicted at, or above, moderate exposure thresholds for dissolved (50 ppb) and high exposure thresholds for entrained (100 ppb) in-water hydrocarbons for both Victorian and Tasmanian state waters for the worst-case scenario modelled (RPS 2023). No hydrocarbon exposure was identified for NSW at relevant thresholds.	The modelling predicted at, or above, moderate exposure thresholds for dissolved and high exposure thresholds for entrained in-water hydrocarbons for both Victorian and Tasmanian state waters for the worst-case scenario modelled (RPS 2023). The worst-case scenario modelled predicted exposure to some nearshore areas at high thresholds of entrained (100 ppb) hydrocarbons. No nearshore areas were predicted to be impacted by moderate (50 ppb) or high (400 ppb) thresholds of dissolved hydrocarbons (RPS 2023). Both the nearshore waters of Tasmania and Victoria were identified to be exposed to thresholds of entrained (100 ppb) hydrocarbons, however, at relatively low probabilities (2% and 7%, respectively). No hydrocarbon exposure was identified for NSW at relevant thresholds. The potential exposure area for MDO is located entirely within the potential exposure area for condensate LOWC (RPS 2023).

Predicted Environmental Impact		
Surface	**In-water**	**Shoreline**
Mangroves are considered to have a high sensitivity to hydrocarbon exposure. Mangroves can be killed by heavy or viscous oil, or emulsification, that covers the trees' breathing pores thereby asphyxiating the subsurface roots, which depend on the pores for oxygen. Mangroves can also take up in-water hydrocarbons from contact with leaves, roots or sediments, and it is suspected that this uptake causes	The change in toxicity levels within the marine environment can penetrate the root surfaces, via the respiratory capabilities of the roots, poisoning the plant. Acute impacts to mangroves can be observed within weeks of exposure, whereas chronic impacts may day months to years to detect.	Hydrocarbon can enter mangrove forests when the tide is high and be deposited on the aerial roots and sediment surface as the tide recedes. This process commonly leads to a patchy distribution of the oil and its effects because different places within the forests are at different tidal heights (IPIECA 1993, NOAA 2014). The physical smothering of aerial roots by standard hydrocarbons can block the trees' breathing pores used

Mangroves	
defoliation through leaf damage and tree death (Wardrop et al. 1987).	for oxygen intake and result in the asphyxiation of sub-surface roots (International Petroleum Industry Environmental Conservation Association (IPIECA 1993).

Predicted Level of Impact

Based on the extent and duration of potential exposure, predicted level of impact is based on the condensate LOWC scenarios.

There are only a few isolated mangroves communities that may be exposed to hydrocarbons. Given the non-persistent nature of the hydrocarbon there is expected to be minimal impact from smothering of aerial roots or seedlings. However, if the residual oil does melt, some impact to the root systems and seedlings may occur.

Consequently, the potential consequences to mangroves exposed to hydrocarbons is considered to be **Moderate (2)**, as they could be expected to result in minor, short-term damage not affecting ecosystem function.

Saltmarsh

Saltmarsh	
Predicted Hydrocarbon Exposure	✘ **Surface** ✓ **In-water** ✘ **Shoreline**
Relevant Hydrocarbon Exposure	**Moderate Exposure Thresholds (Dissolved)** **High Exposure Thresholds (Entrained)**
Condensate	**MDO**
Communities of saltmarsh are predicted to be within the area potentially exposed to hydrocarbons at relevant exposure thresholds following a LOWC of condensate, such as estuaries and inlet/riverine systems along the Victorian and Tasmania coastline. The modelling predicted the highest probability of shoreline accumulation at, or above, the moderate (100 g/m^2) threshold to occur at King Island (81%), followed by Colac Otway (37%), with the minimum time for shoreline contact predicted as 9 days (King Island) and 7 days (Colac Otway), with a peak volume ashore of 188 m^3 and 96 m^3 respectively, (RPS 2023). Areas where saltmarsh is most extensive, such as western Port Phillip Bay (see Section 6.4.3), were only identified to be contacted by low (10 g/m^2) threshold exposure of shoreline accumulation.	Communities of saltmarsh may be present with the area potentially exposed to hydrocarbons at relevant exposure thresholds following a vessel LOC of MDO. The modelling predicted the highest probability of shoreline accumulation at, or above, the moderate (100 g/m^2) threshold to occur at King Island (13%), followed by Colac Otway (6%), with the minimum time for shoreline contact predicted as 7 days (King Island) and 4 days (Colac Otway), with a peak volume ashore of 29 m^3 and 35 m^3 respectively, (RPS 2023). Areas where saltmarsh is most extensive, such as western Port Phillip Bay (see Section 6.4.3), were not identified to be contacted by low any threshold exposure of shoreline accumulation. The potential exposure area for MDO is located entirely within the potential exposure area for condensate LOWC (RPS 2023).
Predicted Environmental Impact	
Shoreline	
Saltmarsh is considered to have a high sensitivity to hydrocarbon exposure. Hydrocarbon (in liquid form) will readily adhere to the marshes, coating the stems from tidal height to sediment surface. However, heavy oil coating is unlikely due to the highly volatile nature of the condensate hydrocarbon. Oil can enter saltmarsh systems during the tidal cycles if the estuary/inlet is open to the ocean. Saltmarsh vegetation offers a large surface area for oil absorption and tends to trap oil. Similar to mangroves, this can lead to a patchy distribution of the oil and its effects, because different places within the inlets are at different tidal heights. Evidence from case histories and experiments shows that the damage resulting from oiling, and recovery times of oiled marsh vegetation, are highly variable. In areas of light to moderate oiling where oil is mainly on perennial vegetation with little penetration of sediment, the shoots of the plants may be killed but recovery can be relatively rapid, occurring the following growing season or earlier. However, when oil penetrates the soil and the initial mortality of the vegetation is extensive, recovery to reference conditions may take 3–4 years (Hester and Mendelssohn 2000).	

Saltmarsh
Predicted Level of Impact
Saltmarshes are considered to be highly sensitive to hydrocarbon exposure. Consequently, the potential consequences to saltmarsh exposed to hydrocarbons is considered to be **Moderate (2)**, as they could be expected to be result in minor, short-term damage not affecting ecosystem function.

7.12.5.2 Marine Fauna

Plankton

Plankton	
Predicted Hydrocarbon Exposure	✓ **Surface** ✓ **In-water** ✗ **Shoreline**
Relevant Exposure Thresholds	**Surface: Moderate Exposure Thresholds** **In-water: Moderate (dissolved) and High (entrained) Exposure Thresholds**
Condensate	**MDO**
Plankton (phytoplankton and zooplankton) are found in nearshore and open waters beneath the surface and form the basis for the marine food web. These organisms migrate vertically through the water column to feed in surface waters at night and, when doing so, may be exposed to surface hydrocarbons, however, to a greater extent, hydrocarbons dissolved or entrained in the water column (NRDA 2012). Plankton species are known to be sensitive to the toxic effects of oil at relatively low concentrations and large numbers of planktonic organisms may be affected in the event of a spill event (ITOPF 2014). Plankton risk exposure through ingestion, inhalation and dermal contact. Plankton are likely to be present within the area exposed to in-water hydrocarbons (at relevant exposure thresholds) within the upper 0–10 m of the water column and the surface hydrocarbons (at relevant exposure thresholds) following a LOWC of condensate. The modelling predicted a maximum distance of 88 km for surface hydrocarbons at, or above, the moderate threshold for the worst-case scenario (RPS 2023). However, it is acknowledged that effects will be greatest in the area close to the spill source where hydrocarbon concentrations are likely to be highest.	Plankton are likely to be present within the area exposed to in-water hydrocarbons (at relevant exposure thresholds) within the upper 0 – 10 m of the water column and the surface hydrocarbons (at relevant exposure thresholds) following a vessel LOC of MDO. The modelling predicted a maximum distance of 57 km for surface hydrocarbons at, or above, the moderate threshold for the worst-case scenario (RPS 2023). The potential exposure area for MDO is located entirely within the potential exposure area for condensate LOWC (RPS 2023).
Predicted Environmental Impact	
Surface	**In-water**
Phytoplankton (photosynthetic organisms) can accumulate rapidly, due to their small size and high surface area to volume ratio, therefore populations are typically not sensitive to the impacts of oil (Hook et al. 2016). However, if phytoplankton are exposed to hydrocarbons at the sea surface, their ability to photosynthesise via smothering may	Zooplankton (protozoans and animals), such as rotifers, copepods and krill, are vulnerable to hydrocarbons due to their small size and high surface area to volume ratio. Some zooplankton also have high lipid content, which facilitates hydrocarbon uptake and bioaccumulation (Hook et al. 2016). Water column organisms that come

Plankton	
be directly affected and would have implications for the next trophic level in the food chain (e.g., small fish) (Hook et al. 2016). In addition, the presence of surface hydrocarbons may result in a reduction of light penetrating the water column, which may again affect the rate of photosynthesis, particularly in instances where there is prolonged presence of surface hydrocarbons over an extensive area. A reduction in the rate of photosynthesis may inhibit growth, depending on the concentration range. For example, photosynthesis is stimulated by low concentrations of oil in the water column (10-30 ppb) but becomes progressively inhibited above 50 ppb. Conversely, photosynthesis can be stimulated below 100 ppb for exposure to weathered oil (Volkman et al. 1994).	into contact with oil risk exposure through ingestion, inhalation and dermal contact (NRDA 2012), which can cause immediate mortality or declines in egg production and hatching rates along with a decline in swimming speeds (Hook et al. 2016). In general, the distribution of zooplankton is closely linked to spatial and temporal patterns in primary production by phytoplankton, which in turn is closely linked to the supply of nutrients and oceanographic processes (Fathom Pacific 2023). Variations in the temporal scale of oceanographic processes therefore are expected to have a greater influence on plankton communities than the direct effect of spilled hydrocarbons. This is because reproduction by survivors or migration from unaffected areas is likely to rapidly replenish any losses from permanent zooplankton (Volkman et al. 1994). Furthermore, the proximity of nutrient-rich seasonal upwelling events which occur within the vicinity will further assist recovery rates. Studies have shown minimal or transient effects on marine plankton (Volkman et al. 1994). Once background water quality conditions have re-established, the plankton community may take weeks to months to recover due to short generation times (ITOPF 2011a), allowing for seasonal influences on the assemblage characteristics.
Predicted Level of Impact	
Phytoplankton may be impacted by limited photosynthetic (growth) capacity as a result of direct smothering or limited ability for light to penetrate the water column. While zooplankton may be impacted by toxicity through direct contact (ingestion, inhalation and dermal contact) resulting in injury or mortality. Plankton exhibit rapid recovery due to mass spawning behaviours of many species with planktonic life phase, along with ocean current facilitating migration from unaffected areas. It is expected that plankton communities will recovery over weeks to months once background water quality conditions have re-established. The magnitude of potential risk associated with a spill is considered to result in short-term and localised impacts, representing a small portion of the plankton population that is widely representative of the region, with no population level impact or impact to dependent species expected. Consequently, given the limited area exposed by moderate levels of dissolved hydrocarbons, the potential consequence to plankton are considered to be **Minor (1)**, as they could be expected to result in localised low-level, short-term, and recoverable impacts.	

Marine Invertebrates

Marine Invertebrates	
Predicted Hydrocarbon Exposure	✘ **Surface** ✓ **In-water** ✘ **Shoreline**
Relevant Exposure Thresholds	**Moderate Exposure Thresholds (Dissolved)** **High Exposure Thresholds (Entrained)**
Condensate	**MDO**
Marine invertebrates, located in shallow nearshore or intertidal waters where diversity and abundance are highest may be impacted moderate exposure of dissolved (50 ppb) and high exposure of entrained (100 ppb) hydrocarbons predicted to occur within the upper 0 – 10 m of the water column. Benthic invertebrates, including commercially and culturally important species such as squid, crustaceans (rock lobster, crabs) and molluscs (scallops) may be exposed to hydrocarbon at relevant exposure thresholds within the vicinity of a subsea release before the subsea plume rises. Exposure to these benthic species are less likely to occur as predicted in-water exposure (dissolved and entrained) of hydrocarbons at relevant exposure thresholds is only predicted to occur within the upper 0-10 m of the water column. For the worst-case scenario modelled, exposure to nearshore areas, where culturally important species such abalone, bimbalas, mussels, oysters and pipis may be present, was predicted at moderate (50 ppb) thresholds of dissolved, with some sites predicted to be exposed to high thresholds of both dissolved (400 ppb) and entrained (100 ppb) (RPS 2023). The shallow waters of King Island and Albatross Island were the only nearshore areas predicted to be exposed to high exposure levels of dissolved and entrained in-water hydrocarbons for the worst-case scenario modelled (RPS 2023). The modelling predicted high thresholds of dissolved and entrained to occur within Tasmanian state waters, however, only low thresholds levels for dissolved and entrained hydrocarbons were predicted for Victorian state waters (RPS 2023).	Marine invertebrates, located in shallow nearshore or intertidal waters where diversity and abundance are highest may be impacted moderate exposure of dissolved (50 ppb) and high exposure of entrained (100 ppb) hydrocarbons predicted to occur within the upper 0 – 10 m of the water column. The worst-case scenario modelled predicted exposure to some nearshore areas at high thresholds of entrained (100 ppb) hydrocarbons. No nearshore areas were predicted to be impacted by moderate (50 ppb) or high (400 ppb) thresholds of dissolved hydrocarbons (RPS 2023). Both the nearshore waters of Tasmania and Victoria were identified to be exposed to thresholds of entrained (100 ppb) hydrocarbons, however, at relatively low probabilities (2% and 7%, respectively). The potential exposure area for MDO is located entirely within the potential exposure area for condensate LOWC (RPS 2023).
Predicted Environmental Impact	
In-water	

Marine Invertebrates
The primary modes of exposure for marine invertebrate communities include: • Direct exposure to dispersed oil (e.g., physical smothering) from a subsea release of hydrocarbon which remains at the sea floor, • Direct exposure to dispersed and non-dispersed oil (e.g., physical smothering) where oil sinks down from higher depths of the ocean, • Direct exposure to dispersed and non-dispersed oil dissolved in sea water and/or partitioned onto sediment particles, • Indirect exposure to dispersed and non-dispersed oil through the food web (e.g., uptake of oiled plankton, detritus, prey, etc.) (NRDA 2012), and • Acute or chronic exposure through surface contact and/or ingestion can result in toxicological risks. Entrained and dissolved hydrocarbons can have negative impacts on marine invertebrates and associated larval forms. Impacts to some adult species (e.g. crustaceans) is reduced as a result of the presence of an exoskeleton, while others with no exoskeleton and larval forms may be more prone to impacts. Exposure to microscopic oil droplets may also impact aquatic biota either mechanically (especially filter feeders) or act as a conduit for exposure to semi-soluble hydrocarbons (that might be taken up by the gills or digestive tract) (French-McCay 2009). Toxicity is primarily attributed to water soluble polycyclic aromatic hydrocarbons (PAHs), specifically the substituted naphthalene (C2 and C3) as the higher C-ring compounds become insoluble and are not bioavailable. ANZECC (2000) identifies the following 96-hr LC50 concentrations (concentrations that kill 50% of test animals during a 96-hour observation period) for naphthalene (a key PAH dissolved phase toxicant in crude oils): • For the bivalve mollusc, *Katelysia opima*, a concentration of 57,000 ppb. • For six species of marine crustaceans, a concentration between 850 and 5,700 ppb. If invertebrates are contaminated by hydrocarbons, tissue taint can remain for several months, although taint may eventually be lost. For example, it has been demonstrated that it took 2-5 months for lobsters to lose their taint when exposed to a light hydrocarbon (NOAA 2002). Studies of offshore benthic decapod assemblages (crabs, lobsters, prawns) associated with the seaweeds and benthic substrate in the northwest Gulf of Mexico prior to and after the Macondo well blowout at Sackett and Ewing banks (in water depths of 55–75 m) showed a strong decline in abundance at both banks post-spill (species richness on Ewing Bank reduced by 42% and on Sackett Bank by 29%) (Felder et al. 2014), however, these banks are exposed to influences from Mississippi River discharges that vary year to year, so definitive links to the oil spill were not possible. Petroleum residues were observed on Ewing Bank and it is possible that this may have caused localised mortalities, reduced fecundity of surviving female decapods and/or reduced recruitment (Felder et al. 2014). Felder et al. (2014) also notes that freshly caught soft-sediment decapod samples caught in early and mid-2011 near the spill site exhibited lesions that were severe enough to cause appendage loss and mortality. Other possible impacts from the presence of dispersed and non-dispersed oil include effects of oxygen depletion in bottom waters due to bacterial metabolism of oil (and/or dispersants), and light deprivation under surface oil (NRDA 2012). Water quality in benthic habitats exposed to entrained hydrocarbons would be expected to return to background conditions within weeks to months of contact. Several studies have indicated that rapid recovery rates may occur even in cases of heavy oiling (National Academies Press 2003).

Marine Invertebrates
Predicted Level of Impact
The physical properties of the hydrocarbons and the well- mixed nature of the waters known within this area, indicates that prolonged exposure to hydrocarbons at relevant exposure thresholds is considered relatively unlikely. Given exposure is limited to in-water hydrocarbons within the upper 0 – 10 m of the water column, and not within the deeper areas of the water column where rock lobster and giant crab species are found, impacts to these species are not predicted. However, nearshore species such as abalone, bimbalas, mussels, oysters and pipis which occur within the upper 0 – 10 m of the water column may be exposed to hydrocarbons. Consequently, the potential consequence to invertebrates, including commercially and recreationally fished and culturally important species, are considered to be **Moderate (2)**, as they could result in medium-term impacts on a small portion of the invertebrate population (in shallow waters), with no population level impact expected.

Fish

<table>
<tr><th colspan="2">Fish</th></tr>
<tr><td>Predicted Hydrocarbon Exposure</td><td>✘ Surface ✓ In-water ✘ Shoreline</td></tr>
<tr><td>Relevant Exposure Thresholds</td><td>Moderate Exposure Thresholds (Dissolved)
High Exposure Thresholds (Entrained)</td></tr>
<tr><td>Condensate</td><td>MDO</td></tr>
<tr><td>Several fish species may be present within the area exposed to moderate thresholds of dissolved (50 ppb) and high thresholds of entrained (100 ppb) hydrocarbons following a LOWC of condensate (see Section 6.4.7.3 for all EPBC-listed fish species).
Demersal species may be susceptible to oiled sediments, particularly species that are site restricted.
Any pelagic fish and shark species that occupy the water column, specifically within the upper 0 – 10 m of the water column the surface layers of the water column (where in-water hydrocarbon exposure at relevant exposure thresholds is predicted), are more susceptible to entrained and dissolved hydrocarbons.
Since fish and sharks do not generally break the sea surface, the impacts of surface hydrocarbons to fish and shark species are unlikely to occur. Near the sea surface, fish are able to detect and avoid contact with surface slicks meaning fish mortalities rarely occur in the event of a hydrocarbon spill in open waters (Volkman et al. 1994).
Besides an overlap with the white shark distribution BIA, which resides within the release location, the modelling predicted an overlap with the foraging and breeding BIA for the white shark by moderate thresholds of dissolved (27% and 1% probabilities, respectively) (RPS 2023).
High threshold levels of entrained hydrocarbons (100 ppb) were also predicted to overlap the foraging BIAs of the white shark (78% probability) (RPS 2023).
No overlap with grey nurse shark BIAs at relevant exposure thresholds is predicted.</td><td>Several fish species may be present within the area exposed to moderate thresholds of dissolved (50 ppb) and high thresholds of entrained (100 ppb) hydrocarbons following a vessel LOC of MDO (see Section 6.4.7.3) for all EPBC-listed fish species).
Besides an overlap with the white shark distribution BIA (within which the modelled release locations are located), the modelling predicted an overlap with the foraging BIA by only the high thresholds of entrained (100 ppb) hydrocarbons (2% probability). No BIA outside of where the release location is located was predicted to be impacted by moderate threshold of dissolved (50 ppb) hydrocarbons.
The potential exposure area for MDO is located entirely within the potential exposure area for condensate LOWC (RPS 2023).</td></tr>
<tr><td colspan="2">Predicted Environmental Impact</td></tr>
<tr><td colspan="2">In-water</td></tr>
<tr><td colspan="2">Fish (including) sharks can be exposed to in-water hydrocarbon droplets through a variety of pathways, including:</td></tr>
</table>

Fish
• Direct dermal contact (e.g. whilst swimming through oil or waters with elevated dissolved hydrocarbon concentrations and other constituents, with diffusion across their gills (Hook et al. 2016)), • Ingestion (e.g. directly or via food base, fish that have recently ingested contaminated prey may themselves be a source of contamination for their predators), and • Inhalation (e.g. elevated dissolved contaminant concentrations in water passing over the gills). Exposure to hydrocarbons entrained or dissolved in the water column can be toxic to fish. Studies have shown a range of impacts including changes in abundance, decreased size, inhibited swimming ability, changes to oxygen consumption and respiration, changes to reproduction, immune system responses, DNA damage, visible skin and organ lesions and increased parasitism. However, many fish species can metabolise toxic hydrocarbons, which reduces the risk of bioaccumulation of contaminants in the food web (and human exposure to contaminants through the consumption of seafood) (NRDA 2012). Sub-lethal impacts in adult fish include altered heart and respiratory rates, gill hyperplasia, enlarged liver, reduced growth, fin erosion, impaired endocrine systems, behavioural modifications and alterations in feeding, migration, reproduction, swimming, schooling, and burrowing behaviour (Kennish 1996). Fish exposed to aromatics in the water have been shown to have a reduced aerobic capacity, which may be a result of the process to eliminate ingested oil from the fish (Cohen et al. 2005). However, generally these species are highly mobile species, and their patterns of movements makes it unlikely for them to remain within the area long enough to be exposed to hydrocarbons to experience sub-lethal impacts (ITOPF 2011a). The exception would be in areas such as reefs and other seabed features where species are less likely to move away into open waters (i.e., site-attached species). Pelagic species fish are able to detect and avoid contact with surface slicks meaning fish mortalities rarely occur in the event of a hydrocarbon spill in open waters (Volkman et al. 1994). As a result, wide-ranging pelagic fish of the open ocean generally are not highly susceptible to impacts from surface hydrocarbons. Adult fish kills reported after oil spills, occur mainly to shallow water, near-shore benthic species (Volkman et al. 1994). Fish are most vulnerable to hydrocarbons during their embryonic, larval and juvenile life stages. Embryos and larvae may sustain mechanical damage to feeding and breathing apparatus from contact with oil droplets, and genetic damage, physical deformities and altered developmental timing from hydrocarbons in water (Fodrie and Heck, 2011). There may also be chronic effects to fish exposed to hydrocarbons in early life stages, such as disruption of predator avoidance behaviour (Hjermann et al. 2007). Eggs and larvae exposed to weathered concentrations of hydrocarbons in water for a prolonged period of time have been shown to be immunosuppressed (Hjermann et al. 2007). Hydrocarbons in the water column can physically affect fish with high site fidelity. When exposed for an extended duration (weeks to months) coating of gills may lead to lethal and sub-lethal effects from reduced oxygen exchange and coating of body surfaces may lead to increased incidence of irritation and infection. Fish may also ingest hydrocarbon droplets or contaminated food, leading to reduced growth (Volkman et al. 1994). Studies of impacts on bony fishes report that light, volatile oils are likely to be more toxic to fish. Many studies conclude that exposure to PAHs and soluble compounds are responsible for the majority of toxic impacts observed in fish (e.g., Carls et al. 2008; Ramachandran et al. 2004). The threshold value for species toxicity in the water column is based on global data from French et al. (1999) and French-McCay (2002, 2003) This data showed that species sensitivity (fish and invertebrates) to dissolved aromatics exposure of >4 days (96-hour LC50) under different environmental conditions varied from 6 to 400 µg/L (ppb), with an average of 50 ppb. This range covered 95% of aquatic organisms tested, which included species during sensitive life stages (eggs and larvae). Based on scientific literature, a minimum threshold of 6 ppb over 96 hours or equivalent was used to assess in-water low exposure zones (Engelhardt 1983; Clark 1984; Geraci and St Aubin 1988; Jenssen 1994; Tsvetnenko 1998). French-McCay (2002) indicates that an average 96-hour LC50 of 50 ppb could serve as an acute lethal threshold to 50%. Large scale fish kills have rarely been observed as a result of hydrocarbon spills (ITOPF 2011a) (though mortality in aquaculture pens has been reported), which is likely to be because vertebrates can rapidly metabolise and excrete hydrocarbons (Hook et al. 2016). Furthermore, the majority of studies, either from laboratory trials or of fish collected

Fish
after spill events (including the Hebei Spirit, Macondo, and Sea Empress spills), found evidence of elimination of PAHs in fish tissues returning to reference levels within two months of exposure when subsequently exposed to clean water (Challenger and Mauseth 2011; Davis et al. 2002; Gagnon & Rawson 2011; Gohlke et al. 2011; Jung 2011; Law 1997; Rawson et al. 2011). Recovery of fish assemblages depends on the intensity and duration of an unplanned discharge, the composition of the discharge and whether dispersants are used, as each of these factors influences the level of exposure to potential toxicants. Recovery would also depend on the life cycle attributes of fishes. Species that are abundant, short-lived and highly fecund may recover rapidly. However less abundant, long-lived species may take longer to recover. The range of movement of fishes will also influence recovery. The nature of the receiving environment would influence the level of impact on fishes.
Predicted Level of Impact
There is a known distribution, foraging and breeding BIA for the white shark in the area exposed to in-water hydrocarbons (RPS 2023), however, it is not expected that this species spends a large amount of time close to the surface (within the 0-10 m water depth) 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). Furthermore, impacts on eggs and larvae entrained in the upper water column are not expected to be significant given the temporary period of water quality impairment, and the limited geographical extent of the spill. As egg/larvae dispersal is extensive in the upper layers of the water column and it is expected that current induced drift will rapidly replace any affected populations. Impacts to King George whiting spawning and recruitment was raised by a stakeholder (Stakeholder ID 25165861) in relation to the Corner Inlet Fishery. However, exposure at the moderate thresholds of dissolved (50 ppb) and high thresholds of entrained (100 ppb) hydrocarbons are not predicted within Corner Inlet. Consequently, the potential consequence to fish, including eggs/larvae and those commercially and recreationally fished and culturally important, are considered to be **Moderate (2)**, as they could be expected to result in localised low-level, short-term impacts to species of commercial, conservation and cultural value.

Birds

Birds		
Predicted Hydrocarbon Exposure		✓ **Surface** ✓ **In-water** ✓ **Shoreline**
Relevant Exposure Thresholds		**Surface: Moderate Exposure Threshold** **In-water: Moderate Exposure Threshold (Dissolved) and High Exposure Threshold (Entrained)** **Shoreline: Moderate Exposure Threshold**
Condensate		**MDO**
Several threatened, migratory and/or listed marine bird species have the potential to be rafting, resting, diving and feeding within the area predicted to be contacted by surface hydrocarbons; diving or foraging within in-water hydrocarbons; and foraging or nesting within shoreline exposure following a LOWC of condensate. The modelling predicted a maximum distance of 88 km for surface hydrocarbons at, or above, the moderate threshold for the worst-case scenario (RPS 2023). The extent of the in-water hydrocarbons overlaps foraging BIAs for several species, such as various albatross species (i.e. antipodean, black-browed, Bullers, Campbell, Indian-yellow-nosed, shy and wandering), petrels (white-face storm and common-diving), little penguin, black-faced cormorant, and the wedge-tailed shearwater (see Section 6.4.7.4 for the full list). Based on the worst-case scenario, the modelling predicted the highest probability of shoreline accumulation at, or above, the moderate (100 g/m^2) threshold to occur at King Island (81%), followed by Colac Otway (37% probability), with the minimum time for shoreline contact predicted as 9 days (King Island) and 7 days (Colac Otway), with a peak volumes ashore of 188 m^3 and 96 m^3 respectively, (RPS 2023).		Several threatened, migratory and/or listed marine species have the potential to be rafting, resting, diving and feeding within the area predicted to be contacted by surface hydrocarbons; diving or foraging within in-water hydrocarbons; and foraging or nesting within shoreline exposure following a LOWC of condensate. The modelling predicted a maximum distance of 57 km for surface hydrocarbons at, or above, the moderate threshold for the worst-case scenario (RPS 2023). Based on the worst-case scenario, the modelling predicted the highest probability of shoreline accumulation at, or above, the moderate (100 g/m^2) threshold to occur at king Island (13%), followed by Colac Otway (6% probability), with the minimum time for shoreline contact predicted as 7 days (King Island) and 2 days (Colac Otway), with a peak volumes ashore of 29 m^3 and 35 m^3 respectively, (RPS 2023). The potential exposure area for MDO is located entirely within the potential exposure area for condensate LOWC (RPS 2023).
Predicted Environmental Impact		
Surface	**In-water**	**Shoreline**
Seabirds rafting, resting, diving or feeding within surface hydrocarbons may be exposed to surface hydrocarbons. Species most at risk include those that readily rest on the sea surface (such as shearwaters) and surface plunging species such as terns and boobies.	Seabirds could be impacted by in-water hydrocarbon exposure directly (i.e., whilst diving through the water column foraging) or indirectly (i.e. by consuming hydrocarbon-tainted fish, resulting in sub-lethal or toxic impacts).	Shorebird species foraging for invertebrates in intertidal feeding habitats, such as exposed sand and mud flats at lower tides, will be at potential risk of both direct impacts through contamination of individual birds (ingestion or soiling of feathers) and indirect impacts

Birds

Direct contact with hydrocarbons is likely to foul plumage, which may result in hypothermia due to a reduction in the ability of the bird to thermo-regulate and impaired waterproofing (ITOPF 2011a). Increased heat loss as a result of a loss of water-proofing results in an increased metabolism of food reserves in the body, which is not countered by a corresponding increase in food intake and may lead to emaciation (DSEWPaC 2011a).

A bird suffering from cold, exhaustion and a loss of buoyancy (resulting from fouling of plumage) may dehydrate, drown or starve (ITOPF 2011a; DSEWPaC 2011a; AMSA 2013). Physical smothering may also result in impaired navigation and flight performance (Hook et al. 2016).

Toxic effects on birds, including internal tissue irritation in their lungs and stomachs, may also result where the oil is ingested as the bird attempts to preen its feathers (ITOPF 2011a). The preening process may also spread oil over otherwise clean areas of the body (ITOPF 2011a). Whether this toxicity ultimately results in mortality will depend on the amount consumed and other factors relating to the health and sensitivity of the bird.

In a review of 45 marine hydrocarbon spills, there was no correlation between the numbers of bird deaths and the volume of the spill (Burger 1993).

Penguins may be especially vulnerable to oil because they spend a high portion of their time in the water and readily lose insulation and buoyancy if their feathers are oiled. The Iron Baron vessel spill, of 325 tonnes of bunker fuel in Tasmania in 1995, is estimated to have resulted in the death of up to 20,000 penguins (Hook et al. 2016).

As seabirds are top order predators, any impact on other marine life (e.g., pelagic fish) from hydrocarbon exposure may disrupt and limit food supply both for the maintenance of adults and the provisioning of young.

Furthermore, the foraging BIAs are typical over relatively extensive areas, therefore, impacts are not anticipated at a population level due to the localised and temporary exposure of moderate levels of surface hydrocarbons.

through the contamination of foraging areas that may result in a reduction in available prey items (Clarke 2010).

Any direct impact of oil on terrestrial habitats has the potential to contaminate seabirds present at the breeding sites (Clarke 2010). Bird eggs may also be damaged if an oiled adult sits on the nest. Fresh crude was shown to be more toxic than weathered crude, which had a medial lethal dose of 21.3 mg/egg (Clarke 2010). Studies of contamination of duck eggs by small quantities of crude oil, mimicking the effect of oil transfer by parent birds, have been shown to result in mortality of developing embryos (French-McCay, 2009).

Shoreline accumulation will be concentrated along the high tide mark while the lower/upper parts are often untouched (IPIECA, 1995). As breeding activities of shorebirds and seabirds generally occurs above the high tide mark, exposure to hydrocarbons is considered unlikely to occur.

However, oiled bird species may track oil into their nests, which may then have subsequent impacts on any eggs present. The little penguin, is the species where this would be the highest risk, as they have to traverse through the intertidal area to reach nesting sites.

Predicted Level of Impact

Acute or chronic toxicity impacts (death or long-term poor health) to seabirds is possible, however, the presence of birds within areas exposed to moderate threshold levels is expected to be limited, due to the transitory nature of foraging individuals, and given the absence of offshore aggregation areas in the area.

Based on the worst-case scenario, the modelling predicted the highest probability of shoreline accumulation at, or above, the moderate (100 g/m^2) threshold to occur at King Island (81%), followed by Colac Otway (37% probability), with the minimum time for shoreline contact predicted as 9 days (King Island) and 7 days (Colac Otway), with a peak volumes ashore of 188 m^3 and 96 m^3 respectively, (RPS 2023).

Birds
However, due to the anticipated hydrocarbon weathering and fate of the condensate, majority is expected to have either evaporated or entrained during that time. Modelling predicted between approximately 70-82% of the volume to evaporate and between 0-22% to entrain within the first 24 hours, depending on the wind conditions (RPS 2023). Furthermore, tidal and wave action within the area is anticipated to breakdown any shoreline hydrocarbons. Consequently, the potential consequence to seabirds and shorebirds is considered to be **Moderate (2)**, as they could be expected to result in minor, short-term impact to species of recognised conservation value.

Marine Reptiles

Marine Reptiles	
Predicted Hydrocarbon Exposure	✓ **Surface** ✓ **In-water** ✓ **Shoreline**
Relevant Exposure Thresholds	**Surface: Moderate Exposure Threshold** **In-water: Moderate Exposure Threshold (Dissolved) and High Exposure Threshold (Entrained)** **Shoreline: Moderate Exposure Threshold**
Condensate	**MDO**
Marine turtles may be exposed to hydrocarbon when transiting through in-water hydrocarbons, surfacing to breathe within the surface slick, or nesting on oiled shorelines following a LOWC of condensate. There are no BIAs or habitat critical to the survival of the species (Section 6.4.7.5) within the area predicted to be exposed to moderate thresholds of surface, shoreline and dissolved (in-water) hydrocarbons or high thresholds of entrained (in-water) hydrocarbons.	Marine turtles may be exposed to hydrocarbon when transiting through the in-water hydrocarbons, surfacing to breathe within the surface slick, or nesting on oiled shorelines following a vessel LOC of MDO. The potential exposure area for MDO is located entirely within the potential exposure area for condensate LOWC (RPS 2023). There are no BIAs or habitat critical to the survival of the species (Section 6.4.7.5) within the area predicted to be exposed to moderate thresholds of surface, shoreline and dissolved (in-water) hydrocarbons or high thresholds of entrained (in-water) hydrocarbons.

Predicted Environmental Impact

Marine sea turtles are vulnerable to the effects of oil at all life stages—eggs, post-hatchlings, juveniles, and adults in nearshore waters. Several aspects of marine turtle biology and behaviour place them at particular risk (NOAA 2010a), including a lack of avoidance behaviour, indiscriminate feeding in convergence zones, and large pre-dive inhalations. Oil exposure affects different turtle life stages in different ways. Turtles may be exposed to chemicals in oil in two ways:

- Internally – eating or swallowing oil, consuming prey containing oil-based chemicals, or inhaling of volatile oil related compounds; and
- Externally – swimming in oil or dispersants, or oil or dispersants on skin and body.

Effects of oil on turtles include:

- Increased egg mortality and developmental defects,
- Direct mortality due to oiling in hatchlings, juveniles, and adults, and
- Negative impacts to the skin, blood, digestive and immune systems and salt glands.

Surface	In-water	Shoreline

Marine Reptiles

Marine turtles make large, rapid inhalations before they dive which may result in inhalation of toxic vapours from hydrocarbons in surface waters (Milton and Lutz, 2003). This can lead to respiratory irritation, inflammation, emphysema or pneumonia (NOAA 2010a).

Ingested oil may cause harm to the internal organs of turtles. Visibly oiled turtles showed higher indicators of polycyclic aromatic hydrocarbons (PAH) in tissues, stomach content, colon content and faeces compared to non-visibly oiled turtles (Ylitalo et al. 2017). This exposure pathway may cause an increase in the production of white blood cells and may affect the functioning of their salt gland (Lutcavage et al. 1995). Oiling has the potential to cause mortality depending on the size of the individual and the extent of oiling (DWH Natural Resource Damage Assessment Trustees, 2016).

Some individual marine reptiles may come into contact with in-water hydrocarbon exposure while swimming or feeding.

Entrained hydrocarbons can adhere to body surfaces (Gagnon and Rawson 2010) and can enter cavities such as the eyes, nostrils, or mouth. This can cause an elevated susceptibility to infections (NOAA 2010a).

Records of oiled wildlife during spills rarely include marine turtles, even from areas where they are known to be relatively abundant (Short 2011). An exception to this was the large number of marine turtles collected (613 dead and 536 live) during the Macondo spill in the Gulf of Mexico, although many of these animals did not show any sign of oil exposure (NOAA 2013). Of the dead turtles found, 3.4% were visibly oiled and 85% of the live turtles found were oiled (NOAA 2013). Of the captured animals, 88% were later released, suggesting that oiling does not inevitably lead to mortality.

Marine turtles may experience oiling impacts on nesting beaches when they come ashore to lay their eggs. There is potential for contamination of turtle eggs to result in toxic impacts, such as developmental defects in hatchlings, to developing embryos.

Studies on freshwater snapping turtles showed uptake of polycyclic aromatic hydrocarbons (PAHs) from contaminated nest sediments, but no impacts on hatching success or juvenile health following exposure of eggs to dispersed weathered light crude (Rowe et al. 2009). However, other studies found evidence that exposure of freshwater turtle embryos to PAHs results in deformities (Bell et al. 2006, Van Meter et al. 2006).

Turtle hatchlings may be more vulnerable to smothering as they emerge from the nests and make their way over the intertidal area to the open water (AMSA 2015). Hatchlings that contact oil residues while crossing a beach can exhibit a range of effects including impaired movement and bodily functions (Shigenaka 2010). Hatchlings sticky with oily residues may also have more difficulty crawling and swimming, rendering them more vulnerable to predation.

Marine pollution is listed as a threat to marine turtle in the Recovery Plan for Marine Turtles in Australia, 2017 – 2027, particularly in relation to shoreline oiling of nesting beaches.

Predicted Level of Impact

The number of marine turtles that may be exposed to hydrocarbons during a spill event is expected to be low due to the localised and temporary presence of surface hydrocarbons at moderate exposure levels and the absence of BIAs or habitat critical to the survival of the species within this area. The potential impact would be limited to individual transiting marine turtles, with population impacts not anticipated. Furthermore, there are no nesting beaches within the Planning Areas, and the activity will be conducted in a manner which is not inconsistent with the relevant management actions.

Consequently, the potential consequence to marine turtles is considered to be **Moderate (2)**, as they could be expected to result in minor, short-term impact to species of recognised conservation value.

Pinnipeds

<table>
<tr><th colspan="6">Pinnipeds</th></tr>
<tr><td colspan="3">Predicted Hydrocarbon Exposure</td><td colspan="3">✓ Surface ✓ In-water ✓ Shoreline</td></tr>
<tr><td colspan="2">Relevant Exposure Thresholds</td><td colspan="4">Surface: Moderate Exposure Threshold
In-water: Moderate Exposure Threshold (Dissolved) and High Exposure Threshold (Entrained)
Shoreline: Moderate Exposure Threshold</td></tr>
<tr><th colspan="3">Condensate</th><th colspan="3">MDO</th></tr>
<tr><td colspan="3">Pinnipeds may be present within the area exposed to hydrocarbons following a LOWC of condensate. Individuals have the potential to be impacted by surface hydrocarbons when surfacing to breathe, in-water hydrocarbons when transiting through the area, and shoreline accumulated hydrocarbons that occur at haul-out sites along the coastline.
The modelling predicted a maximum distance of 88 km for surface hydrocarbons at, or above, the moderate threshold for the worst-case scenario (RPS 2023).
Important breeding sites for the Australian fur seal, such as Seal Rocks and Kanowna Island, off the coast of Victoria colonies may be exposed to hydrocarbons, Therefore, hydrocarbon exposure to individual whilst transit through exposed nearshore waters to breeding sites may be impacted.
However, no BIAs for pinnipeds were identified within the area predicted to exposed to moderate thresholds of surface, shoreline and dissolved (in-water) hydrocarbons or high thresholds of entrained (in-water) hydrocarbons (see Section 6.4.7.7).</td><td colspan="3">Pinnipeds may be present within the area exposed to hydrocarbons following a vessel LOC of MDO. Individuals have the potential to be impacted by surface hydrocarbons when surfacing to breathe, in-water hydrocarbons when transiting through the area, and shoreline accumulated hydrocarbons that occur at haul-out sites along the coastline.
The modelling predicted a maximum distance of 57 km for surface hydrocarbons at, or above, the moderate threshold for the worst-case scenario (RPS 2023).
The potential exposure area for MDO is located entirely within the potential exposure area for condensate LOWC (RPS 2023).</td></tr>
<tr><td colspan="6">Predicted Environmental Impact</td></tr>
<tr><th colspan="2">Surface</th><th colspan="2">In-water</th><th colspan="2">Shoreline</th></tr>
<tr><td colspan="2">Pinnipeds are vulnerable to sea surface exposures given they spend much of their time on or near the surface of the water, to breathe and regularly haul out on to beaches.
As a result of exposure to surface oils, pinnipeds, with their relatively large, protruding eyes are particularly vulnerable to effects such as irritation to mucous</td><td colspan="2">Pinnipeds are sensitive to in-water hydrocarbon exposure as they will stay near established colonies and haul-out areas, meaning they are less likely to practice avoidance behaviours. This is corroborated by Geraci and St. Aubins (1988) who suggest seals, sea-lions and fur-seals have been observed swimming in oil slicks during a number of documented spills.</td><td colspan="2">Breeding colonies may be sensitive to hydrocarbon spills in the event of shoreline accumulation. Individual adults may also be impacted by oil while transiting through the nearshore environments at haul-out sites that may be impacted from the spill event.
Following the Iron Baron oil spill (in Tasmania 1995) nearby seal colonies were monitored. The report</td></tr>
</table>

Pinnipeds		
membranes that surround the eyes. Irritation may also occur to mucous membranes that line the oral cavity, respiratory surfaces, and anal and urogenital orifices. Hook et al. (2016) reports that seals appear not to be very sensitive to contact with oil, but instead to the toxic impacts from the inhalation of volatile components. For some pinnipeds, fur is an effective thermal barrier because it traps air and repels water. Petroleum stuck to fur reduces its insulative value by removing natural oils that waterproof the pelage. Consequently, the rate of heat transfer through fur seal pelts can double after oiling (Geraci & St. Aubin 1988), adding an energetic burden to the animal. Kooyman et al. (1976) suggest that fouling of approximately one-third of the body surface resulted in 50% greater heat loss in fur-seals immersed in water at various temperatures. Heavy oil coating and tar deposits on fur-seals may result in reduced swimming ability and lack of mobility out of the water. Pinnipeds other than fur-seals are less threatened by thermal effects of fouling, if at all (Helm et al. 2015). Oil has no effect on the relatively poor insulative capacity of sea-lion and bearded and ringed seal pelts, and oiled Weddell seal samples show some increase in conductance (Oritsland 1975; Kooyman et al. 1976, 1977). ITOPF (2011a) demonstrates that species that rely on fur to regulate their body temperature (such as fur-seals) are most vulnerable to oil, as the animals may die from hypothermia or overheating, depending on the season, if the fur becomes matted with oil. It is reported that most pinnipeds scratch themselves vigorously with their flippers and do not lick or groom themselves, so are less likely to ingest oil from skin surfaces (Geraci & St. Aubin 1988). However, mothers trying to clean an oiled pup may ingest oil. Ingested hydrocarbons can irritate or destroy epithelial cells that	Hydrocarbons within the water column or consumption of prey affected by the oil may cause sub-lethal impacts to pinnipeds. However, impacts to pinnipeds at a population level are considered very unlikely given their transient, highly mobile nature and their typically extensive foraging grounds.	concluded that reduced pup production was evident on islands close to the spill, but not evident on islands more distant (Pemberton 1999) Conservation Listing Advice for the *Neophoca cinerea* (Australian sea lion) (TSSC, 2010) identifies oil spills as a potential threat to habitat. However, activities within this Environment Plan will not be inconsistent with the conservation and management priorities outlined in this advice.

Pinnipeds
line the stomach and intestine, thereby affecting motility, digestion and absorption.
Predicted Level of Impact
Physical contact with diesel and condensate which are light hydrocarbons are unlikely to result in levels of oiling and matting of pelts to results in seals not being able to thermal regulate. Impacts to the Australian sea lion are unlikely as they do not have fur, breed outside the Planning Area and is a specialised benthic forager, i.e. it feeds primarily on the sea floor (DSEWPaC 2013). Individual pinnipeds may be exposed to hydrocarbons within the near-shore waters and accumulated on the shoreline in areas where colonies and breeding/haul out sites are present, and hydrocarbons are above the moderate exposure threshold such as along the Otway coast, Seals Rocks and Kanowna Island and Maatsuyker Island. Consequently, the potential consequence to pinnipeds are considered to be **Moderate (2)**, as they could be expected to result in minor, short-term impact to species of recognised conservation value.

Cetaceans

Cetaceans	
Predicted Hydrocarbon Exposure	✓ **Surface** ✓ **In-water** ✘ **Shoreline**
Relevant Exposure Thresholds	**Surface: Moderate Exposure Threshold** **In-water: Moderate Exposure Threshold (Dissolved) and High Exposure Threshold (Entrained)**
Condensate	**MDO**
Several threatened, migratory and/or listed cetacean species may occur within the area predicted to be exposed to moderate levels of surface hydrocarbons following a LOWC of condensate (see Section 6.4.7.6) including: • Blue, fin, humpback, pygmy right and sei foraging, feeding or related behaviour. • Pygmy blue whale foraging BIAs • Southern right whale migration BIA. The modelling predicted a maximum distance of 88 km for surface hydrocarbons at, or above, the moderate threshold for the worst-case scenario (RPS 2023). Several threatened, migratory and/or listed cetacean species may occur within the area predicted to be exposed to moderate dissolved or high entrained exposure (in the upper 0 -10 m of the water column) which thresholds in the water column following a LOWC of condensate (see Section 6.4.7.6) including: • Blue, fin, humpback, pygmy right and sei foraging, feeding or related behaviour. • Pygmy blue whale foraging BIAs • Southern right whale migration and reproduction BIAs.	Several threatened, migratory and/or listed cetacean species may occur within the area predicted to be exposed to moderate levels of surface hydrocarbons following a LOC of MDO (see Section 6.4.7.6) including: • Blue, fin, pygmy right and sei foraging, feeding or related behaviour. • Pygmy blue whale foraging BIAs • Southern right whale migration BIA. • The modelling predicted a maximum distance of 57 km for surface hydrocarbons at, or above, the moderate threshold for the worst-case scenario (RPS 2023). Several threatened, migratory and/or listed cetacean species may occur within the area predicted to be exposed to moderate dissolved or high entrained exposure (in the upper 0 -10 m of the water column) which thresholds in the water column following a LOC of MDO (see Section 6.4.7.6) including: • Blue, fin, humpback, pygmy right and sei foraging, feeding or related behaviour. • Pygmy blue whale foraging BIAs • Southern right whale migration and reproduction BIAs.
Predicted Environmental Impact	
Cetaceans can be exposed to the chemicals in oil through: • Dermal contact, by swimming in oil and having oil directly on the skin and body (NRDA 2012; Hook et al. 2016). • Inhaling volatile oil compounds when surfacing to breathe. • Internal exposure by consuming oil or contaminated prey. The effects of this exposure include: • Maternal transfer of contaminants to embryos.	

Cetaceans	
• Hypothermia due to conductance changes in skin, resulting in metabolic shock (expected to be more problematic for non-cetaceans in colder waters). • Toxic effects and secondary organ dysfunction due to ingestion of oil. • Congested lungs. • Damaged airways. • Interstitial emphysema due to inhalation of oil droplets and vapour. • Gastrointestinal ulceration and haemorrhaging due to ingestion of oil during grooming and feeding. • Eye and skin lesions from continuous exposure to oil. • Decreased body mass due to restricted diet. • Stress due to oil exposure and behavioural changes.	
Surface	**In-water**
Cetaceans may come into contact with surface hydrocarbons when surfacing. However, direct surface oil contact with hydrocarbons is considered to have little deleterious effect on cetaceans, and any effect is likely to be minor and temporary. This may be due to the skin's effectiveness as a barrier to toxicity (Geraci & St Aubin 1988). Cetaceans have mostly smooth skins with limited areas of pelage (hair covered skin) or rough surfaces such as barnacled skin. Oil tends to adhere to rough surfaces, hair, or calluses of animals, so contact with hydrocarbons by cetaceans is expected to cause only minor hydrocarbon adherence. Helm et al. (2015) detailed that oil does not adhere to cetacean's relatively slick skin and it would not be expected to accumulate in or around the eyes, mouth, blow hole, or other potentially sensitive external areas. Insulation is provided by a layer of blubber rather than hair or fur, so it is unlikely oil would compromise the thermoregulatory system of cetaceans. The inhalation of oil droplets, vapours and fumes is a distinct possibility if cetaceans' surface in slicks to breathe (Helm et al. 2015). Exposure to hydrocarbons in this way could damage mucous membranes and damage airways threatening their health. The risk is greatest near the source of a fresh spill because volatile toxic vapours disperse relatively quickly (Helm et al. 2015). The susceptibility to ingested hydrocarbon has also been shown to vary with feeding habits. Baleen whales (such as blue, fin, pygmy right and sei) are not particularly susceptible to ingestion of oil in the water column but are susceptible to oil at the sea surface as they feed by skimming the surface. Oil may stick to the baleen while they 'filter feed' near slicks. Sticky, tar-like residues are particularly likely to foul the baleen	Cetaceans exposed to entrained hydrocarbons can result in physical coating as well as ingestion (Geraci and St Aubin, 1988). Such impacts are associated with 'fresh' hydrocarbon, the risk of impact declines rapidly as the hydrocarbon weathers. The susceptibility to ingested hydrocarbon has also been shown to vary with feeding habits. Specifically, toothed whales and dolphins may be susceptible to ingestion of dissolved and entrained oil as they gulp feed at depth. There are reports of declines in the health of individual pods of killer whales (a toothed whale species), though not the population as a whole, in Prince William Sound after the Exxon Valdez vessel spill (heavy oil) (Hook et al. 2016). Geraci (1988) found little evidence of cetacean mortality from hydrocarbon spills; however, some behaviour disturbance (including avoidance of the area) may occur. Pelagic species have been said to avoid hydrocarbon, mainly because of its noxious odours, but this has not been proven. In the event that avoidance were to occur, the potential for physiological impacts from contact with hydrocarbons would be reduced, however, active avoidance of an area may disrupt behaviours such as migration, or displace individuals from important habitat, such as foraging, resting or breeding. Although, the strong attraction to specific areas for breeding or feeding may override any tendency for cetaceans to avoid the noxious presence of hydrocarbons. Dolphin populations from Barataria Bay, Louisiana, USA, which were exposed to prolonged and continuous oiling from the Macondo oil spill in 2010, had higher incidences of lung and kidney disease than those in the other urbanised

Cetaceans	
plates. However, the structural and chemical integrity of isolated baleen plates of seven species of whales were reported to remain intact when they were soaked in crude oil, gasoline, or tar over long periods (Helm et al. 2015).	environments (Hook et al. 2016). The spill may have also contributed to unusually high perinatal mortality in bottlenose dolphins (Hook et al. 2016).

Predicted Level of Impact

As highly mobile species, in general it is very unlikely that cetaceans will be constantly exposed to concentrations of hydrocarbons in the water column for continuous durations (e.g., >96 hours) that would lead to chronic toxicity effects. Furthermore, the potential for environmental impacts would be limited to a relatively short period following the release and would need to coincide with a migration or aggregation event to result in exposure to a large number of individuals. Regardless such exposure is not anticipated to result in long-term population viability effects. A proportion of the migrating population of whales could be affected for a single migration event, which could result in temporary and localised consequences.

The Conservation Management Plan for the Blue Whale (CoA 2015) and the draft National Recovery Plan for the Southern Right Whale (DCCEEW 2022a) detail that in extreme cases, acute chemical discharges such as oil or condensate have shown to cause long-term, population level declines due to toxicity and associated mortality. However, oil and condensate spills are rated as a minor consequence of individuals are affected but no affect at population level in both plans (CoA 2015). The study referred to in the plans is from Matkin et al. 2008 who looked at killer whale populations pre and port the Exxon Valdez crude oil spill. Crude oil is significantly heavier and does not breakdown as quickly as a condensate or diesel spill. Thus, for a diesel of condensate spill it is more likely that the minor consequence rating of individuals are affected but no affect at population level, is relevant.

The draft National Recovery Plan for the Southern Right Whale (DCCEEW 2022a) details that oil spills have the potential to have the greatest impact on Southern Right Whales within or near reproductive BIAs, when there are larger concentrations of whales engaged in breeding activities over sustained periods of time (i.e., weeks to months) and where oil may accumulate.

Consequently, the potential consequence to cetaceans is considered to be **Moderate (2)**, as they could be expected to result in minor, short-term damage to species of recognised conservation value.

7.12.5.3 Conservation Values and Sensitivities

Heritage Properties and Places

Heritage Places	
Predicted Hydrocarbon Exposure	**✗ Surface ✓ In-water ✓ Shoreline**
Relevant Exposure Thresholds	**Shoreline: Low Exposure Threshold** **In-water: High Exposure Threshold (Dissolved) and High Exposure Threshold (Entrained)r**
Condensate	**MDO**

The modelling predicted a number of Heritages Properties and Places (World, National, Commonwealth and Maritime Archaeological) to be present within the area predicted to be exposed to low levels of shoreline hydrocarbons following a LOWC of condensate (RPS 2023). These include:
• World Heritage Properties (see Section 6.2.1 for further details):
  ◦ Tasmanian Wilderness
• National Heritage Places (see Section 6.2.3 for further details):
  ◦ Great Ocean and Scenic Environments
  ◦ Point Nepean Defence Sites and Quarantine Station Area, and
  ◦ Tasmanian Wilderness, and
  ◦ Western Tasmania Aboriginal Cultural Landscape.
• Commonwealth Heritage Places (see Section 6.2.4 for further details):
  ◦ HMAS Cerberus Marine and Coastal Area, and
  ◦ Swan Island and Naval Waters
• Maritime Archaeological Heritage (see Section 6.2.5 for further details):
  ◦ Historical shipwrecks
	The modelling predicted a number of Heritages Places (World, National, Commonwealth and Maritime Archaeological) to be present within the area predicted to be exposed to low levels of shoreline hydrocarbons following a vessel LOC of MDO (RPS 2023). These include:
	• World Heritage Properties (see Section 6.2.1 for further details):
	  ◦ Tasmanian Wilderness
	• National Heritage Places (see Section 6.2.3 for further details):
	  ◦ Western Tasmania Aboriginal Cultural Landscape.
	• Maritime Archaeological Heritage (see Section 6.2.5 for further details):
	  ◦ Historical shipwrecks
	No Commonwealth Heritage Places were predicted to be exposed to relevant shoreline thresholds.
	The potential exposure area for MDO is located entirely within the potential exposure area for condensate LOWC (RPS 2023).

Heritage Places	
Predicted Environmental Impact	
Shoreline	**In-water**
The values identified of these World, National and Commonwealth Heritage Areas (see Sections 6.2.1 to 6.2.4) have the potential to be impacted by surface hydrocarbons at the low threshold. Visible shoreline hydrocarbons may have the potential to reduce the visual amenity of the area, subsequently deterring any tourism or recreational activities, or impacting the cultural significant of the specific Heritage Place. Any impact to the environmental values of the areas (i.e., the unique habitats, species and ecosystem process) from exposure at, or above, the low threshold of shoreline hydrocarbons may also affect the value of the specific heritage areas. Refer also to: • Benthic Habitats • Marine Fauna • Nationally Important Wetlands • Recreation and Tourism • First Nations	Historical shipwrecks (see Section 6.2.5) have the potential to be impacted by in-water hydrocarbons above the high threshold. The is limited information on the effect of oil spills on historic shipwrecks. One laboratory study looked at how crude oil may impact preservation of steel shipwrecks. Salerno et al. (2018) found that crude oil and chemical dispersant could impact the biodiversity and metabolic function of microbial biofilms colonising metal-hulled shipwrecks this could have downstream effects on corrosion rates of metal hulls, potentially impacting their longevity in the marine environment. The laboratory tests were conducted with 5 mg/l (5000 ppb) of crude oil.
Predicted Level of Impact	
The minimum time for shoreline accumulation to reach a shoreline based on the worst-case scenario modelled is 4 days (Colac Otway, Corangamite, Cape Otway West, Apollo Bay and Moonlight Head). Therefore, this may be the worst-case minimum time before Heritage Places within this area are impacted by shoreline accumulation (i.e., Great Ocean and Scenic Environments). However, the minimum time predicted before shoreline accumulation at, or above, the low threshold for the West coast of Tasmania (i.e., Western Tasmania Aboriginal Cultural Landscape and Tasmanian Wilderness) is predicted to be 28 days (RPS 2023). Due to the anticipated hydrocarbon weathering and fate of the condensate, the majority is expected to have either evaporated or entrained during that time. Modelling predicted between approximately 70-82% of the volume to evaporate and between 0-22% to entrain within the first 24 hours, depending on the wind conditions (RPS 2023). Visible hydrocarbons along the shorelines at these locations can change the aesthetic value. However, given the nature of the condensate, being light non-persistent hydrocarbon, any impacts to visual aesthetic at heritage places are expected to be localised and short-term. The wave and tidal action, together with predicted weathering, indicates that hydrocarbons along shorelines will continually wash off the substrates, and be readily flushed into the water, leading to further weathering. Impacts to historical shipwrecks are not predicted as based on the oil spill modelling (RPS 2023) for in-water hydrocarbons above 5000 ppb are only predicted in 0 – 10 m below the sea surface near to the spill source where water depths are > 50 m. Thus, historical shipwrecks would not be exposed to oil above 5000 ppb.	

Heritage Places
Consequently, the potential consequence to Heritage Properties and Places is considered to be **Moderate (2)**, as they could be expected to result in minor, short-term impacts to an area of recognised conservation value.

Wetlands

<table>
<tr><th colspan="2">Wetlands</th></tr>
<tr><td>Predicted Hydrocarbon Exposure</td><td>✘ Surface ✘ In-water ✓ Shoreline</td></tr>
<tr><td>Relevant Exposure Thresholds</td><td>Shoreline: Low Exposure Threshold</td></tr>
<tr><td>Condensate</td><td>MDO</td></tr>
<tr><td>Modelling predicted three Internationally Important Wetlands (Ramsar-listed wetlands) to be contacted by shoreline hydrocarbons at the relevant exposure thresholds following a LOWC of condensate (RPS, 2023), these included:
• Glenelg Estuary and Discovery Bay Wetlands
• Port Phillip Bay (Western Shoreline) and Bellarine Peninsula, and
• Lavinia.
Several additional wetlands of National Importance were also identified within the area predicted to be contacted by shoreline hydrocarbons at the relevant exposure thresholds (RPS, 2023). See Section 6.2.7 for a full list of these Nationally Important Wetlands.
The major values for these wetlands have been identified within Section 6.2.6 and 6.2.7 of the EP and include values such as diverse waterbird diversity, unique ecological processes, shoreline and intertidal habitats, tourism, recreational activities, and sites of cultural significance for First Nations people.</td><td>Modelling predicted only one Internationally Important Wetlands (Ramsar-listed wetlands) to be contacted by low shoreline hydrocarbons at the relevant exposure thresholds following a vessel LOC of MDO (RPS, 2023):
• Lavinia.
Only a few wetlands of National Importance were also identified within the within the area predicted to be contacted by shoreline hydrocarbons at the relevant exposure thresholds (RPS, 2023), these included:
• Princetown Wetlands
• Lower Aire River Wetlands
• Western Port
• Lavina Nature Reserve
The potential exposure area for MDO is located entirely within the potential exposure area for condensate LOWC (RPS 2023).</td></tr>
<tr><td colspan="2">Predicted Environmental Impact</td></tr>
<tr><td colspan="2">Shoreline</td></tr>
<tr><td colspan="2">Internationally Important wetlands (Ramsar-listed wetlands) and Nationally Important Wetlands are predominantly saline marsh and estuarine environments that are a continuation from the sea. Therefore, depending on where the shoreline contact occurs there is a potential for shoreline hydrocarbon to move into the estuary and wetlands, potentially impacting the aesthetic and ecological value of the wetland.
Visible hydrocarbons stranded on shorelines have the potential to reduce the visual amenity of the area for tourism and discourage recreational activities. Precautionary exclusion from shorelines may be implemented by local governments until water quality monitoring verifies the absence of residual hydrocarbons. This could cause disruption to some recreational and tourism activities within that area. Furthermore, visible hydrocarbons along shorelines may impact the value of a culturally significant sites.
Wetland environments are considered to have a high sensitivity to hydrocarbon exposure. The vegetation found in wetlands, are similar to saltmarshes and other estuarine plants, typically have a large surface area for oil absorption and their structure traps oil. The degree of impact of oil on wetland vegetation are variable and complex, and can be both</td></tr>
</table>

Wetlands
acute and chronic, ranging from short-term disruption of plant functioning to mortality. Spills reaching wetlands during the growing season will have a more severe impact than if oil reaches wetlands during the times when many plant species are dormant. Wetland habitats can be of particular importance for some species of waterbirds, fish, and invertebrates. As such, in addition to direct impacts on plants, oil that reaches wetlands also affects these fauna utilising wetlands during their life cycle.
Predicted Level of Impact
The minimum time for shoreline accumulation to reach a shoreline associated with a Ramsar-listed wetlands was 10 days for King Island (i.e. Lavina), 22 days for Glenelg (i.e. Glenelg Estuary and Discovery Bay Wetlands), and 73 days for Port Phillip (Queenscliff) (i.e. Port Phillip Bay (Western Shoreline) and Bellarine Peninsula) (RPS 2023). Due to the anticipated hydrocarbon weathering and fate of the condensate, majority is expected to have either evaporated or entrained during that time. Modelling predicted between approximately 70-82% of the volume to evaporate and between 0-22% to entrain within the first 24 hours, depending on the wind conditions (RPS 2023). Furthermore, given the nature of the condensate, being light non-persistent hydrocarbon, any impacts to coastlines are expected to be localised and short-term. Consequently, the potential consequence to these Internationally and Nationally important wetlands are considered to be **Moderate (2)**, as they could be expected to result in minor, short-term damage to an area of recognised conservation value.

State Protected Areas – Terrestrial

<table>
<tr><th colspan="2">State Protected Areas - Terrestrial</th></tr>
<tr><td>Predicted Hydrocarbon Exposure</td><td>✘ Surface ✘ In-water ✓ Shoreline</td></tr>
<tr><td>Relevant Exposure Thresholds</td><td>Shoreline: Low Exposure Threshold</td></tr>
<tr><td>Condensate</td><td>MDO</td></tr>
<tr><td>Modelling predicted a multiple terrestrial State Protected Areas within the area predicted to be exposed to low levels of shoreline hydrocarbons following a LOWC of condensate (RPS, 2023). These include the terrestrial state protected areas identified within the planning Area (relevant low exposure threshold for shoreline hydrocarbons) located within Victoria, Tasmania, and NSW (see Section 6.2.9, 6.2.11, and 6.2.14 for further details for these State Protected Areas).
The terrestrial State Protected Areas include values such as terrestrial habitats, ecological communities, unique coastal formations, and culturally significant sites which may be impacted by exposure to shoreline hydrocarbons at the relevant low exposure thresholds.</td><td>Modelling predicted several terrestrial State Protected Areas within the area predicted to be exposed to low levels of shoreline hydrocarbons following a vessel LOC of MDO (RPS, 2023). These include some of the terrestrial state protected areas identified within Victoria, and the King Island and Hunter Island State Protected Areas identified within the planning Area (relevant low exposure threshold for shoreline hydrocarbons for LOWC) (see Section 6.2.9, 6.2.11, and 6.2.14 for further details for these State Protected Areas).
No terrestrial State Protected Areas within NSW of mainland Tasmania were predicted to be exposed to the shoreline hydrocarbons of relevant thresholds (RPS, 2023).
The potential exposure area for MDO is located entirely within the potential exposure area for condensate LOWC (RPS 2023).</td></tr>
<tr><td colspan="2">Predicted Environmental Impact</td></tr>
<tr><td colspan="2">Shoreline</td></tr>
<tr><td colspan="2">Visible shoreline hydrocarbons have the potential to reduce the visual amenity of the area for tourism and discourage recreational activities within the identified protected areas. Furthermore, hydrocarbons at the relevant threshold may impact values and sensitivities identified for this state protected areas, subsequently reducing the value of these locations.
Refer also to:
• Benthic Habitats
• Shorebirds
• Wetlands
• Coastal Settlements
• Recreation and Tourism</td></tr>
<tr><td colspan="2">Predicted Level of Impact</td></tr>
</table>

State Protected Areas - Terrestrial
The minimum time for shoreline accumulation to reach a shoreline based on the worst-case scenario modelled is 4 days (Colac Otway, Corangamite, Cape Otway West, Apollo Bay and Moonlight Head). However, due to the anticipated hydrocarbon weathering and fate of the condensate, majority is expected to have either evaporated or entrained during that time. Modelling predicted between approximately 70-82% of the volume to evaporate and between 0-22% to entrain within the first 24 hours, depending on the wind conditions (RPS, 2023). Visible hydrocarbons along the shorelines at these located can change the aesthetic value. However, given the nature of the condensate, being light non-persistent hydrocarbon, any impacts to coastal settlements are expected to be localised and short-term. The wave and tidal action, together with predicted weathering, indicates that hydrocarbons along shorelines will continually wash off the substrates, and be readily flushed into the water, leading to further weathering. Consequently, the potential consequence to these State Marine Protected Areas is considered to be **Moderate (2)**, as they could be expected to result in minor, short-term damage to an area of recognised conservation value.

State Protected Areas – Marine

State Protected Areas - Marine	
Predicted Hydrocarbon Exposure	✓ **Surface** ✓ **In-water** ✗ **Shoreline**
Relevant Exposure Thresholds	**Surface: Low Exposure Threshold** **In-water: Moderate Exposure Threshold (Dissolved) and High Exposure Threshold (Entrained)**
Condensate	**MDO**
Modelling predicted several Marine State Protected Areas within the area predicted to be exposed to low levels of surface and moderate levels of dissolved hydrocarbons and high levels of entrained hydrocarbons following a LOWC of condensate (RPS, 2023). These include protected areas within: • Victoria (see Section 6.2.8 for further details): ◦ Discovery Bay Marine National Park ◦ Twelve Apostles Marine National Park ◦ Point Addis Marine National Park ◦ Port Phillip Heads Marine National Park ◦ Mushroom Reef Marine Sanctuary ◦ Bunurong Marine Park and Marine National Park ◦ Wilsons Promontory Marine Park and Marine National Park ◦ Point Hicks Marine National Park ◦ Cape Howe Marine National Park ◦ Marengo Reefs Marine Sanctuary • Tasmania (see Section 6.2.10 for further details): ◦ Kent Group National Park ◦ Arthur Bay Conservation Area The major conservation values for these areas have been identified within Section 6.2.8 to 6.2.13 of the EP. The marine State Protected Areas include values such as important intertidal and coastal habitat for species, high species diversity and abundance, and culturally significant sites, which may be impacted by exposure to surface and in-water hydrocarbons at relevant exposure thresholds.	Modelling predicted several Marine State Protected Areas within the area predicted to be exposed to low levels of surface and moderate levels of dissolved hydrocarbons and high levels of entrained hydrocarbons following a vessel LOC of MDO (RPS, 2023). These include protected areas within: • Victoria (see Section 6.2.8 for further details): ◦ Twelve Apostles Marine National Park ◦ Marengo Reefs Marine Sanctuary No marine State Protected Area within Tasmania or NSW was predicted to be impacted by hydrocarbons at relevant thresholds (RPS 2023). The potential exposure area for MDO is located entirely within the potential exposure area for condensate LOWC (RPS 2023).

State Protected Areas - Marine	
The modelling predicted a maximum distance of 307 km for surface hydrocarbons at, or above, the low threshold for the worst-case scenario (RPS, 2023). Any values which occupy the water column, specifically within the upper 0 – 10 m of the water column the surface layers of the water column (where in-water hydrocarbon exposure at relevant exposure thresholds is predicted), are more susceptible to entrained and dissolved hydrocarbons.	
Predicted Environmental Impact	
Surface	**In-water**
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. The values identified for these marine State Protected Areas have the potential to be exposed to surface hydrocarbons at, or above, the low threshold, in the event of a spill incident. Impact to these receptors from direct or indirect exposure to surface hydrocarbons may cause a subsequent negative impact to the value of the Protected Areas. Refer also to: • Recreation and Tourism • Seabirds	The values identified within these State Protected Areas have the potential to be exposed to entrained hydrocarbons at, or above, the moderate threshold in the event of a spill incident. Impact to these receptors from direct or indirect exposure to in-water hydrocarbons may cause a subsequent negative impact to the value of the State Protected Areas. Refer also to: • Macroalgae • Seagrass • Soft Corals • Marine Invertebrates • Fish • Birds • Marine Reptiles • Cetaceans • Heritage Places • First Nations
Predicted Level of Impact	
Due to the anticipated hydrocarbon weathering and fate of the condensate, majority is expected to evaporate during that time. Modelling predicted between approximately 70-82% of the volume to evaporate within the first 24 hours, depending on the wind conditions (RPS, 2023). Therefore, low concentrations are anticipated to remain at the water surface or be entrained within the water column.	

State Protected Areas - Marine
Consequently, the potential consequence to these State Marine Protected Areas is considered to be **Moderate (2)**, as they could be expected to result in minor, short-term damage to an area of recognised conservation value.

Australian Marine Parks

Australian Marine Parks	
Predicted Hydrocarbon Exposure	✓ **Surface** ✓ **In-water** ✘ **Shoreline**
Relevant Exposure Thresholds	**Surface: Low Exposure Threshold** **In-water: Low Exposure Threshold (Dissolved) and Low Exposure Threshold (Entrained)**
Condensate	**MDO**
Modelling predicted five AMPs to be intersect by surface or in-water hydrocarbons at the relevant thresholds (RPS, 2023), these include: • Apollo AMP (100% overlap) • Beagle AMP (approximately less than 20% overlap) • Boags AMP (100% overlap) • Franklin AMP (100% overlap) • Zeehan AMP (approximately less than 50% overlap) The major conservation values for these AMPs have been identified within Section 6.2.2 of the EP (i.e., ecosystems, habitats, EPBC-listed species, culturally significant sites) which may be impacted by exposure to surface and in-water hydrocarbons at relevant thresholds. Any values which occupy the water column, specifically within the upper 0 – 10 m of the water column the surface layers of the water column (where in-water hydrocarbon exposure at relevant exposure thresholds is predicted), are more susceptible to entrained and dissolved hydrocarbons. The modelling predicted a maximum distance of 307 km for surface hydrocarbons at, or above, the low threshold for the worst-case scenario (RPS, 2023), therefore, any values that utilise the water surface of the marine environment may also be impacted.	Modelling predicted three AMPs to be intersect by surface or in-water hydrocarbons at the relevant thresholds following the vessel LOC of MDO (RPS, 2023), these include: • Apollo AMP (approximately less 25% overlap) • Boags AMP (approximately less that 75% overlap) • Zeehan AMP (approximately less than 20% overlap) The modelling predicted a maximum distance of 57 km for surface hydrocarbons at, or above, the low threshold for the worst-case scenario (RPS, 2023) The potential exposure area for MDO is located entirely within the potential exposure area for condensate LOWC (RPS 2023).
Predicted Environmental Impact	
Surface	**In-waterV**
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.	The values identified within these AMPs have the potential to be exposed to entrained hydrocarbons at, or above, the moderate threshold in the event of a spill incident.

Australian Marine Parks	
The values identified within the AMPs have the potential to be exposed to surface hydrocarbons at, or above, the low threshold, in the event of a spill incident. Impact to these receptors from direct or indirect exposure to surface hydrocarbons may cause a subsequent negative impact to the value of the AMPs. Refer also to: • Seabirds • Recreation and Tourism • First Nations	However, the exposure of entrained hydrocarbons will be greatest within the upper 0-10 m of the water column and areas close to the spill source. The AMPs are located within various water depths (i.e., 80-120 m for Apollo; 50-70m for Beagle; 40-80 m for Boags; 40-150 m for Franklin, and 50-3,000 m for Zeehan, respectively) therefore, any benthic conservation values within these AMPs, such as ecosystems, habitats and sea-floor features are not predicted to be impacted. Impact to these receptors from direct or indirect exposure to in-water hydrocarbons may cause a subsequent negative impact to the value of the AMPs. Refer also to: • Plankton • Fish • Seabirds • Pinnipeds • Cetaceans • First Nations
Predicted Level of Impact	
Visible surface hydrocarbons can impact the aesthetic value and discourage any tourism of recreational activities that may occur within the AMPs. However, given the nature of the condensate, being light non-persistent hydrocarbon, any impacts are expected to be localised and short-term. Modelling predicted majority of the condensate, 70-82%, to evaporate within the first 24 hours, depending on the wind conditions (RPS, 2023). Therefore, low concentrations are anticipated to remain at the water surface. Furthermore, impacts from in-water hydrocarbons (dissolved and entrained) at the relevant thresholds are only anticipated to occur within the upper 0 – 10 m of the water column the surface layers of the water column, therefore, the majority of the values of the AMPs below the 10 m are not anticipated to experience significant impacts. Consequently, the potential consequence to these AMPs are considered to be **Moderate (2)**, as they could be expected to result in minor, short-term damage to an area of recognised conservation value.	

Key Ecological Features

<table>
<tr><th colspan="2">Key Ecological Features</th></tr>
<tr><td>Predicted Hydrocarbon Exposure</td><td>✓ Surface ✓ In-water ✘ Shoreline</td></tr>
<tr><td>Relevant Exposure Thresholds</td><td>Surface: Low Exposure Threshold
In-water: Moderate Exposure Threshold (Dissolved) and High Exposure Threshold (Entrained)</td></tr>
<tr><th>Condensate</th><th>MDO</th></tr>
<tr><td>Modelling predicted three KEFs to be intersected by surface or in-water hydrocarbons at the relevant thresholds following a LOWC of condensate, including:
• Bonney Coast Upwelling (approximately <5% overlap)
• Upwelling East of Eden (approximately <5% overlap)
• West Tasmania Canyons (approximately <50% overlap)
The major conservation values for these KEFs have been identified within Section 6.2.15 of the EP (i.e. regions of high productivity, unique seafloor geology, seasonal upwelling,) which may be impacted by exposure to surface and in-water hydrocarbons at relevant thresholds.
Any values which occupy the water column, specifically within the upper 0 – 10 m of the water column the surface layers of the water column (where in-water hydrocarbon exposure at relevant exposure thresholds is predicted), are more susceptible to entrained and dissolved hydrocarbons.
The modelling predicted a maximum distance of 307 km for surface hydrocarbons at, or above, the low threshold for the worst-case scenario (RPS, 2023), therefore, any values that utilise the water surface of the marine environment may also be impacted.</td><td>Modelling predicted one KEFs to be intersected by surface or in-water hydrocarbons at the relevant thresholds following a vessel LOC MDO:
• West Tasmania Canyons (approximately less than 15% overlap)
The modelling predicted a maximum distance of 57 km for surface hydrocarbons at, or above, the low threshold for the worst-case scenario (RPS, 2023)
The potential exposure area for MDO is located entirely within the potential exposure area for condensate LOWC (RPS 2023).</td></tr>
<tr><td colspan="2">Predicted Environmental Impact</td></tr>
<tr><th>Surface</th><th>In-water</th></tr>
<tr><td>The values identified within the KEFs have the potential to be exposed to surface hydrocarbons at, or above, the low threshold, in the event of a spill incident.
Impact to these receptors from direct or indirect exposure to surface hydrocarbons may cause a subsequent negative impact to the value of the KEFs.
Refer also to:</td><td>The values identified within these KEFs have the potential to be exposed to entrained hydrocarbons at, or above, the low threshold.
However, the exposure of entrained hydrocarbons will be greatest within the upper 0-10 m of the water column and areas close to the spill source. Therefore, the spill is unlikely to intersect with majority of the values of the KEFs which are concentrated within the water column >10 m deep or along the seafloor at varying water depths.</td></tr>
</table>

Key Ecological Features	
• Birds	Hydrocarbon exposure to the key receptors of the KEFs (e.g. seabirds, pinnipeds and cetaceans) may cause a subsequent negative impact to the value of the KEFs, however is expected to be limited to a small number of individuals, with no impacts to regional populations. Refer also to: • Soft Corals • Plankton • Fish • Birds • Marine Invertebrate • Cetaceans

Predicted Level of Impact

Hydrocarbons at, or above, low thresholds may cause impacts to receptors (i.e. seabirds) within the area impacted. However, modelling predicted majority of the condensate (70-82%) to evaporate within the first 24 hours, depending on the wind conditions (RPS, 2023). Therefore, low concentrations are anticipated to remain at the water surface.

Furthermore, impacts from in-water hydrocarbons (dissolved and entrained) at the relevant thresholds are only anticipated to occur within the upper 0 – 10 m of the water column the surface layers of the water column. As majority of the values of the KEFs are within the water column below the 10 m, the values of the KEFs are not anticipated to be impact.

Modelling predicted the highest probability of exposure to surface and or in-water hydrocarbons at relevant thresholds to occur at the West Tasmania Canyons KEF. The dominant feature of the KEFs are associated with the seafloor geology, of eight submarine canyons off the coast of Tasmania, which influence currents. Majority of the values are on the seafloor, therefore, are unlikely to be impacted by in-water hydrocarbons at the relevant thresholds.

However, plankton populations which are associated with the nutrient-rich waters brought by the currents influenced by the unique seafloor geology may be impacted by in-water hydrocarbon exposure at the relevant thresholds (refer also to Plankton).

Consequently, the potential consequence to these KEFs are considered to be Moderate (2), as they could be expected to result in minor, short-term damage to an area of recognised conservation value.

7.12.5.4 Socio-economic Environment

Coastal Settlements

Coastal Settlements	
Predicted Hydrocarbon Exposure	✘ **Surface** ✘ **In-water** ✓ **Shoreline**
Relevant Exposure Thresholds	**Shoreline: Low Exposure Threshold**
Condensate	**MDO**
There are several sub local government areas (Sub-LGAs) identified as potentially being impacted from shoreline hydrocarbon exposure at the low threshold following a LOWC of condensate (RPS, 2023), those with the highest probability of shoreline loading included: • Cape Otway West (96%), • Apollo Bay (89%), • Moonlight Head (86%), • Cape Patton (69%), • Cape Liptrap (NW) (34%), and • Lorne (31%). Based on the worst-case scenario modelled, the minimum time for shoreline accumulation to reach a shoreline at the relevant threshold is 4 days (Colac Otway, Corangamite, Cape Otway West, Apollo Bay and Moonlight Head), with the maximum total volume of hydrocarbons ashore predicted as 193 m^3 (RPS, 2023).	There are several sub local government areas (Sub-LGAs) identified as potentially being impacted from shoreline hydrocarbon exposure at the low threshold following a LOWC of condensate (RPS, 2023), those with the highest probability of shoreline loading included: • Cape Otway West (18%), • Apollo (11%), • Moonlight Head (10%) • Cape Patton (8%) • Lorne (5%), and • Port Campbell (3%) Based on the worst-case scenario modelled, the minimum time for shoreline accumulation to reach a shoreline at the relevant threshold is 2 days (Colac Otway), with the maximum total volume of hydrocarbons ashore as 35 m^3 (RPS, 2023). The potential exposure area for MDO is located entirely within the potential exposure area for condensate LOWC (RPS 2023).
Predicted Environmental Impact	
Shoreline	
Visible hydrocarbons along the shorelines at these locations can change the aesthetic value. Furthermore, closure of these shorelines may impact public use and public activities. However, given the nature of the condensate, being light non-persistent hydrocarbon, any impacts to coastal settlements are expected to be localised and short-term. The wave and tidal action, together with predicted weathering, indicates that hydrocarbons along shorelines will continually wash off the substrates, and be readily flushed into the water, leading to further weathering.	
Predicted Level of Impact	

Coastal Settlements
Based on the worst-case scenario modelled that was shown to overlap local government areas (LGAs) at, or above, the low level (10 g/m^2) threshold, the minimum time for shoreline accumulation to reach a shoreline is 4 days (Cape Otway West, Apollo Bay and Moonlight Head) up to 24 days (Lorne), with the longest minimum time being 95 days (Port Fairy). However, due to the anticipated hydrocarbon weathering and fate of the condensate, majority is expected to have either evaporated or entrained during that time. Modelling predicted between approximately 70-82% of the volume to evaporate and between 0-22% to entrain within the first 24 hours, depending on the wind conditions (RPS, 2023). Furthermore, tidal and wave action within the area is anticipated to breakdown any shoreline hydrocarbons. Consequently, any impacts have been ranked as **Minor (1),** as they are anticipated to be localised low-level, short-term and recoverable impacts.

Other Marine Users

<table>
<tr><th colspan="2">Other Marine Users</th></tr>
<tr><td>Predicted Hydrocarbon Exposure</td><td>✓ Surface ✓ In-water ✘ Shoreline</td></tr>
<tr><td>Relevant Exposure Thresholds</td><td>Surface: High Exposure Threshold
In-water: Low Exposure Threshold (Dissolved) and Low Exposure Threshold (Entrained)</td></tr>
<tr><td>Condensate</td><td>MDO</td></tr>
<tr><td>Surface hydrocarbons may interact with other marine users, such as offshore petroleum industry, defence, and shipping, present within the area exposed to hydrocarbons at the relevant thresholds following a LOWC of condensate (see Sections 6.5.1to 6.5.5 for further details).
The modelling predicted a maximum distance of 1 km (Otway) to 17 km (Bas)s for surface hydrocarbons at, or above, the high threshold for the worst-case scenario (RPS 2023).
In-water hydrocarbons at or above the low exposure threshold could require the Victorian Desalination Plant to shut their intakes.</td><td>Surface hydrocarbons may interact with other marine users, such as offshore petroleum industry, defence, and shipping, present within the area exposed to hydrocarbons at the relevant thresholds following a vessel LOC of MDO (see Sections 6.5.1to 6.5.5 for further details).
The modelling predicted a maximum distance of 8 km (Otway) to 11 km (Bass) for surface hydrocarbons at, or above, the high threshold for the worst-case scenario (RPS 2023).
The potential exposure area for MDO is located entirely within the potential exposure area for condensate LOWC (RPS 2023).</td></tr>
<tr><td colspan="2">Predicted Environmental Impact</td></tr>
<tr><td>Surface</td><td>In-water</td></tr>
<tr><td>Hydrocarbons at the high threshold may result in oiling of vessel hulls and exclusion of the area until the hydrocarbons evaporation and entrain.</td><td>In-water hydrocarbons at or above the low exposure threshold could require the Victorian Desalination Plant to shut their intakes.</td></tr>
<tr><td colspan="2">Predicted Level of Impact</td></tr>
<tr><td colspan="2">Physical displacement of vessel marine users may occur due to the establishment of exclusion zones following a spill incident. Due to the nature of the condensate, being a light non-persistent hydrocarbon, with high anticipated evaporation and entrainment rates, exclusion zones are not expected to be long-term and are unlikely to result in significant impacts to other vessel based marine users who may be required to avoid the area.
No impacts to subsea cables are predicted from in-water hydrocarbons.
In-water hydrocarbons at or above the low exposure thresholds at the Bass Coast where the Victorian Desalination Plant intake is located are only predicted for a LOWC of condensate for a spill in the Vic/P43. Dissolved hydrocarbons at the Bass Coast are predicted at the low exposure threshold (1% probability) and the moderate exposure threshold (1%) in summer) and at the low exposure threshold (4% probability) in winter. The minimum time before dissolved hydrocarbon exposure at the low threshold is 40 days and the maximum residence time is <1 day. In-water hydrocarbons at the Bass Coast are not predicted at the high exposure threshold and are only predicted at the low exposure</td></tr>
</table>

Other Marine Users
threshold in winter (2% probability) The minimum time before entrained hydrocarbon exposure at the low threshold is 54 days and the maximum residence time is <1 day. Thus, in-water hydrocarbons at the low exposure threshold that could potentially require the desalination plant to shut in the intake would occur for < 1 day. Impacts to other vessel based marine users and the desalination plan have been ranked as **Minor (1),** as they are anticipated to be localised low-level, short-term and recoverable.

Recreation and Tourism

Recreation and Tourism	
Predicted Hydrocarbon Exposure	✓ **Surface** ✗ **In-water** ✓ **Shoreline**
Relevant Exposure Thresholds	**Surface: Low Exposure Threshold** **Shoreline: Low Exposure Threshold**
Condensate	**MDO**
The areas identified as potentially being overlapped by surface and shoreline hydrocarbons at the relevant exposure thresholds following a LOWC of condensate provide areas for a diverse range of tourism and recreational activities, such as: scuba diving, fishing, marine fauna watching, sailing (see Sections 6.5.6 to 6.5.8 for further details). The modelling predicted a maximum distance of 307 km for surface hydrocarbons at, or above, the low threshold for the worst-case scenario (RPS 2023). The minimum time for shoreline accumulation to reach a shoreline based on the worst-case scenario modelled is 4 days (Colac Otway, Corangamite, Cape Otway West, Apollo Bay and Moonlight Head) up to 24 days (Lorne) (RPS, 2023).	The areas identified as potentially being overlapped by surface and shoreline hydrocarbons at the relevant exposure thresholds following a vessel LOC of MDO provide areas for a diverse range of tourism and recreational activities, such as: scuba diving, fishing, marine fauna watching, sailing (see Sections 6.5.6 to 6.5.8 for further details). The modelling predicted a maximum distance of 57 km for surface hydrocarbons at, or above, the low threshold for the worst-case scenario (RPS, 2023). The minimum time for shoreline accumulation to reach a shoreline based on the worst-case scenario modelled is 2 days (Colac Otway), and up to 20 days (King Island) (RPS, 2023). The potential exposure area for MDO is located entirely within the potential exposure area for condensate LOWC (RPS 2023).
Predicted Environmental Impact	
Surface	**Shoreline**
Visible surface hydrocarbons (i.e. a rainbow sheen) have the potential to reduce the visual amenity of the area for tourism and discourage recreational activities. Recreation is also linked to the presence of marine fauna and direct impacts to marine fauna such as whales, birds, and pinnipeds can result in indirect impacts to recreational values. It is important to note that the impact from a public perception perspective may be even more conservative. This may deter tourists and locals from undertaking recreational activities. If this occurs, the attraction is temporarily closed, economic losses to the business are likely to eventuate. The extent of these losses would be dependent on how long the attraction remains closed.	Visible hydrocarbons stranded on shorelines have the potential to reduce the visual amenity of the area for tourism and discourage recreational activities. In general, recreational and tourism activities are restricted to shallower coastal waters and shorelines. Precautionary exclusion from shorelines may be implemented by local governments until water quality monitoring verifies the absence of residual hydrocarbons. This could cause disruption to some recreational and tourism activities within that area. Furthermore, visible hydrocarbons along shorelines may impact the aesthetic value for tourism and discourage recreational activities that may be operating within the area

Recreation and Tourism
Refer also to: • Fish and sharks • Seabirds and Shorebirds • Pinnipeds • Cetaceans (whales and dolphins) • Marine invertebrates
Predicted Level of Impact
Any impact to receptors that provide nature-based tourism features (e.g. cetaceans, seabirds) may cause a subsequent negative impact to recreation and tourism activities. However, socio-economic impacts, such a reduction in the visual amenity of the area, are more likely to occur at low exposure thresholds. Visible hydrocarbons along the shorelines at these located can change the aesthetic value and discourage any tourism of recreational activities that may occur within the area. However, given the nature of the condensate, being light non-persistent hydrocarbon, any impacts to coastal settlements are expected to be localised and short-term. The wave and tidal action, together with predicted weathering, indicates that hydrocarbons along shorelines will continually wash off the substrates, and be readily flushed into the water, leading to further weathering. Consequently, any impacts are anticipated to be short-term and localised, and potential impacts have been ranked as **Moderate (2)**.

Commercial Fisheries

<table>
<tr><th colspan="2">Commercial Fisheries</th></tr>
<tr><td>Predicted Hydrocarbon Exposure</td><td>✓ Surface ✓ In-water ✘ Shoreline</td></tr>
<tr><td>Relevant Exposure Thresholds</td><td>Surface: Low Exposure Threshold
In-water: Moderate Exposure Threshold (Dissolved) and High Exposure Threshold (Entrained)</td></tr>
<tr><td>Condensate</td><td>MDO</td></tr>
<tr><td>Several commercial fisheries, including Commonwealth and State managed fisheries, may be intersected by surface or in-water hydrocarbons at the relevant thresholds following a LOWC of condensate (see Sections 6.5.9 to 6.5.13 for further details). Furthermore, the Australia seaweed industry was identified be present within areas where in-water hydrocarbons at the relevant thresholds may occur (see Section 6.5.14 for further details).
The modelling predicted at, or above, moderate exposure thresholds for dissolved and high exposure thresholds for entrained in-water hydrocarbons for both Victorian and Tasmanian state waters for the worst-case scenario modelled (RPS, 2023). Noting that in-water exposure (dissolved or entrained) is only predicted to occur within the upper 0 -10 m of the water column.
The shallow waters of King Island (a location where seaweed collectors harvest bull kelp) was the only nearshore areas predicted to be exposed to high exposure levels of dissolved and entrained in-water hydrocarbons for the worst-case scenario modelled (RPS, 2023).
The modelling predicted a maximum distance of 307 km for surface hydrocarbons at, or above, the low threshold for the worst-case scenario (RPS, 2023).</td><td>Several commercial fisheries, including Commonwealth and State managed fisheries, may be intersected by surface or in-water hydrocarbons at the relevant thresholds following a vessel LOC of MDO (see Sections 6.5.9 to 6.5.13 (for further details). Furthermore, the Australia seaweed industry was identified be present within areas where in-water hydrocarbons at the relevant thresholds may occur (see Section 6.5.14f or further details).
The modelling only predicted at, or above, high exposure thresholds for entrained in-water hydrocarbons for both Victorian and Tasmanian state waters for the worst-case scenario modelled (RPS, 2023). Noting that in-water exposure (entrained) is only predicted to occur within the upper 0 -10 m of the water column.
No impact from dissolved hydrocarbons at, or above the moderate hydrocarbon threshold was predicted for either Tasmania or Victoria (RPS, 2023).
The shallow waters of King Island (a location where seaweed collectors harvest bull kelp) had very low (1%) probability of high exposure to levels of entrained in-water hydrocarbons for the worst-case scenario modelled (RPS, 2023).
The modelling predicted a maximum distance of 57 km for surface hydrocarbons at, or above, the low threshold for the worst-case scenario (RPS, 2023).
The potential exposure area for MDO is located entirely within the potential exposure area for condensate LOWC (RPS 2023).</td></tr>
<tr><td colspan="2">Predicted Environmental Impact</td></tr>
<tr><td>Surface</td><td>In-water</td></tr>
<tr><td>Physical displacement of commercial fishers may occur due to the establishment of exclusion zones during the spill response.</td><td>As discussed in the relevant sections above (i.e. fish and invertebrates) exposure to in-water hydrocarbons has the potential to impacts species. Due to the sensitivity, a small number of juvenile fish, larvae, and planktonic organisms, may be impacted.</td></tr>
</table>

Commercial Fisheries	
Visible surface hydrocarbons (i.e. a rainbow sheen) may have the potential to cause impact public perception of the industry, potentially causing a negative economic impact.	In-water hydrocarbon exposure may result in a reduction in commercially targeted marine species (i.e. fish and invertebrate species), subsequently resulting in impacts to commercial fishing productivity. Contamination of target species can cause economic impacts to the industry. Exposure of in-water hydrocarbons to commercially valuable marine plants, such as macroalgae, can cause smothering, resulting in fouling and asphyxiation (Blumer 1971; Cintron et al. 1981). Notably, hydrocarbon smothering can act as a physical barrier for the diffusion of CO_2 across cell walls to macroalgae (O'Brien & Dixon 1976). Any impacts to commercially valuable seaweed has to potential to results in a negative economic impacts to the industry. However, any acute impacts are expected to be limited to individuals and not expected to cause impacts at a population level. Furthermore, impacts are not expected to affect population viability or recruitment. Refer to: • Macroalgae • Invertebrates • Fish

Predicted Level of Impact

In-water exposure (entrained and dissolved) at the relevant exposure thresholds is only predicted to occur within the upper 0 – 10 m of the water column; therefore, commercially valuable species, such as pelagic and benthic species, are less likely to experience impacts.

Given the anticipated weathering on the condensate (modelling predicted between approximately 70-82% of the volume to evaporate and between 0-22% to entrain within the first 24 hours, depending on the wind conditions (RPS, 2023), any impact to macroalgae (i.e. commercially valuable seaweed) is not expected to result in long-term or irreversible damage.

Impacts to King George whiting spawning and recruitment was raised by a stakeholder (Stakeholder ID 25165861) in relation to the Corner Inlet Fishery. However, exposure at the moderate thresholds of dissolved (50 ppb) and high thresholds of entrained (100 ppb) hydrocarbons are not predicted within Corner Inlet.

Furthermore, due to the nature of the condensate, being a light non-persistent hydrocarbon, with high anticipated evaporation and entrainment rates, exclusion zones are not expected to be long-term and are unlikely to result in significant impacts. Consequently, any impacts are anticipated to be short-term and localised, and potential impacts have been ranked as **Moderate (2)**.

7.12.5.5 First Nations

<table>
<tr><th colspan="2">First Nations</th></tr>
<tr><td>Predicted Hydrocarbon Exposure</td><td>✓ Surface ✓ In-water ✓ Shoreline</td></tr>
<tr><td>Relevant Exposure Thresholds</td><td>Surface: Low Exposure Threshold
In-water: Moderate Exposure Threshold (Dissolved) and High Exposure Threshold (Entrained)
Shoreline: Low Exposure Threshold</td></tr>
<tr><td>Condensate</td><td>MDO</td></tr>
<tr><td>First Nations cultural values and sensitivities may be present within the area exposed to surface, in-water and shoreline hydrocarbons at the relevant exposure thresholds following a LOWC. These include values related to marine fauna and benthic species such as seagrass and kelp as identified in 6.6.3.
The modelling predicted low exposure thresholds of shoreline accumulation to intersect with the following IPAs within Tasmania:
• Badger Island (west of Flinders Island),
• Mount Chappell Island (west of Flinders Island)
• Preminghana (within the North-western coastline of Tasmania)
The modelling predicted a minimum time of 28 days for shoreline accumulation to occur along the West coast of Tasmania (i.e. Preminghana IPA), at, or above, the low exposure threshold, with a maximum volume of 22 m^3 expected ashore at this location (RPS 2023).
A minimum time of 42 days for shoreline accumulation to occur along the Flinders Island (i.e. Badger Island and Mount Chappell Island IPA), at, or above, the low exposure threshold, with a maximum volume of 24 m^3 expected ashore at this location (RPS 2023). Though no shoreline accumulation at the moderate shoreline accumulation is predicted at the IPAs.
Surface hydrocarbons at, or above, the low threshold may occur within Tasmanian State waters on the north west corner but are not predicted in other State waters (SA, NSW or Victoria) or King Island (RPS 2023).
The extent of the modelled in-water hydrocarbons, moderate dissolved and high entrained, exposure thresholds may overlap areas where species that have cultural</td><td>First Nations cultural values and sensitivities may be present within the area exposed to surface, in-water and shoreline hydrocarbons at relevant thresholds following a vessel LOC of MDO. These include values related to marine fauna and benthic species such as seagrass and kelp as identified in 6.6.3.
The modelling did not predict any surface at, or above, the low threshold in any State waters (RPS 2023).
No IPAs along coastlines were predicted to be exposed to shoreline hydrocarbons at relevant thresholds (RPS 2023).
The extent of the modelled in-water hydrocarbons, moderate dissolved and high entrained, exposure thresholds may overlap areas where species that have cultural value are present. This includes any BIAs . Noting that in-water exposure (dissolved or entrained) is only predicted to occur within the upper 0 -10 m of the water column.
The potential exposure area for MDO is located entirely within the potential exposure area for condensate LOWC (RPS 2023).</td></tr>
</table>

First Nations		
value are present. This includes any BIAs . Noting that in-water exposure (dissolved or entrained) is only predicted to occur within the upper 0 -10 m of the water column.		
Predicted Environmental Impact		
Surface	**In-water**	**Shoreline**
Visible surface hydrocarbons have the potential to reduce the visual amenity of culturally significant areas. The following First Nations cultural values and sensitivities identified in Section 6.6.3 may be present within the area exposed to surface hydrocarbons at relevant thresholds and are assessed in the relevant sections: • Birds – Section 7.12.5.2 • Whales and dolphins – Section 7.12.5.2 • Seals – Section 7.12.5.2	The following First Nations cultural values and sensitivities identified in Section 6.6.3 may be present within the area exposed to in-water hydrocarbons at relevant thresholds and are assessed in the relevant sections: • Kelp and seagrass – Section 7.12.5.1 • Birds – Section 7.12.5.2 • Abalone, bimbalas, mussels, oysters, pipis – Section 7.12.5.2 • Rock lobster and crabs – Section 7.12.5.2 • Fish and eels – Section 7.12.5.2 • Whales and dolphins – Section 7.12.5.2 • Seals – Section 7.12.5.2	Visible hydrocarbons along a shoreline have the potential to reduce the visual amenity of culturally significant areas. The following First Nations cultural values and sensitivities identified in Section 6.6.3 may be present within the area exposed to shoreline hydrocarbons at relevant thresholds and are assessed in the relevant sections: • Birds – Section 7.12.5.2 • Seals – Section 7.12.5.2
Predicted Level of Impact		
Impacts to onshore cultural heritage, relics, and artefacts are not predicted as anyone shoreline oil exposure would occur up to the high tide mark. Impacts to submerged cultural heritage and submerged cultural landscapes are not predicted as in-water oil exposure would only occur within a depth of 10 m from the surface. No impacts are predicted to Batemans Bay Marine Park at the relevant exposure thresholds. No impacts are predicted to Three sisters rocks and Deen Maar at the relevant exposure thresholds. The worst-case scenario modelled, predicted minimum time before shoreline accumulation at, or above, the low threshold of 28 days is for the along the West coast of Tasmania (RPS, 2023) where the Preminghana IPA. However, due to the anticipated hydrocarbon weathering and fate of the condensate, majority is expected to have either evaporated or entrained during that time. Modelling predicted between approximately 70-82% of the volume to evaporate and between 0-22% to entrain within the first 24 hours, depending on the wind conditions (RPS, 2023). Furthermore, tidal and wave action within the area is anticipated to further breakdown shoreline hydrocarbons. Consequently, any impacts are anticipated to be short-term and localised, and potential impacts have been ranked as **Moderate (2)**.		

7.12.6 Demonstration that Risk will be ALARP

ALARP decision context and justification	**ALARP Decision Context: Type B** Vessels have been used for activities within the Otway and Bass including drilling for over a decade with no major incident. Vessel activities are well regulated with associated control measures, well understood, and are implemented across the offshore industry. Drilling has been ongoing within the Otway and Basin for over a decade with no major incident. Drilling activities are highly regulated with associated control measures, well understood, and are implemented across the offshore industry. However, if a loss of containment occurred this could attract public and media interest. Consequently, Beach believes that ALARP Decision Context B should be applied.
Adopted Control Measures	**Source of good practice control measures**
CM01: Marine Assurance Process	The rig and vessels will meet relevant maritime laws and includes pre-commencement rig and vessel inspections of class certification requirements under the Navigation Act 2012 and associated Marine Orders, including but not limited to: • Marine Order 21: Safety and emergency arrangements gives effect to SOLAS regulations dealing with life-saving appliances and arrangements, safety of navigation and special measures to enhance maritime safety. • Marine Order 27: Safety of navigation and radio equipment gives effect to SOLAS regulations regarding radiocommunication and safety of navigation and provides for navigation safety measures and equipment and radio equipment requirements. • Marine Order 30: Prevention of collisions requires that onboard navigation, radar equipment, and lighting meets the International Rules for Preventing Collisions at Sea (COLREGs) and industry standards. • Marine Order 31: SOLAS and non-SOLAS certification details survey, maintenance, and certification requirements for vessel class. • Marine Order 70: Seafarer Certification details training and competency requirements.
	Rig and vessels will have Preventative Maintenance System that provides a status on the maintenance of equipment and detailed manufacturer's specification on maintenance procedures for: • Equipment detail as a control in this EP will be inspected to ensure effective operation. • Power generation and propulsion systems on the MODU and vessels will be inspected to ensure efficient operation.
	Materials and equipment that have the potential to spill onto the deck or marine environment will be stored within a contained area.
	In accordance with MARPOL Annex I and Marine Order 91 Marine Pollution Prevention – oil, a Shipboard Marine Pollution Emergency Plan (SMPEP) or Shipboard Oil Pollution Emergency Plan (SOPEP) (according to class) is required to be developed based upon the Guidelines for the Development of Shipboard Oil Pollution Emergency Plans, adopted by IMO as Resolution MEPC.54(32) and approved by AMSA. To prepare for a spill event, the SMPEP/SOPEP details: • Response equipment available to control a spill event. • Review cycle to ensure that the SMPEP/SOPEP is kept up to date. • Testing requirements, including the frequency and nature of these tests. In the event of a spill, the SMPEP/SOPEP details: • Reporting requirements and a list of authorities to be contacted. • Activities to be undertaken to control the discharge of hydrocarbon.

	• Procedures for coordinating with local officials. In addition, spill response kits will be available and routinely checked to ensure adequate stock is maintained.
CM02: Vessel and Rig Operating Procedures	A 500 m radius Petroleum Safety Zone (PSZ) will be published in the Government Notices Gazette for each new well location for the duration of the drilling and will remain in place for those wells which are suspended for future production. A 2 km radius cautionary zone will be in place around the rig when on location and will be monitored by a support vessel. At least one support vessel will accompany the rig when in operation and when safe to do so (e.g. outside of weather event), to manage interactions with other marine users.
	Bunkering and bulk liquids will be transferred in accordance with bulk transfer procedures to reduce the risk of an unintentional release to sea during transfer. The procedures include standards for: • Certified equipment with confirmed integrity (e.g. hose and valves). • Transfer process (e.g. safety, communication, monitoring, inventory, emergency shut down procedures, procedural documents, and spill incident details)
CM03: Consultation for Implementation of EP	As per Section 4.16 Beach will undertake consultation for the implementation of the EP which will include at a minimum: • Notification to all relevant person regarding acceptance of the EP by NOPSEMA. • Commencement of activities, exclusion zones, vessel details, pre-lay of anchors and buoys, movement of drilling rig to new locations, during activity and cessation notification requirements. • On-water communication processes, including SMS messages and radio communication. • Consultation with relevant First Nations groups (section 6.6.2) regarding identified cultural heritage and cultural landscapes in accordance with CM05: Seabed Survey. • Consultation with commercial fishing associations (and individual commercial fishers where identified) regarding well locations, the ongoing communication of Beach activities to their members, and applying CM04: Beach Fair Ocean Access Procedure. Under the Navigation Act 2012, the Australian Hydrographic Office (AHO) are responsible for maintaining and disseminating hydrographic and other nautical information and nautical publications such as Notices to Mariners. AMSA also issue radio-navigation warnings. Notifications to AMSA and AHO will be undertaken as detailed in Section4.16.
CM04: Beach Fair Ocean Access Procedure	Beach's Fair Ocean Access Procedure was developed with input from commercial fishing industry organisations (Bass Strait Scallop Industry Association, Scallop Fisherman's Association of Tasmania, South East Trawl Fishing Industry Association and Tasmanian Seafood Industry Council. The procedure details the process whereby a commercial fisher can claim compensation for an economic loss associated with Beach's offshore activities where impacts cannot be avoided. An information sheet on the procedure is available in Appendix D.
CM09: Drilling Program	The BOP shall be routinely function and pressure tested in accordance with industry standards and preventative maintenance will be in accordance with manufacturer's specifications and in alignment with Drilling Contractors preventative maintenance system. Pre-operational function and pressure test to be conducted and may be witnessed by additional third-party prior to campaign.

	Prior to campaign commencement a register of suitable relief well rigs will be compiled and updated monthly during the campaign, or more frequently should any change in status of available rigs occur.
CM13: Beach Offshore Oil Pollution Emergency Plan	Under the OPGGS(E)R, NOPSEMA require that the petroleum activity have an accepted Oil Pollution Emergency Plan (OPEP) in place before the activity commences. In the event of a LOC or LOWC, the OPEP will be implemented. The Offshore OPEP was developed to support all Beach activities offshore Victoria and includes response arrangements for a worst-case LOC / LOWC scenario from the activity. The OPEP also includes Tactical Response Plans (TRPs) for identified protection priority areas within the region. The Victorian Desalination Plant is identified as a sensitive environmental receptor in the Offshore OPEP and forms part of the Powlett River Tactical Response Plan.
CM14: Beach Offshore Operational and Scientific Monitoring Plan	Under the Environment Regulation, NOPSEMA require that the Environment Plan Implementation Strategy provides for monitoring of an oil pollution emergency. The OSMP details operational monitoring to inform response planning and scientific monitoring to inform the extent of impacts from hydrocarbon exposure and potential remediation requirements.
CM15: Well Engineering and Construction Management System	Beach has in place an Operational Excellence Management System (OEMS) which consists of Well Engineering and Construction Management System (WECS) that ensures Beach well activities are fit for purpose with operational risks managed to a level that is as low as reasonably practicable. It also ensures that changes are made in a controlled manner, that appropriate standards are adhered to, and that a sufficiently resourced and competent organisation is in place.
CM16: Source Control Contingency Plan (SCCP), inclusive of Relief Well Plan	The SCCP will be consistent with the International Oil and Gas Producers (IOGP) Report 594 - Subsea Well Source Control Emergency Response Planning Guide for Subsea Wells (2019). Relief Well Plan will be developed in line with industry guidelines, i.e. UK Offshore Energies (OEUK). Beach is a signatory for accessing source control support through the Australian Energy producers Memorandum of Understanding (AEP MoU) arrangement. Mutual aid is a multi-lateral support network that provides a pre-agreed framework for the sharing of equipment and expertise. The key objective is to enable rapid response to control the source as efficiently as possible.
CM17: NOPSEMA Accepted Well Operations Management Plan	The Well Operations Management Plan (WOMP) details well barriers and the integrity testing that will be in place for the program. Beach's NOPSEMA-accepted WOMP describes the minimum requirements for well barriers during drilling activities.
CM18: NOPSEMA accepted Rig Safety Case	The Offshore Petroleum and Greenhouse Gas Storage (Safety) Regulations 2009 (OPGGS(S)) set out the requirements for the contents of safety cases. The rig requires an Australian Safety Case detailing the control in place to prevent a major accident event. The Rig Safety Case: • Identifies the hazards and risks. • Describes how the risks are controlled. • Describes the safety management system in place to ensure the controls are effectively and consistently applied.

Additional controls assessed

Control	Control Type	Cost/Benefit Analysis	Control Implemented?
Preventative			

Eliminate or substitute the use of diesel.	Equipment	The use of diesel for fuel for vessels and machinery cannot be eliminated. Substituting for another fuel, i.e. Heavy Fuel Oil or bunker fuel oil, would have a higher environmental impact than diesel.	No
Remove support vessels from activity.	Equipment	Vessels are required to support operational activities and provide essential safety standby duties including tracking/intersecting vessels that are coming towards or close to the rig. Thus, there is an increased risk of collision by removing support vessels from the activity.	No
No refuelling to rig at sea.	Equipment	Eliminates the risk of incidents related to the transfer of fuels to the rig. Refuelling operations are one of the most likely causes of a hydrocarbon spill occurring during marine operations. However, given the offshore location and the inability to bring the rig into port to refuel, this activity cannot be removed.	No
Reduction			
Reduce the volume of MDO carried.	Equipment	May reduce the total volume of MDO released. Evaluation of trade-offs indicates that carrying less diesel would result in the need for more frequent port visits for refuelling and/or more frequent at-sea bunkering and may increase the risk of transit and bunkering related incidents. The trade-offs and associated costs are grossly disproportionate to the benefit gained.	No
Response			
Relief well rig on standby	Equipment	Any rig on standby would require an in-force Safety Case to operate in Australian Commonwealth waters. The key benefit would be a reduction in the overall shoreline loading from weathered, residual fractions of the condensate. The predicted maximum length of shoreline potentially impacted by low thresholds of hydrocarbon is between 105-138 km, with the average predicted being between 11-73 km. There is no predicted shoreline exposure at moderate or high thresholds. Having a rig on standby would potentially halve the time to implement source control, therefore, the overall potential reduction in exposure to shorelines by halve. Halving the potential loading at a low threshold would produce a marginal overall environment benefit given the nature of weathered condensate. Although conceptual relief well planning will be performed as part of the SCCP, time would	No

		still be required to plan the relief well to address the actual situation. Rig availability will be a challenge and on top of this, having a relief well rig on standby would result in significant additional costs (approx. $1M / day) to Beach that that are considered grossly disproportionate to the level of environmental benefit gained given the relatively small level of potential low threshold shoreline oiling.	
Capping Stack System (CCS)	Equipment	Well CCS is designed to stem the hydrocarbon flow prior to permanent plugging of the well. Beach undertook a feasibility review of CCS and has confirmed that due to the technical complexity (i.e. lack of vertical access above the well in a blowout scenario, significant HSE risks in deploying the capping stack and any Offset Installation methods due to no vertical access) of deploying a capping stack in shallow waters with a gas plume environment and harsh metocean conditions, a relief well is the preferred means of primary source control for the exploration, appraisal, and development wells. Refer to Section 7.13.1 Response Option Selection.	No
Emergency Shut In Device - Kinetic Blowout Stopper (K-BOS)	Equipment	K-BOS is a single use pyrotechnic device with rams which relies on conditions-based monitoring to verify availability during operations. This is a new technology which has not been deployed in Australia and which has only been deployed <10 times internationally in subsea applications. To date, the device has never been activated to control a subsea loss of containment. he system has been factory tested to shear drill collars, heavy-walled casing, landing string etc. in controlled conditions only. The device has not been qualified for sealing and supplier has not been able to demonstrate full sealing capability. There is a lack of actual subsea deployments and risk to system (well) integrity of untested safety critical equipment. An assessment of this system is provided in Section 7.13.1 Response Option Selection.	No
Dispersant application	Equipment	Chemical dispersants are generally ineffective for gas-condensate hydrocarbon releases. However, dispersants may be effective to reduce VOCs at surface to below lower explosive limits. Given the installation of a capping stack is not a feasible response option for the production or suspended wells, and a relief well would be offset to the release	No

	location, there is no potential benefit with applying subsea dispersants.
Consequence rating	Moderate (2)
Likelihood of occurrence	LOC MDO: Highly Unlikely (2) based upon AMSA Annual Report 2017-18 (serious incident reports) LOWC condensate: Remote (1) (7.2 x 10^{-5} per producing well based upon producing gas wells operated to North Sea Standard) ref IOGP Risk Assessment Data Directory Blowout Frequencies September 2019: https://www.iogp.org/bookstore/product/risk-assessment-data-directory-blowout-frequencies/
Residual risk	Medium

7.12.7 Demonstration that Risks will be Acceptable

Consequence rating	Moderate (2)
Likelihood of occurrence	Highly Unlikely (B)
Residual risk	Low
Acceptability assessment	
Acceptability Assessment	
To meet the principles of ESD	The risk of a hydrocarbon spill was assessed as Low, and the highest consequence assessed as Moderate (2) which is not considered as having the potential to result in serious or irreversible environmental damage. There is high confidence in the predicted level of risk as Beach has significant experience operating in the Otway and Bass based on their existing offshore developments and associated activities including the Beach Otway Drilling Campaign in 2021/2022.
Internal context	The proposed management of the risk is aligned with the Beach Environment Policy. Activities will be undertaken in accordance with the Implementation Strategy (Section 7).
External context	Stakeholder objections or claims have been assessed in relation to hydrocarbon spills and appropriate controls have been adopted as detailed in Section 7.12.6. King Island Council (Stakeholder ID 8388624) raised concerns about hydrocarbon release that may reach King Island causing harm to the commercial fishing sector and reputational damage to the island's brand. Beach explained spill risks and spill response approach and support agencies.
Other Requirements	• Vessel activities undertaken during the Drilling Program will adhere to relevant legislative requirements as detailed in the controls section. • Integrity of wells, pipeline and subsea equipment is managed as per the requirements of the in-force EP, safety cases and WOMPs required under the OPGGS(E)R and Offshore Petroleum and Greenhouse Gas Storage (Safety) Regulations and Offshore Petroleum and Greenhouse Gas Storage (Resource Management and Administration) Regulations 2011, respectively. • The South-east Commonwealth Marine Reserves Network Management Plan 2013-23 (Director of National Parks, 2013) identifies oil pollution associated with shipping, other vessels and offshore mining operations as a pressure or source of pressure on the conservation values of the South-east Marine Reserves Network. Apollo, Beagle, Boags, Franklin and Zeehan AMPs may be exposed to surface or in-water hydrocarbons at the low threshold. Impacts to these AMP major conservation values are assessed as short-term and recoverable based on the majority of the exposure being to dissolved hydrocarbons for a short period of time. Impacts to

	AMP major conservation values for ecosystems, habitats, communities and cultural and heritage sites are not predicted.
	• The following Conservation Advice / Recovery Plans identify pollution as a key threat:
	  ◦ Recovery Plan for Marine Turtles in Australia (CoA 2017b), identified as acute chemical discharge (oil pollution).
	  ◦ National Recovery Plan for the Australian Fairy Tern (*Sternula nereis nereis*) (CoA 2020b).
	  ◦ National Recovery Plan for the Australian Painted Snipe (CoA 2022) identified as a deterioration of water quality.
	  ◦ Conservation Advice *Calidris ferruginea* (curlew sandpiper) (DoE 2015f) identified as Habitat degradation/ modification (oil pollution).
	  ◦ Conservation Advice for *Calidris acuminata* (sharp-tailed sandpiper) (DCCEEW 2024h) identified wetlands and intertidal habitats threatened by acute pollution (oil).
	  ◦ Conservation Advice for *Arenaria interpres* (ruddy turnstone) (DCCEEW 2024i) identified wetlands and intertidal habitats threatened by acute pollution (oil).
	  ◦ Conservation Advice for *Numenius madagascariensis* (eastern curlew) (DoE 2015e) identified as Habitat degradation/ modification (oil pollution).
	  ◦ Conservation Advice for *Calidris tenuirostris* (great knot) (DCCEEW 2024f) identified wetlands and intertidal habitats threatened by acute pollution (oil).
	  ◦ Conservation Advice for *Calidris canutus* (red knot) (DCCEEW 2024g) identified wetlands and intertidal habitats threatened by acute pollution (oil).
	  ◦ National Recovery Plan for Albatrosses and Petrels 2022 (CoA 2022a).
	  ◦ Wildlife Conservation Plan for Migratory Shorebirds – 2015 (DoE 2015b).
	  ◦ Wildlife Conservation Plan for Seabirds (CoA 2020a).
	• These Conservation Advice and Recovery Plans identify the following conservation actions:
	  ◦ Minimise chemical and terrestrial discharge. Controls have been identified and will be implemented to minimise the risk of minimise chemical discharges.
	  ◦ Ensure spill risk strategies and response programs include management for turtles and their habitats, particularly in reference to 'slow to recover habitats', e.g. nesting habitat, seagrass meadows or coral reefs. No habitats for turtles are identified within the Planning Areas. OPEP and OSMP cover management of response to oiled turtles.
	  ◦ Ensure appropriate oil-spill contingency plans are in place for the subspecies' breeding sites which are vulnerable to oil spills. OPEP and OSMP cover response strategies for management breeding sites vulnerable to oil spills.
	  ◦ Implement measures to reduce adverse impacts of habitat degradation and/or modification. Controls have been identified and will be implemented to reduce adverse impacts of habitat degradation and/or modification.

Monitoring and reporting	Loss of containment resulting in a hydrocarbon spill is required to be reported as per Section 8.3.1. Impacts as a result of a loss of containment resulting in a hydrocarbon spill will be monitored and reported in accordance with the OSMP.
Acceptability outcome	**Acceptable**

7.13 Spill Response

This section presents the impact assessment for oil spill response strategies.

Beach has developed a regional Offshore Oil Pollution Emergency Plan (OPEP) which is the primary reference document and key control measure to be implemented in the highly unlikely event of a hydrocarbon release whilst undertaking the Drilling Program.

7.13.1 Response Strategy Selection

Spill response strategies are triggered in the event of a hydrocarbon spill. Not all response strategies are appropriate for every oil spill. Different oil types, spill locations, and volumes require different response strategies, or a combination of response strategies, to form an effective response.

Beach has undertaken a preliminary Net Environmental Benefit Analysis (NEBA) to identify response strategies that will result in the lowest overall impact and maximum protection, or recovery, of environment, socio-economic and cultural values. The NEBA process is undertaken at a strategic level (pre-spill) to identify pre-determined appropriate response strategies. In the event of a spill, an Operational NEBA is undertaken throughout the response, and implementation of specific response strategies is subject to the outcomes of the Operational NEBA.

Table 7-19 details the review undertaken of current oil spill response strategies and identifies the response strategies that are appropriate to unplanned loss of well containment (LOWC) of condensate and an unplanned vessel spill of MDO.

7.13.2 Spill Response Planning Area

Exposure values for oil spill modelling were used to approximate the spatial extent to inform the evaluation and planning for oil spill response and monitoring.

To identify the area where oil spill response strategies would be effective the following actionable hydrocarbon exposure thresholds based on the NOPSEMA Bulletin: Oil Spill Modelling (NOPSEMA 2019) were used:

- Surface moderate exposure (50 g/m^2).
- Shoreline moderate exposure (100 g/m^2).

The Spill Response Planning Area for diesel is in Figure 7-12 and for condensate in Figure 7-13.

No areas of actionable shoreline oil (>100 g/m^2) were identified outside of Victoria and Tasmania with the main areas being King Island and the Otway Coast.

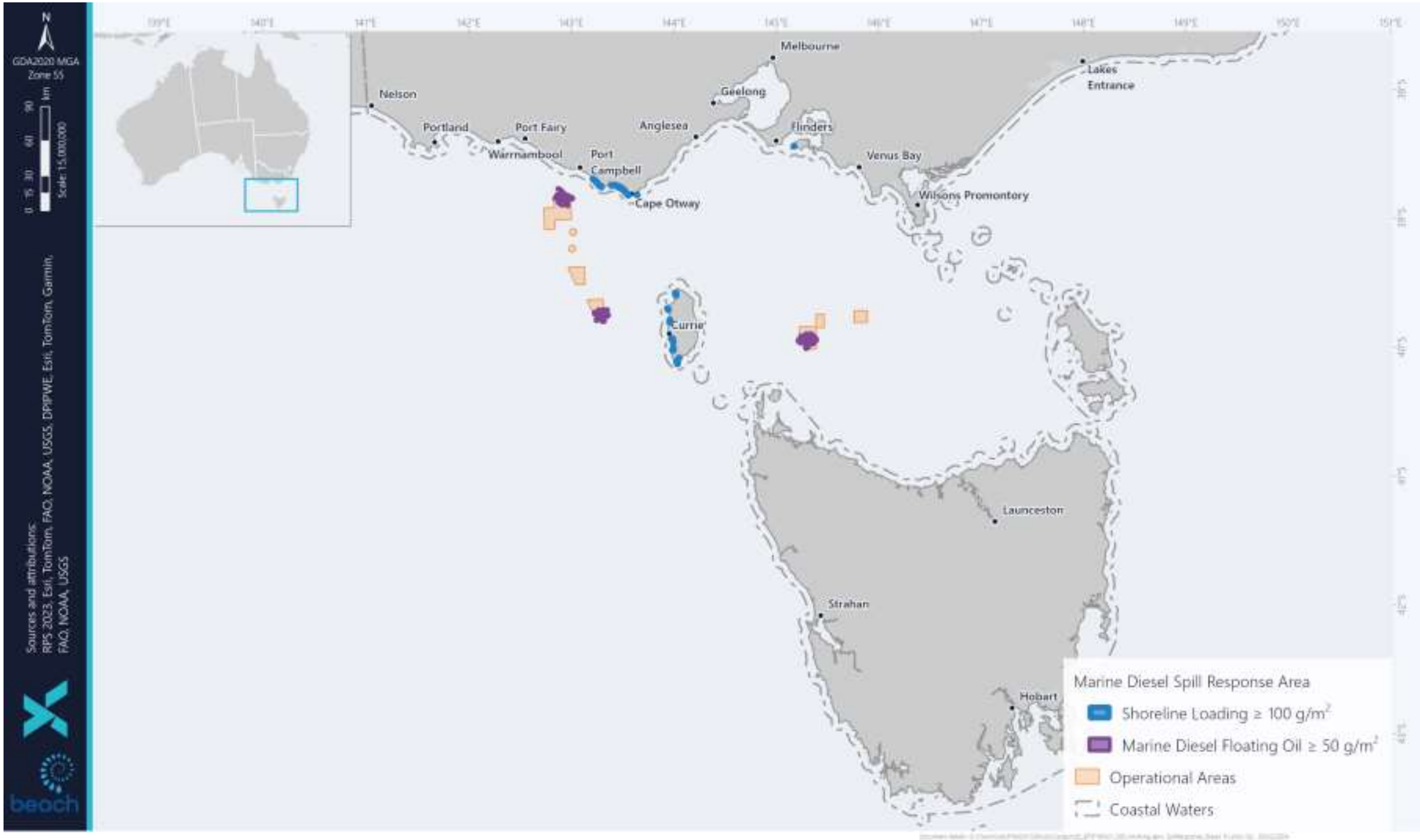

Figure 7-12: Diesel Oil Spill Response Area

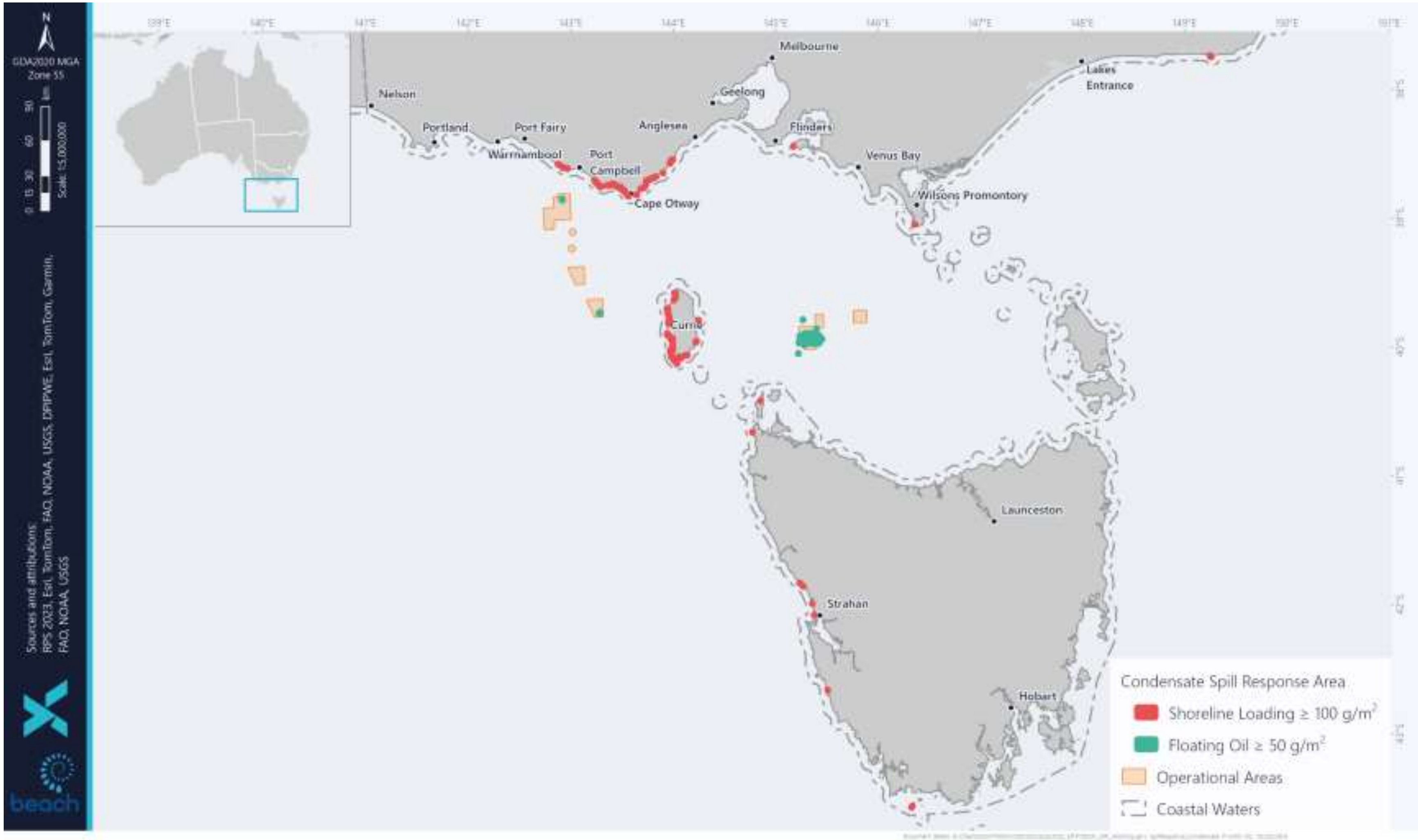

Figure 7-13: Condensate Oil Spill Response Area

Table 7-19: Preliminary NEBA Summary - Feasibility, Effectiveness & ALARP Analysis

Response Strategy	Response Description	Hydrocarbon Type	Feasibility, Effectiveness & ALARP Analysis	Net Environmental Benefit	Capability Needs Analysis (See OPEP and OSMP for details)	Capability Assessment
Monitor and Evaluate	Visual – aerial & vessel Satellite Predictive modelling	Gas condensate	Feasible. Effective – Gas condensate expected to spread to thin layers on the sea surface within 1 km of the well location. Monitoring used to inform both response planning and monitoring requirements. Hydrocarbons likely visible on sea surface for duration of LOWC. Visual and satellite operational monitoring implemented during LOWC event. Scientific monitoring implemented to inform extent of impact and remediation 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. All feasible monitoring techniques have been applied and monitoring personnel and equipment are readily available for deployment. Monitoring buoy maintained aboard rig whilst undertaking drilling activity for deployment. No further benefit gained by having additional monitoring capability. OSMP details the vessels and personnel to implement the appropriate scientific studies.	Yes	Actionable on-water hydrocarbon thresholds limited to immediate vicinity of well site. Maximum length of shoreline accumulation at the response threshold (moderate) is 44 km with a mean of 14 km. 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).	As detailed in OPEP: • Tracking buoy on rig. • Aerial contracts in place • Aerial observers available via AMOSC. • Vessels available for duration of Drilling Program. • OSTM contract in place and available via AMOSC. • Environmental monitoring consultants accessible. Implement response as per OPEP and under direction of the State Control Agency (if in State waters). Capability in place and sufficient to implement timely response.
	Visual – aerial and vessel	MDO	Effective - MDO rapidly spreads to thin layers on surface waters. Monitoring 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		
Source Control	ROV Emergency BOP Intervention	Gas condensate	Feasible. Effective. Response strategy that can be rapidly implemented to reduce the release of hydrocarbons into the marine environment whilst undergoing plans for the primary response strategy of a relief well.	Yes	Support vessel Trained personnel Operating equipment (i.e. ROVs/cameras /cutters)	As detailed in OPEP and SCCP: • Access to response specialists such as AMOSC/ Oceaneering/Wild Well Control for equipment.
	Relief well	Gas condensate	At the time of writing, the following drilling rigs have been deemed as being within Australia in the expected time frame of the Drilling Program. • Ocean Apex (North West Shelf) • Noble Deliverer (Western Australia) • Transocean Endurance (North West Shelf) • Valaris 247 (North West Shelf) Due to the remote location of the Otway and Bass Basins, the available rigs shall be monitored on a monthly basis upon commencement of drilling activities thus ensuring the mobilisation of an alternate rig remains feasible within the assumed timeframe of approximately 35 days (the largest time component of the relief well kill). The ongoing assessment of rig availability shall be conducted with reference to: • Rig with a valid Australian Safety Case. • Rig with the ability to conduct relief well kill operations. • Rig ability to operate in shallow water.	Yes	Rig – with Australian Safety Case. Casing, drill pipe and consumables. 3 x Support vessels. Well control personnel as detailed in SCCP.	As detailed in OPEP, SCCP and Relief Well Plan: • Access to rig via AEP MoU. • Contracts with Well Control Specialists. • Relief well mobilisation strategy and schedule. • Wells Emergency Team (WET). Implement response as per OPEP, SCCP and Relief Well Plan. Capability in place and sufficient to implement timely response.

Response Strategy	Response Description	Hydrocarbon Type	Feasibility, Effectiveness & ALARP Analysis	Net Environmental Benefit	Capability Needs Analysis (See OPEP and OSMP for details)	Capability Assessment
			• Proximity to the Otway and Bass. • Ability to engage in a mutual aid agreement with the Operator. Transport of one of the identified rigs to the Otway or Bass Basin is within the 35-day mobilisation estimate provided, assuming a tow speed of ~4 knots. If there are suitable rigs operating in New Zealand within the expected timeframe of the Beach Drilling Program (at the time of writing, none are planned to be), the transport from New Zealand waters to the Otway or Bass Basins is likely to take approximately half of the duration relative to mobilisation from the North-West Shelf. Interface shall be managed via the Australian Energy Producers 'Memorandum of Understanding (AEP MoU): Mutual Assistance' (to which Beach is a signatory) between Beach Energy, the New Zealand Oil Operator, Rig Contractor, and the Australian Regulator. Source control planning has identified all reasonable controls to implement relief well in a timely manner. Beach considers the potential environmental benefit gained by having a pre-positioned alternate rig on location to be grossly disproportionate given the high financial and logistical support cost associated with having a rig on standby. All reasonable pre-planning has been undertaken to facilitate the timely initiation of a relief well if required.			
	Capping stack system (CSS)	Gas condensate	Trendsetter Engineering, as the manufacturer of capping stacks, was engaged by Beach to review various capping stack options and its feasibility. Trendsetter reviewed available concepts promoted within industry and selected the two most viable deployment concepts for further evaluation with the various CSS. The feasibility analyses are detailed in the following two studies: • Beach Energy Capping Stack Shallow Water Feasibility Assessment • GER-9002748_BE CS Non-Vertical Study Two (2) alternative offset installation (non-vertical access) methods were applied to four (4) different CSS identified by Beach Energy for potential use on a typical shallow water subsea blowout gas well. **Delmar Offset Installation Method** This method requires that the subsea blowout wellhead was left clear, with BOP stack removed previously or not installed at all, so that Delmar's subsea wellhead winches could be established for drawdown operations. For this concept, the subsea winch is the primary installation method, with the mudmat winch drawdown being the secondary installation method. The positioning of the capping stack is solely dependent on the use of the drawdown winches. The subsea hook up would need to be made with vessel support from outside the plume diameter, with adequate safety margin, estimated to be at least 335 m. Furthermore, vertical control is fully dependent on the positive buoyancy of the system, and successful deployment relies heavily on the precisely calculated buoyancy force of the chained buoys, with only minimum control or adjustable measures to compensate the required vertical lifting of the payloads. If the gas plume impact forecast to the buoys is not within the assumed design, then the buoyancy performance will be outside the calculated parameter range. **Trendsetter Offset Installation Method** The Trendsetter method relies on a series of chained oceangoing barges to assist in lifting and deployment of the CSS and BOP adaptor spool. The barges are used to assist positioning and ensure the anchor handling vessel is maintained in a safe zone away from	N/A	N/A	N/A

Response Strategy	Response Description	Hydrocarbon Type	Feasibility, Effectiveness & ALARP Analysis	Net Environmental Benefit	Capability Needs Analysis (See OPEP and OSMP for details)	Capability Assessment
			the gas plume. Gas plume impact on oceangoing barges in exclusion zone above blowout well will severely limit the success of the deployment. In addition, two subsea winches, may be deployed on clump weights on the seabed approximately 30 m from the wellhead and used for lowering and guidance of the capping stack over the damaged well. In general, the subsea drawdown system would be recommended with a less heavy 7" 15,000 psi capping stack (Boots and Coots) and to assist with successful guidance of the CSS assembly. Unlike the Delmar method that uses buoyancy modules, these are not required for the Trendsetter method. Furthermore, the use of the drawdown capability is dependent on the wet weight of the stack and the up-thrust forces from the blowout well. The Trendsetter method does require additional vessels available, and the successful deployment would be limited due to the weather and metocean conditions. **Summary** Rough sea states (especially as per prevailing in the Otway Basin), including high waves and longer wave periods define the safe operating limits of CSS deployment. The ability to safely deploy the capping stack using a deck crane or A-frame located on the stern of the deployment vessel is questionable. Furthermore, if the vessel is experiencing too much heave due to wave action, the CSS could unintentionally hit the subsea wellhead during deployment causing damage to the equipment itself and to the wellhead. Support vessels have wind ratings for routine and critical operations, above which, operations may be suspended, and high wind speeds will tend to increase wave heights in open water conditions which can further limit operations. Defining operating limits of acceptable sea states are required for successful deployment of the CCS equipment in adverse sea state environments. The feasibility analysis confirmed a sea state limit of 2 m significant wave height (Hs) and 15 knots winds is required. The Otway Basin is a predominant moderate to high wave energy environment with wave heights in the summer months average between 2.5 and 3.0 m and maximum heights range between 5.6 and 7.7. Wave conditions are more severe in winter, when mean heights range from 3.1 to 3.7 m and maximum heights are between 7.6 and 10.3 m. In summary, all seasons show a relatively high level of wind and wave activity. Winds in the eastern Otway and western Bass Strait area also are generally strong, exceeding 13 knots for 50% of the time. The sea state in the area does not stay below the limit for a duration long enough for the CCS operation. The conditions are thus not operationally suitable for deployment of the CSS. Furthermore, the gas plume environment in shallow water conditions is manifestly different to a deeper water environment due to the exclusion zone above the wellhead preventing vertical installation of the equipment. Additionally, given the use of a CSS is not operationally suitable for the Drilling Program, the debris clearance tooling as part of the SFRT is not required.			
	Subsea First Response Toolkit (SFRT)	Gas condensate	Feasible. Potentially effective - may support decision making for source control strategy, and potentially allow for debris clearance. Given that the use of a CSS is not operationally feasible, as described above, the use of the SFRT is not required.	NA	NA	NA
	Emergency Shut In Device - Kinetic Blowout Stopper (K-BOS)	Gas condensate	K-BOS is a single use pyrotechnic device with rams which rely on conditions-based monitoring to verify availability during operations. The seal components are installed into a hermetically sealed chamber that is not reopened until recertification or activation. The equipment is not routinely function tested or pressure tested, like a conventional subsea BOP, to confirm equipment condition and relies on being hermetically sealed during its lifetime.	NA	NA	NA

Response Strategy	Response Description	Hydrocarbon Type	Feasibility, Effectiveness & ALARP Analysis	Net Environmental Benefit	Capability Needs Analysis (See OPEP and OSMP for details)	Capability Assessment
			This is a new technology which has not been deployed in Australia and has only been deployed <10 times internationally in subsea applications. The system has been factory tested to shear drill collars, heavy-walled casing, landing string etc. in controlled conditions only. The device has not been qualified for sealing and supplier has not been able to demonstrate full sealing capability. The classification of K-BOS as a barrier is yet to undergo a barrier validation process acceptable to DNV, NOPSEMA and Beach technical requirements. DNV is the leading industry body to ensure that safety critical equipment and wells are designed, constructed, and maintained to manage the risk of unintentional fluid escapes. The Drilling Program wells will have the rig's subsea BOP installed on the wellhead prior to drilling into any hydrocarbon bearing sections. This is proven technology with built in redundancy in terms of sealing capability (multiple rams), shearing capability (multiple shear rams), control systems (mudline subsea control), emergency systems (emergency disconnect sequence, surface and subsea accumulator bottles, autoshear / Deadman system, acoustic control, ROV control panels on the lower marine riser package and BOP, portable emergency acoustic control). With the existing BOP stack in place including multiple redundant systems, the newness of the K-BOS technology and the lack of validation of the sealing system to function to its design intent, risks along with the additional costs and time, lack of actual subsea deployments and risk to system (well) integrity of untested safety critical equipment, means the trade-offs are considered grossly disproportionate to the unproven benefit of the K-BOS.			
	Vessel Source Control	MDO	Effective – primary response strategy for all spills in accordance with vessel SMPEP/SOPEP. Given AMSA is the Control Agency in the event of a vessel collision in Commonwealth waters, and their access to NatPlan resources not further controls are considered.	Yes	Support vessels	Drilling Program is serviced by multiple support vessels. Capability available at request of AMSA as Control Agency.
Offshore Containment and Recovery	Booms and skimmers	Gas condensate	Not feasible. Actionable surface thickness of 50 g/m^2 is expected in the vicinity of the release location (<1 km) for both seasons for the Otway wells. For the Bass wells Actionable surface thickness of 50 g/m^2 is up to 17 km with a residency times of only 3 days. 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.	N/A	N/A	N/A
		MDO	Not feasible. MDO spreads rapidly to less than 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.			
Protection and Deflection	Nearshore Booms and skimmer	Gas condensate	Potentially feasible. Partially effective. The maximum length of actionable shoreline oil is approximately 44 km with initial shoreline contact predicted to occur within 5 days of the release with a maximum loading of 193 m^3 predicted. If operational monitoring indicates shorelines are potentially exposed to actionable levels of hydrocarbons and accessible to response personnel and equipment, protection and deflection may be an effective technique for reducing shoreline loadings. Given Beach have access to both AMOSC equipment and Core Group personnel available for timely deployment as per Tactical Response Plans, no further controls have been identified.	Subject to operational NEBA	Response personnel Booms & skimmers Waste facilities	As detailed in OPEP: • Core responders and equipment available via AMOSC. • NRT and NRST available via Control Agency request under NatPlan. • Environmental monitoring providers accessible. • Waste contracts in place. • Tactical Response Plans developed for priority response planning areas.

Response Strategy	Response Description	Hydrocarbon Type	Feasibility, Effectiveness & ALARP Analysis	Net Environmental Benefit	Capability Needs Analysis (See OPEP and OSMP for details)	Capability Assessment
						Implement response as per OPEP and under direction of the State Control Agency. Capability in place and sufficient to implement timely response.
		MDO	Potentially feasible. Partially effective. The maximum length of actionable shoreline oil is approximately 10 km with initial shoreline contact predicted to occur within 2 days of the release with a maximum loading of 35 m^3 predicted. If operational monitoring indicates shorelines are potentially exposed to actionable levels of hydrocarbons and accessible to response personnel and equipment, protection and deflection may be an effective technique for reducing shoreline loadings. Given Beach have access to both AMOSC equipment and Core Group personnel available for timely deployment as per Tactical Response Plans, no further controls have been identified.	Subject to operational NEBA	Response personnel Booms & skimmers Waste facilities	As detailed in OPEP: • Core responders and equipment available via AMOSC. • NRT and NRST available via Control Agency request under NatPlan. • Environmental monitoring providers accessible. • Waste contracts in place. Implement response as per OPEP and under direction of the State Control Agency. Capability in place and sufficient to implement timely response.
Shoreline Clean-up	The active removal and/or treatment of oiled sand and debris	Gas condensate	Feasible. Effective on beaches. The maximum length of actionable shoreline oil is approximately 44 km with actionable shoreline oil contact predicted to occur within 9 days of the release with a maximum loading of 193 m^3 predicted. If operational monitoring indicates shorelines are potentially exposed to actionable levels of hydrocarbons and accessible to response personnel and equipment, shoreline clean-up may be an effective technique for reducing shoreline loadings. Given Beach have access to both AMOSC equipment and Core Group personnel available for timely deployment as per Tactical Response Plans, no further controls have been identified.	Subject to operational NEBA	For shoreline clean-up planning the volume of collected oil is multiple by a factor of 10. The clean-up rate is based on 1 m^3 per day per person with clean-up teams based on 10 persons per team.	As detailed in OPEP: • Core Group responders and equipment available via AMOSC. • NRT and NRST available via Control Agency request under NatPlan. • Waste contracts in place. • Tactical Response Plans developed for priority response planning areas. Implement response as per OPEP and under direction of the State Control Agency. Capability in place and sufficient to implement timely response.
		MDO	Feasible. Effective on beaches. The maximum length of actionable shoreline oil is approximately 10 km with actionable shoreline oil contact predicted to occur within 4 days of the release with a maximum loading of 35 m^3 predicted. If operational monitoring indicates shorelines are potentially exposed to actionable levels of hydrocarbons and accessible to response personnel and equipment, shoreline clean-up may be an effective technique for reducing shoreline loadings. Given Beach have access to both AMOSC equipment and Core Group personnel available for timely deployment as per Tactical Response Plans, no further controls have been identified.	Subject to operational NEBA	For shoreline clean-up planning the volume of collected oil is multiple by a factor of 10. The clean-up rate is based on 1 m^3 per day per person with clean-up teams based on 10 persons per team.	As detailed in OPEP: • Core Group responders and equipment available via AMOSC. • NRT and NRST available via Control Agency request under NatPlan. • Waste contracts in place. Implement response as per OPEP and under direction of the State Control Agency. Capability in place and sufficient to implement timely response.
Oiled Wildlife Response (OWR)	Capture, cleaning, and rehabilitation of oiled wildlife.	Gas condensate	Feasible. Effective. At the conservative environmental impact surface threshold (10 g/m^2) the predicted exposure is up to 20 km for the Otway wells and 88 km for Bass from the release location. Oiling could also occur on shorelines if fauna present.	Yes	Personnel Equipment Triage and waste facilities	As detailed in OPEP: • Core Group responders and equipment available via AMOSC • NRT and NRST available via Control Agency request under NatPlan. See OPEP for details of applicable response and support agencies for the relevant state. Capability in place and sufficient to implement timely response
		MDO	Feasible. Effective. At the conservative environmental impact surface threshold (10 g/m^2) the predicted exposure is up to 48 km from the release location with a maximum residency time of up to one day. Low numbers of exposed birds would be predicted based on exposure time. Oiling could also occur on shorelines if fauna present.			

Response Strategy	Response Description	Hydrocarbon Type	Feasibility, Effectiveness & ALARP Analysis	Net Environmental Benefit	Capability Needs Analysis (See OPEP and OSMP for details)	Capability Assessment
Chemical Dispersant Application	Application of chemical dispersants either surface or subsea	Gas condensate	Feasible. Not recommended for Group I oils such as condensate due to the very low viscosity and high volatility – generally no environmental benefit gained by the application of dispersant on Group I oils. Subsea dispersant injection (SSDI) may reduce volatile organic compounds (VOCs) at sea surface within the response area, therefore creating a safer work environment for responders. Given the use of a CSS is not operationally suitable, the application of chemical dispersants to reduce surface VOCs is not required.	No	N/A	N/A
		MDO	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	N/A

7.13.3 Response Strategies

7.13.3.1 Source Control

Source control responses for consideration in this plan include:

- ROV Emergency BOP Intervention
- Relief Well
- Subsea First Response Toolkit
- Vessel Source Control

Refer to the well-specific Source Control Contingency Plan (SCCP) for the recommended source control strategies.

ROV Emergency BOP Intervention

Emergency BOP activation involves delivering hydraulic fluid to the BOP stack using an ROV to mitigate any problems that may have arisen with the BOP control system in the event of a loss of well containment.

Relief Well

Drilling a relief well is the primary source control strategy for wells in the Otway and Bass Basins. Each well, or group of similar wells, has a Relief Well Plan (CM16) detailing: the relief well strategy for each well or group of similar wells, anticipated timeframes to drill a relief well and resources available to implement the Relief Well Plan.

The primary method of well control is via a dynamic well kill by intersecting the well bore below the release location via a relief well and circulating kill weight drilling fluid into the well bore, thus controlling the flow of hydrocarbons from the reservoir. This requires the mobilisation of another suitable rig to the existing well location.

Relief Well Scope

The scope of drilling a relief well is the same as drilling a standard well although it will be a deviated well due to the need to drill at distance from the original flowing well. A relief well is typically drilled as a straight hole down to a planned kick-off point, where it is turned towards the target using directional drilling technology and tools to get within 30 - 60 m of the original well. The drilling assembly is then pulled from hole and a magnetic proximity ranging tool is run on wireline to determine the relative distance and bearing from the target well. Directional drilling continues with routine magnetic ranging checks to allow for the original well to be intersected. Once the target well is intersected dynamic kill commences by pumping kill weight mud and cement downhole to seal the original well bore.

Planning for the relief well will begin simultaneously with other well intervention options. Outline relief well plans, and methodology are contained in each well-specific Source Control Contingency Plan (SCCP) (CM16) The SCCP details the process for relief well design with key activities prioritised as part of the immediate response operations:

- Mobilisation of well control and relief well specialists.

- Confirmation of relief well strategy with well specialist to define rig/vessel requirements:
- Confirm relief well location using geophysical site survey data. This will consider the prevailing weather at the time of the incident, seabed infrastructure in the area and directional drilling requirements for well intersection.
- Validate relief well casing design.
- Screen available rigs in the region with current Australian Safety Case and select rig with appropriate technical specifications to execute the strategy. A memorandum of understanding has been established between Australian operators (including Beach Energy) to expediate access to suitable rigs, equipment, and services for relief well drilling. If required Beach is able to request the use of a rig, equipment, and services, that may be under contract to another operator. Minimum technical specifications for the well kill have been modelled, and the selected rig will meet these requirements and be capable of operating in the metocean conditions at the relief well location.
- Prepare and submit regulatory documentation required for relief well activities.
- Mobilise necessary equipment and services such as directional drilling equipment and appropriate ranging tools for relief well strategy.

Relief Well Design

The SCCP and Relief Well Plan (CM16) includes technical details as to the design and equipment requirements to drill a relief well. Detailed well kill modelling has demonstrated that the activity wells can be killed via a single relief well. Two relief well sites have been identified for each well location, even though modelling confirms only one relief well is required for the kill operation. This redundancy will give contingency in the event one of the relief well sites is deemed not accessible. Final sites will be chosen based on a risk assessment considering the actual conditions in the event of a loss of containment.

The relief well can be executed using a semi-submersible rig (moored) similar to that used for the Drilling Program. Moorings are expected to extend approximately 2 km from the rig and may therefore extend beyond the distance of the Operational Area, which may expand by approximately 1-2 km radius under emergency conditions. The final anchor layout will be based on mooring analysis and rig configuration.

At least two Anchor Handling Tug Supply (AHTS) vessels would be required to tow the rig (if unable to self-propel) and install moorings. An active rig would already be supported by AHTS vessels and hence would likely be accompanied by those vessels during relief well drilling. AHTS vessels could also be sourced from hubs such as the Northwest shelf and Singapore.

Rig Selection

The Otway and Bass Basins are considered remote locations and therefore likely to have an impact on the time taken for a suitable rig to be mobilised to the relief well location. This timeframe has been built into the oil spill modelling. Rig broker reports are used to monitor the rig market on a monthly basis and, if required, assist in sourcing and contracting a suitable rig:

- The rig broker can be contracted to identify and contract a suitably specified rig (including Australian Safety Case status) within 14 days. This allows sufficient time to engage with other operators as well as drilling contractors to confirm availability of drilling rigs with suitable technical specifications to meet the required engineering well design.
- To facilitate timely response, Beach is a signatory to the AEP Memorandum of Understanding: Mutual Assistance for transfer of drilling rigs between operators in the case of an emergency. A drilling rig that is not currently in operator, or in transit to the next operating well, will be preferential and result in a reduced period from the 14 days predicted for engaging and selecting suitable rigs. The full 14 days will be required where there are no suitable drilling rigs not currently in operation and the selected drilling rig will be required to safely suspend well operations on its existing well prior to commencing of mobilisation to Beach's location.

Rig selection for relief well drilling will be based on the following:

- A rig mobilised from the NWS or Singapore is likely to take 35 days. These periods have been factored into the relief well schedule within the well-specific Relief Well Plans.
- Rating of well control equipment: Rigs considered shall have equipment rated to at least 10,000 psi to perform the required well kill.
- Water depth: Rig being considered for relief well drilling must be rated for a minimum water depth of 60 m-100 m.
- Pump capacity of rig: Suitable to execute the dynamic well kill as per modelling.
- Seabed conditions.
- Rig with a valid Australian Safety Case.
- Proximity to the Otway and Bass Basins.
- Ability to engage in a mutual aid agreement with the operator.

Relief Well Installation Timeline

The relief well timeline is largely guided by the location of mobilisation of the rig drilling the relief well. The three mobilisation points considered are outlined previously. Beach anticipates the mobilisation of an alternate rig to the Otway and Bass basins and the successful intersection of a flowing well would take approximately 86 days. Details of the most suitable source control methods applicable to the specific wells will be detailed in well-specific Source Control Contingency Plan, inclusive of the Relief Well Plan and dynamic kill modelling.

Regulatory Approval Timing Considerations

Planning for relief well drilling will occur in parallel to other tertiary well control responses. A key component of the relief well drilling will be the preparation, submission, and approval of the regulatory documents. Generally, for well operations the regulatory and risk management processes fall on critical path hence in an emergency these documents will require a high level of focus immediately to ensure they are in place prior to arrival of the rig.

The following documents will require consideration:

- Vessel Safety Case – is required for the selected rig.
- Scope of validation - is required by NOPSEMA for any proposed significant change to an offshore facility (i.e. rig or vessel) and to be agreed prior to submission of a safety case revision. Depending on the level of changes the time to complete and gain approval could possibly affect the response time to have regulatory documentation in place prior to start of relief well operations.
- Safety Case Revision - will require preparation, submission and approval prior to operations and is expected to be on critical path for relief well activities.
- Well Operations Management Plan (WOMP) –is expected to be suitable for relief well drilling and not expected to require a revision and resubmitted.
- Environmental Plan (EP) – Is designed to provide for source control response activities. Significant changes may require resubmission subject to initial change assessment, though is not expected to affect overall response time.
- Well Activity Notice (WAN) - As part of the preparation of the above documentation a number of formal safety assessments will be conducted as part of risk management these include:
    - Hazard Identification (HAZID) workshop (identity's risks, assesses hazards and mitigations to control works site hazards with aim to remove major accident events).
    - Hazard Operations (HAZOP) workshop (risk assesses the operational sequence and place controls to reduce hazards to ALARP).
    - Risk Assessments for safety critical equipment (vessel equipment, BOP, mooring, fluids handling).

Response Agreements:

Beach maintains contracts/agreements with specialists to supply well control expertise and support for drilling a relief well. This includes:

- Well engineering support services such as Wild Well Control.
- Technical writing and risk engineering services to support regulatory documentation workflows and submissions is provided by experienced specialists such as ADD Energy.
- Wild Well Control: Well control specialists with experience in relief wells and the coordination of installation activities.
- Wellhead and casing materials supplier.
- Beach is party to the Industry Memorandum of Understanding (MoU) to share drilling rigs, equipment and resources (well site services) in the event of an emergency. The MoU provides for

the timely transfer of third-party contractual arrangements involved in the release of a rig and well site services to the Titleholder for relief well drilling.

- Equipment and materials needed to construct a relief well will be able to be sourced either directly from suppliers or through the industry AEP Mutual Aid MoU. All equipment and materials are tracked and identified prior to the commencement of the offshore activity through the "relief well readiness form" process (refer to OPEP). All equipment and materials are expected to be sourced and transported to site during the safety case revision approval timeframe, rig transit and anchoring phase for the base and mid case response time model estimates. For the local rig mobilisation case, an operational rig would also have equipment and services, with additional equipment and services available via AEP MoU.

- Beach will conduct a relief well readiness check and engage titleholders to ascertain and confirm the level of critical equipment inventories during the operational period for the purpose of drilling a relief well.

Vessel Source Control

For a vessel spill at sea, the Vessel Master shall implement the Shipboard Marine Pollution Emergency Plan (SMPEP) or Shipboard Oil Pollution Emergency Plan (SOPEP) (equivalent to class).

7.13.3.2 Monitoring and Evaluation

Monitoring and evaluation is conducted to assist in identifying resources that are at risk of exposure, directing response efforts and evaluating the effectiveness of response techniques. Monitoring activities are conducted throughout the incident response and include:

- Manual Spill Trajectory – manual vectoring and software (e.g. ADIOS) to predict the weathering and trajectory of the hydrocarbon.
- Oil Spill Trajectory Modelling (OSTM) – computer models, and computational techniques estimate the speed and direction of movement, weathering, and dispersal patterns.
- Aerial/Vessel Surveillance– observers on aircrafts or vessels use standard references to characterise surface oil type, movement, and behaviour.
- Satellite Tracking Buoys – are heavy duty floating devices designed for deployment from the rig, support vessel or helicopters to accurately track a surface hydrocarbon spill. Tracking buoys contain a global satellite tracking system and are used to track the leading edge or centre of a spill and provide an oil spill response team with information to plan the incident response.
- Satellite Imagery – a method that uses remote sensing technologies to identify and track surface oil.

7.13.3.3 Protection and Deflection

Protection and deflection response will be under the direction of the relevant State Control Agency (as detailed in the OPEP) and involve using specialist equipment (e.g. nearshore booms and skimmers) to divert floating oil away from sensitive receptors. Techniques vary depending on the location and type of sensitivity being protected.

7.13.3.4 Shoreline Clean-up

Shoreline clean-up will be under the direction of the relevant State Control Agency (as detailed in the OPEP). Shoreline clean-up involves the deployment of personnel to relevant shorelines to identify response priorities, access points and clean-up techniques required. Shoreline clean-up may involve different manual and mechanical recovery techniques to pre-clean shorelines pre-impact and remove oil and contaminated debris from the shoreline post-impact to reduce environmental impact from stranded, typically weathered, hydrocarbons. Resourcing and equipment details are provided in the OPEP.

Shoreline clean-up consists of different manual and mechanical recovery techniques such as:

- Natural recovery – allowing the shoreline to self-clean (no intervention undertaken).
- Manual collection of oil and debris – the use of people to collect oil from the shoreline.
- Mechanical collection – use of machinery to collect and remove stranded oil and contaminated material.
- Sorbents – use of sorbent padding to absorb oil.
- Vacuum recovery, flushing, washing – the use of high volumes of low-pressure water, pumping and/or vacuuming to remove floating oil accumulated at the shoreline.
- Sediment reworking – move sediment to the surf to allow oil to be removed from the sediment and move sand by heavy machinery.
- Vegetation cutting – removing oiled vegetation.

7.13.3.5 Oiled Wildlife Response

The level of oiled wildlife response (OWR) will be determined by data collected via the initial surveillance monitoring. The OWR will be conducted in accordance with the state specific marine oil and chemical spill contingency plans and relevant wildlife response plans, as directed by the relevant State Control Agency (as detailed in the OPEP).

Typical OWR can be separated into three stages, including:

- Wildlife Reconnaissance - situational awareness / visual observations of species present and identification of species that may potentially be impacted by oil exposure and/or response strategies.
- Preventative Actions:
  - Deterrence strategies e.g. hazing by auditory or visual scarers.
  - Displacement strategies e.g. fencing or barricading techniques.
  - Pre-emptive capture - removal of wildlife from an area and transportation to a staging facility or to an area not expected to be impacted.

- Wildlife Rescue:
  - Capture of oiled wildlife – action only to be completed by trained wildlife handlers at direction of relevant Control Agency.
  - Transportation to field processing facility and / or primary care facility staging.
  - Triage – undertaken by trained veterinarians (euthanasia may be required).
  - Stabilisation – of wildlife prior to cleaning.
  - Cleaning – rinsing, washing, drying to remove contamination.
  - Rehabilitation – feeding, swimming, waterproofing, conditioning, pre-releases assessment.
  - Release – once approved.

7.13.3.6 Waste Management

Hydrocarbon spills to the marine environment can generate significant amounts of waste that need to be collected, stored, and disposed of appropriately, in accordance with MARPOL 73/78 Annex V – Garbage, relevant Commonwealth and State/Territory laws and regulations. The potential waste that may be generated during an oil spill response may include:

- Offshore recovery (i.e. from containment and recovery), and
- Shoreline clean-up operations (i.e. manual or mechanical collection).

Due to the high volatility nature of both hydrocarbon types (MDO and condensate), and their subsequent susceptibility to weathering processes (i.e. evaporation) significant volumes of waste are not anticipated. Furthermore, containment and recovery has not been identified as a primary or secondary strategy for either the condensate or MDO scenario meaning the waste storage capacity required is likely to be small.

Waste management arrangements will be implemented prior to activity commencement and will need ensure a continuous response can be maintained. For example, in the event of a clean-up operation, temporary waste handling bases will be set up at designated staging areas such as Port Welshpool. The transport of waste material may be required at sea, from sea to land and on land to on land, liquid transport trucks, flatbed trucks, dump trucks and gully suckers can be utilised to transport waste material through Beach’s licensed waste contractor.

7.13.3.7 Environmental Monitoring

The Offshore Operational and Scientific Monitoring Plan (OSMP) provides a framework for Beach’s environmental monitoring response for Level 2 and Level 3 offshore hydrocarbon spills from their petroleum activities undertaken in the Otway and Bass basins.

The OSMP is the principal tool for determining the extent, severity, and persistence of environmental impacts from an oil spill and allows titleholders to determine whether their environmental protection goals are met. Operational monitoring can be used to assess how effective the oil spill response is in protecting the environment. Whereas scientific monitoring can be used to direct remediation efforts, typically after the spill response activities are completed.

Oil spill monitoring has been divided into two types:

1. Operational monitoring which collects information about the spill and associated response activities to aid planning and decision making during the response or clean-up operations. Operational monitoring typically finishes when the spill response is terminated.
2. Scientific monitoring (also known as Type II or recovery phase monitoring) which is focussed on non-response objectives and evaluating environmental impact and recovery from the spill and response activities. Scientific monitoring may continue for extended periods after a spill response is terminated.

Operational monitoring studies may be implemented in conjunction with relevant response strategies as described in this OPEP (e.g. Monitoring and Evaluation, Protection and Deflection, Shoreline Clean-up, and Oiled Wildlife Response (OWR).

OSMP techniques vary, depending on the type of spill, location, and status of the response. The use of vessels, aircraft, and shoreline responders (on foot, vehicles) may be required to undertake the techniques identified within the OSMP.

7.13.4 Source of Aspect

Oil spill response strategies that could result in environmental impacts are:

- Source control – drilling of a relief well.
- Shoreline protection and deflection.
- Shoreline clean-up.
- Oiled wildlife response.
- Waste management.

7.13.5 Predicted Environmental Impacts

Impacts and risks associated with source control, and monitoring and evaluation oil spill response strategies are similar to those discussed for vessel and rig aspects in Section 7. Impacts and risks associated with the following response strategies that are undertaken onshore are assessed in this section:

- Oiled Wildlife Response (OWR).
- Shoreline Protection and Deflection.
- Shoreline Clean-up.

OWR techniques such as hazing, capture and cleaning can cause direct impacts to fauna. In addition, the use of personnel, vehicles, or equipment for shoreline response may disturb nesting or breeding areas.

Shoreline protection, deflection or clean-up strategies can result in damage or removal of habitat, disturbance to fauna and impacts to socio-economic and cultural features.

7.13.6 EMBA

Predicted impacts resulting from onshore oil spill response will be limited to shorelines where the Operational NEBA has identified that onshore oil spill response will have a net environmental benefit. the within the Oil Spill Response Area (). It should be noted that the Oil Spill Response Area does not represent a single spill but is the outcome of the oil spill modelling which typically uses a 100 different spill scenarios.

No areas of actionable shoreline oil (>100 g/m^2) were identified outside of Victoria and Tasmania with the main areas being King Island and the Otway Coast (Figure 7-12 and Figure 7-13).

7.13.7 Predicted Level of Impact

7.13.7.1 Ecological Receptors

The incorrect handling of oiled fauna during the capture, transportation, cleaning, or rehabilitation phase has the potential to result in increased stress levels which may result in increased fauna stress, injury, or mortality. Deliberate disturbance of individuals species away from an oiled environment, such as resting, feeding, breeding, or nesting area, with the intention to limit hydrocarbon exposure may cause further distress to individuals, specifically fauna which display high site fidelity.

Shoreline response may result in impacts to shoreline habitats (e.g. dunes) and vegetation, which increases the potential to disturb fauna which use these shoreline environments. Damage or removal of habitat (such as contaminated sand from beaches) may expose shorelines to erosion processes or decrease in fauna and flora. Any impacts to intertidal shoreline habitats and communities may have indirect effects on ecosystem dynamics through impacts on food chains of the macrofauna communities which they support.

The additional noise as a result of response activities, or the deliberate noise during hazing activities, may result in disturbance to species feeding, breeding, nesting, or resting. 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 and shoreline deflection, protection and clean-up preparedness and response will be undertaken in accordance with the relevant EPOs and EPSs detailed within the Offshore Oil Pollution Emergency Plan (OPEP).

Oiled wildlife surveillance and wildlife impact studies are detailed within the Offshore Operational and Scientific Monitoring Plan (OSMP).

The consequence to ecological receptors is assessed as Moderate (2) and likelihood as highly unlikely, and the risk is of an acceptable level based on:

- The likelihood of a spill event is assessed as highly unlikely. Though offshore drilling spill events have occurred in the industry Beach has significant experience operating and drilling in the Otway and Bass basins without incident.
- An operational NEBA will be conducted in the event of a spill prior to the implementation of a response to ensure that there is a net environmental benefit of the response techniques. Any

oiled wildlife and shoreline deflection, protection and clean-up response will be at the direction of the State Control Agency with Beach providing support.

- In addition, in consultation with State Control Agency and relevant stakeholders, and prior to undertaking shoreline clean-up operations, Beach shall undertake a risk assessment (Beach's Risk Assessment Process will be used unless otherwise directed) to mitigate potential impacts to:
  - Shoreline habitats
  - Shoreline communities
  - Oiled wildlife
- Shoreline protection, deflection and clean-up activities are well practiced and the impacts from these activities are well understood.
- Only trained wildlife handlers will approach and handle oiled fauna to ensure distress and injury is limited and the correct handling of individuals is conducted.
- Only trained response personnel from Beach Energy, AMSA, AMOSC, the relevant state Control Agencies, and subject matter experts will be used to implement the response strategies to ensure best practice is undertaken and the risks are reduced.
- The oil spill response activities will be conducted in accordance with the relevant EPOs and EPSs detailed within the Offshore Oil Pollution Emergency Plan (OPEP).

7.13.7.2 Socio-economic Receptor

No areas of actionable shoreline oil (>100 g/m^2) were identified outside of Victoria and Tasmania with the main areas being King Island and the Otway Coast (Figure 7-12 and Figure 7-13).

Shoreline protection, deflection and clean-up or response actions have the potential to exclude local residents and tourists from coastal areas with indirect impacts local tourism and businesses. The presence of hydrocarbons on shorelines as well as the presence of clean-up operations may necessitate the implementation of exclusion zones (e.g., beach closures).

Depending on the spill scenario, protection, deflection, and clean-up operations are expected to take anywhere from days to months following a spill incident. However, the characteristics and properties of MDO and gas condensate will result in rapid weathering and low expected persistence within the environment. Therefore, any impacts are expected to be localised and relatively short-term.

Shoreline Protection, Deflection and Clean-up preparedness and response shall be undertaken in accordance with the relevant EPOs and EPSs detailed within the Offshore Oil Pollution Emergency Plan (OPEP).

Hydrocarbon on shorelines and shoreline sediment impacts studies are detailed within the Offshore Operational and Scientific Monitoring Plan (OSMP).

The consequence to socio-economic receptors is assessed as Moderate (2) and likelihood as highly unlikely, and the risk is of an acceptable level based on:

- The likelihood of a spill event is assessed as highly unlikely. Though offshore drilling spill events have occurred in the industry Beach has significant experience operating and drilling in the Otway and Bass basins without incident.
- An operational NEBA will be conducted in the event of a spill prior to the implementation of a response to ensure that there is a net environmental benefit of the response techniques. Any shoreline deflection, protection and clean-up response, access to shoreline and closure of areas will be at the direction of the State Control Agency.
- In addition, in consultation with State Control Agency and relevant stakeholders, and prior to undertaking shoreline clean-up operations, Beach shall undertake a risk assessment (Beach's Risk Assessment Process will be used unless otherwise directed) to mitigate potential impacts to socio-economic receptors.
- Shoreline protection, deflection and clean-up activities are well practiced and the impacts from these activities are well understood.
- Only trained response personnel from Beach, AMSA, AMOSC, the relevant state Control Agencies, and subject matter experts will be used to implement the response strategies to ensure best practice is undertaken and the risks are reduced.
- The oil spill response activities will be conducted in accordance with the relevant EPOs and EPSs detailed within the Offshore Oil Pollution Emergency Plan (OPEP).

7.13.7.3 Conservation Values and Sensitivities

There is the potential for shoreline oil at actionable thresholds (>100 g/m^2) to occur within the following areas that have conservation values:

- Great Oceans Road and Scenic Environs National Heritage Area
- Lavinia Ramsar-listed wetlands and Nature Reserve
- Princetown, Lower Aire and Western Port Wetlands
- A number of Victorian and Tasmanian State Reserve

No areas of actionable shoreline oil (>100 g/m^2) were identified outside of Victoria and Tasmania with the main areas being King Island and the Otway Coast (Figure 7-12 and Figure 7-13).

Conservation values and sensitivities (ecological, socio-economic and/or cultural) of protected areas can potentially be impacts by onshore spill response activities from access of vehicles, vessels, and responders along. Shoreline response activities are undertaken in a manner to prevent impacts and an operational NEBA will be conducted in the highly unlikely event of a spill prior to the implementation of a response to ensure that there is a net environmental benefit of the response techniques. Any shoreline deflection, protection and clean-up response, access to shoreline and closure of areas will be at the direction of the State Control Agency.

Shoreline Protection, Deflection and Clean-up preparedness and response shall be undertaken in accordance with the relevant EPOs and EPSs detailed within the Offshore Oil Pollution Emergency Plan (OPEP).

Hydrocarbon on shorelines and shoreline sediment impacts studies are detailed within the Offshore Operational and Scientific Monitoring Plan (OSMP).

The consequence to conservation values and sensitivities is assessed as Minor (1) and likelihood as highly unlikely, and the risk is of an acceptable level based on:

- The likelihood of a spill event is assessed as highly unlikely. Though offshore drilling spill events have occurred in the industry Beach has significant experience operating and drilling in the Otway and Bass basins without incident.
- An operational NEBA will be conducted in the event of a spill prior to the implementation of a response to ensure that there is a net environmental benefit of the response techniques. Any shoreline deflection, protection and clean-up response, access to shoreline and closure of areas will be at the direction of the State Control Agency.
- In addition, in consultation with State Control Agency and relevant stakeholders, and prior to undertaking shoreline clean-up operations, Beach shall undertake a risk assessment (Beach's Risk Assessment Process will be used unless otherwise directed) to mitigate potential impacts to:
    - Shoreline habitats
    - Shoreline communities
    - Oiled wildlife
    - Cultural heritage sites
    - Socio-economic receptors
- Shoreline protection, deflection and clean-up activities are well practiced and the impacts from these activities are well understood.
- Only trained response personnel from Beach, AMSA, AMOSC, the relevant state Control Agencies, and subject matter experts will be used to implement the response strategies to ensure best practice is undertaken and the risks are reduced.
- The oil spill response activities will be conducted in accordance with the relevant EPOs and EPSs detailed within the Offshore Oil Pollution Emergency Plan (OPEP).

7.13.7.4 Cultural Environment

There is the potential for shoreline oil at actionable thresholds (>100 g/m^2) to occur along parts of the Victoria and Tasmania coastline with the main areas being King Island and the Otway Coast (Figure 7-12 and Figure 7-13). No areas of actionable shoreline oil (>100 g/m^2) were identified outside of Victoria and Tasmania (Figure 7-12 and Figure 7-13).

Cultural values such as fauna, flora, objects, and country can potentially be impacted by onshore spill response activities from access of vehicles, vessels, and responders. Shoreline response activities are undertaken in a manner to prevent impacts and an operational NEBA will be conducted in the highly unlikely event of a spill prior to the implementation of a response to ensure that there is a net environmental benefit of the response techniques. Any shoreline deflection, protection and clean-up response, access to shoreline and closure of areas will be at the direction of the State Control Agency.

Shoreline Protection, Deflection and Clean-up preparedness and response shall be undertaken in accordance with the relevant EPOs and EPSs detailed within the Offshore Oil Pollution Emergency Plan (OPEP).

Hydrocarbon on shorelines and shoreline sediment impacts studies are detailed within the Offshore Operational and Scientific Monitoring Plan (OSMP).

The consequence to cultural values is assessed as Minor (1) and likelihood as highly unlikely, and the risk is of an acceptable level based on:

- The likelihood of a spill event is assessed as highly unlikely. Though offshore drilling spill events have occurred in the industry Beach has significant experience operating and drilling in the Otway and Bass basins without incident.
- An operational NEBA will be conducted in the event of a spill prior to the implementation of a response to ensure that there is a net environmental benefit of the response techniques. Any shoreline deflection, protection and clean-up response, access to shoreline and closure of areas will be at the direction of the State Control Agency.
- In addition, in consultation with State Control Agency and relevant stakeholders, and prior to undertaking shoreline clean-up operations, Beach shall undertake a risk assessment (Beach's Risk Assessment Process will be used unless otherwise directed) to mitigate potential impacts to cultural heritage sites.
- Shoreline protection, deflection and clean-up activities are well practiced and the impacts from these activities are well understood.
- Only trained response personnel from Beach, AMSA, AMOSC, the relevant state Control Agencies, and subject matter experts will be used to implement the response strategies to ensure best practice is undertaken and the risks are reduced.
- The oil spill response activities will be conducted in accordance with the relevant EPOs and EPSs detailed within the Offshore Oil Pollution Emergency Plan (OPEP).

7.13.8 Demonstration that Impacts will be ALARP

ALARP decision context and justification	**ALARP Decision Context: B** The purpose of implementing spill response activities is to reduce the severity of impacts from an oil spill to the environment. However, if the strategies do more harm than good (i.e., they are not having a net environmental benefit) then the spill response is not ALARP.		
Control measures	**Source of good practice control measures**		
All spill response control measures and associated Environmental Performance Outcomes (EPOs) and Environmental Performance Standards (EPSs) are detailed within the Offshore Oil Pollution Emergency Plan (VIC 100 SAF PLN. CDN/ID 18986979).			
All relevant operational and scientific monitoring studies are detailed within the Offshore Operational and Scientific Monitoring Plan (CDN/ID S4100AH717908).			
Additional controls assessed			
Control	**Control type**	**Cost/benefit analysis**	**Control implemented?**
Monitor and evaluate: AUVs	Engineering Risk Assessment	This control measure is not expected to provide significant environmental benefit as mobilisation of in-field monitoring, or aerial surveillance may be implemented rapidly via existing contracts. Costs associated with acquiring the equipment, maintenance, and training personnel to use AUVs is considered grossly disproportionate to the benefit gained.	No
Monitor and evaluate: Night-time monitoring – infrared	Engineering Risk Assessment	Side looking airborne radar, systems are required to be installed on specific aircraft or vessels. The costs of sourcing such vessels/aircraft is approximately $20,000 per day. Infrared may be used to provide aerial monitoring at night-time, however the benefit is minimal given trajectory monitoring (and infield monitoring during daylight hours) will give good operational awareness. In addition to this, satellite imagery may be used at night to provide additional operational awareness.	No
OWR: Pre-positioning of oiled wildlife response resources.	Precautionary approach	Oiled wildlife response equipment containers for first strike activities are positioned in Geelong (AMOSC). Positioning the equipment any closer to the potential spill area is not considered to provide a considerable environmental benefit considering that any visible shoreline contact is not predicted until day 4-5 of the spill (depending on the spill source location), therefore there is adequate time to deploy equipment positioned in Geelong. Additionally, spill modelling indicates potential (hypothetical)	No

		areas of exposure to hydrocarbons, post-spill operational monitoring would be required to predict actual or likely exposure locations, therefore determining an area to pre-position equipment may be inaccurate pre-spill.	
Shoreline protection and clean up: Tactical Response Plans	Precautionary approach	Identified areas for priority protection have pre-populated tactical response plans to reduce response planning timeframes in the event of potential shoreline exposure. Refer to OPEP for TRPs. CM13: Beach Offshore Oil Pollution Emergency Plan	Yes
Chemical Dispersant: Pre-positioning of dispersant and application equipment.	Precautionary approach	No clear benefit identified as stockpiles of dispersant already available in Melbourne and elsewhere in Australia. Application equipment and dispersant can be readily mobilised to site, with no identified restriction on logistics pathways or response timing.	No
Consequence rating	Moderate (2)		
Residual impact category	Low		

7.13.9 Demonstration that Impacts will be Acceptable

Consequence rating	Low (1) to Moderate (2)
Likelihood of occurrence	Highly Unlikely (B)
Residual risk	Low
Acceptability assessment	
To meet the principles of ESD	The spill response activities were evaluated as having the potential to result in a Low (1) to Moderate (2) consequence thus is not considered as having the potential to result in serious or irreversible environmental damage. While some response strategies may pose additional risk to sensitive receptors, to not implement response activities may potentially result in greater negative impact to the receiving environment and a longer recovery period. Response activities will be undertaken in accordance with controls which reduce and/or prevent additional risks. The mutual interests of responding and protecting sensitive receptors from further impact due to response activities will be managed using a NEBA during response strategy planning in preparedness arrangements, as well as during a response. Proposed response activities are consistent with industry practice.
Internal context	The proposed management of the impact is aligned with the Beach Environment Policy. Activities will be undertaken in accordance with the SCCP including relief well plan, OPEP, Tactical Response Plans and OSMP.
External context	Stakeholder objections or claims have been assessed in relation to hydrocarbon spills and appropriate controls have been adopted as detailed in Section 7.13.6.

	King Island Council (Stakeholder ID 8388624) and Savour King Island (Stakeholder ID 25165825) raised concerns about spill response on King Island including expertise and equipment to support response activities. Beach explained spill risks and spill response approach and support agencies. Gunaikurnai Land and Waters Aboriginal Corporation (Stakeholder ID 419613) inquired about spill response risks and approach and asked to be included as a contact regarding spills on Gunaikurnai Sea Country. Beach explained spill risks and spill response approach and support agencies and has amended its OPEP to reflect this request. During any spill response, a close working relationship with key regulatory bodies (Control Agencies) will occur and thus there will be ongoing consultation with relevant persons during response operations.
Other requirements	Response has been developed in accordance with: • OPGGS Act. • AMSA Technical Guideline for the Preparation of Marine Pollution Contingency Plans for Marine and Coastal Facilities (AMSA, 2015); and NOPSEMA (2017). • South-east Commonwealth Marine Reserves Network Management Plan 2013-23 (Director of National Parks, 2013) • The following Conservation Advice / Recovery Plans identify pollution as a key threat: • Conservation Advice *Balaenoptera borealis* (sei whale) (TSSC 2015g) • Conservation Advice *Balaenoptera physalus* (fin whale) (TSSC 2015f) • Recovery Plan for Marine Turtles in Australia (CoA 2017b), identified as acute chemical discharge (oil pollution) • Conservation Advice *Calidris ferruginea* (curlew sandpiper) (DoE, 2015f) identified as habitat degradation/ modification (oil pollution). • Conservation Advice for *Calidris acuminata* (sharp-tailed sandpiper) (DCCEEW 2024h) identified wetlands and intertidal habitats threatened by acute pollution (oil). • Conservation Advice for *Arenaria interpres* (ruddy turnstone) (DCCEEW 2024i) identified wetlands and intertidal habitats threatened by acute pollution (oil). • National Recovery Plan for Threatened Albatrosses and Giant Petrels 2011-2016 (DSEWPC 2011a) • National Recovery Plan for the Australian Fairy Tern (Sternula nereis nereis) (CoA 2020b) The following Conservation Advice / Recovery Plans identify habitats degradation/modification as threat, which may be consequence of accidental release of hydrocarbon: • Conservation Advice for *Calidris tenuirostris* (great knot) (DCCEEW 2024f). • Conservation Advice for *Calidris canutus* (red knot) (DCCEEW 2024g). • Conservation Advice for *Limosa lapponica baueri* (Alaskan bar-tailed godwit) (DCCEEW 2024d)

	• Conservation Advice for *Limosa limosa* (black-tailed godwit) (DCCEEW 2024c). • Conservation Advice for *Numenius madagascariensis* (eastern curlew) (DoE 2015e). • These Conservation Advice and Recovery Plans identify the following conservation actions: • minimise chemical and terrestrial discharge. • ensure spill risk strategies and response programs include management for turtles and their habitats, particularly in reference to 'slow to recover habitats', e.g. nesting habitat, seagrass meadows or coral reefs. • ensure appropriate oil-spill contingency plans are in place for the subspecies' breeding sites which are vulnerable to oil spills. • implement measures to reduce adverse impacts of habitat degradation and/or modification; or • no explicit relevant management actions: oil pollution is recognised as a threat. In regard to oil spill response, activities associated with the drilling activity will not be conducted in a manner inconsistent with the objectives of the respective zones of the AMPs, and the principles of the IUCN Area Categories applicable to the values of the AMPs.
Monitoring and reporting	Impacts will be monitored in accordance with Section 8.4.3.
Acceptability outcome	**Acceptable**

7.14 Cumulative Impact Assessment

7.14.1 Overview

NOPSEMA defines cumulative environmental impacts in the context of offshore petroleum activities, as successive, additive, or synergistic impacts of collectively significant activities or projects with material impacts on the environment that have the potential to accumulate over temporal and spatial scales (NOPSEMA Environment Plan Decision Making Guideline, N-04750-GL1721 A524696, Dec 2022).

The effects of past projects and activities, and currently operating projects, are captured when describing the existing condition of, and any pressure or threats affecting the environment (see Section 4 Description of the Environment). This baseline condition and understanding of the capacity of the receiving environment and receptors to accommodate changes, in light of existing pressures and threats, informs the environmental impact assessments conducted in Section 7 of this EP.

The focus of Cumulative Impact Assessment (CIA) is to further build on these assessments by considering the impacts of the proposed activity on key receptors (or key matters) in conjunction with the impacts from other reasonably foreseeable future projects.

The types of activities and projects typically considered in CIA are large in scale and are of relevance in terms of potentially contributing to or compounding material impacts in the relevant project area.

7.14.2 Methodology

Guidance from the United Kingdom (UK) National Infrastructure Planning Advice Note Seventeen: Cumulative effect assessment relevant to nationally significant infrastructure programs (UK 2019) and the New South Wales (NSW) Cumulative Impact Assessment Guidelines for State Significant Projects (NSW 2022), form the basis of this assessment.

Both the UK and NSW guidelines are intended to apply to large-scale national and state significant projects, respectively, with greater potential for cumulative impacts into the long-term. Consequently, the assessment process applied here has been adapted to the nature and scale of the activities associated with the Drilling Program.

7.14.3 Key Terms

Key terms used in the CIA are:

Key environmental matters are features of the environment (ecological, socio-economic, and cultural values and sensitivities) that are valued because of their rarity or importance, including the critical role they play in supporting systems which are essential for the environment, people and / or the economy (NSW 2022), for example, commercial fisheries and threatened species undertaking biologically important behaviours.

Material impacts are impacts of the Drilling Program and other reasonably foreseeable future projects and activities that may not align with the defined acceptable levels, for example, threats of wide-scale, serious or irreversible damage due to cumulative impacts.

Successive impacts are those that occur one after the other.

Additive impacts are those where the combined impact is the sum of the separate impacts.

Synergistic impacts are those where the combined impact is greater than the sum of the separate impacts.

The relevant **spatial extent** depends on the key environmental matter. For example, for ecological impacts the spatial extent may be based on the range and distribution of a listed threatened species when undertaking biologically important behaviour. NSW (2022) recommends that while the CIA area chosen for each matter must be broad enough to capture all relevant cumulative impacts, it should not be unnecessarily large or include areas where the cumulative impacts are likely to be negligible relative to the baseline condition of the relevant matter.

Temporal extent is dependent on the key environmental matter and the scale and nature of potential impacts on the matter (NSW 2022). For example, for commercial fishers the temporal extent may be based on a part of a season or several seasons depending on how long the impact may occur. For this CIA the temporal extent selected has been aligned to reasonably foreseeable timeframes associated with the Drilling Program and other reasonably foreseeable projects and activities within the Otway and Bass Basins.

7.14.4 Identifying Reasonably Foreseeable Future Projects and Activities CIA Scoping

This CIA considers projects and activities that are reasonably foreseeable within the spatial and temporal extent of the assessment. This defines the boundaries of the assessment by including projects and activities that have a realistic likelihood of occurring and could contribute to cumulative impacts.

To identify reasonably foreseeable future projects and activities a search was conducted of the NOPSEMA and DEECA (Vic) Environment Plan website to identify any relevant projects and activities. In addition, petroleum titleholders within the Otway and Bass Basins have been meeting regularly to discuss environmental management in the region, including processes for improved CIA, focusing on reasonably foreseeable activities. This has provided a more accurate representation of projects and activities and the potential for cumulative impacts, ensuring that relevant impacts are appropriately assessed and managed.

Reasonably foreseeable future projects and activities identified to date, within the term of the EP, are detailed in Table 7-20. Projects and activities that are not reasonably foreseeable or speculative have been excluded from the assessment scope to maintain practicality and relevance in decision-making processes.

Information on projects and activities is typically accessible once consultation commences and relevant technical supporting information is submitted for public comment or assessment. Information relevant to this CIA has been discussed at the ongoing Otway Basin Petroleum Titleholder meetings. Where project/activity-specific data is not yet available, data from similar projects has been used as a proxy prior to technical information being made available. Given the similarity of impacts, there is a high level of certainty in the prediction of cumulative impacts in most cases.

Assumptions around specific timings for projects or activities have been made as there is some level of uncertainty in schedule and timing of approvals to support activities. Consequently, a conservative approach has been adopted whereby credible worst-case scenarios (e.g. concurrent activities with overlapping EMBAs) are assessed.

7.14.5 CIA Scoping

Scoping is undertaken to identify the key environmental matters that could be materially affected by the cumulative impacts of the Drilling Program and other reasonably foreseeable future projects and require a detailed CIA.

The scoping steps are detailed below, and the scoping assessment details in Table 7-21.

- Step 1: Identify the receptors that are predicted to be impacted by the Drilling Program planned aspects as per the environmental impact evaluation in Section 7.
- Step 2: Define the cumulative impact acceptable level for each receptor based on the acceptable level assessment for each receptor/aspect as detailed in Section 7.
- Step 3: Define the spatial extent for the assessment based on the range and distribution of the receptor and/or where the impacts of the Drilling Program associated with the receptor overlap with impacts from other reasonably foreseeable future projects and activities.
- Step 3: Define the temporal extent for the assessment on when the receptor is likely or known to be present within the defined spatial extent and for the period that the impact will occur.
- Step 4: Identify projects and activities that are reasonably foreseeable within the spatial and temporal extent of the assessment as detailed in Section 7.14.4.
- Step 5: Identify where there is the potential for receptors to be materially affected by the cumulative impacts of the Drilling Program and other reasonably foreseeable future projects. These receptors are then required to have a detailed CIA as per Section 7.14.6.
- Step 6: Identify the level of certainty of the scoping assessment. The certainty of the assessment is high based on the points below. If one of these is not met, then a cautious approach is undertaken, and the receptor is required to have a detailed CIA as per Section 7.14.6.
  - Impacts are well understood.
  - Impacts are relatively easy to predict using standard methods.
  - Impacts are capable of being mitigated to comply with relevant standards and to meet the acceptable level.

7.14.6 Detailed CIA

For those receptors and aspects where a potential cumulative cause-effect pathway and material impact was identified in the scoping, a more detailed CIA assessment was applied in general alignment with the impact methodology described in Section 2. The outcome of this detailed assessment is in Table 7-22.

The CIA process applied to each aspect and component of the environment was:

- Identification of:

- Receptor conservation values or values relevant to CIA e.g. EPBC Listed Threatened Species, MNES, commercial or cultural significance.
- Legislative or other requirements relevant to the assessment.
- Relevant threatening processes.
- Relevant spatial extent such as BIAs, and temporal extent when receptor present including any biologically important features such as behaviours or critical life-cycle stages, timings.
- Relevant actions from legislative or other requirements.

- Detail the baseline existing environment including pressures and condition.
- Define the cumulative impact acceptable level.
- Identification of other reasonably foreseeable future projects where the aspect overlaps the identified relevant spatial extent.
- Assessment of potential for cumulative impacts:
    - Description of potential cumulative impact.
    - Detail the level of certainty of the assessment.
    - Detail Beach' existing control measures.
    - Comparison to acceptable level(s), and where required (reiterative process) identification of additional control measures and demonstration that cumulative impacts are as low as reasonably practicable (ALARP).
- Detailing any additional actions.

The potential cumulative impacts to the key receptors were evaluated as being Minor (2). No additional controls were identified however Beach will continue to work with other titleholders undertaking activities within the Otway Basin with the aim of identifying and minimising the potential for cumulative impacts, in addition to cooperation on monitoring and management to increase effectiveness.

OGV Drilling Program

Table 7-20: Reasonably Foreseeable Future Projects and Activities in Otway and Bass Basins

Titleholder	Activity	Basin	Status	Timing Window	Potential Temporal Overlap with the Drilling Program	Potential Spatial Overlap with the Drilling Program
Beach Energy	Otway Operations	Otway	Existing and future Operations	Ongoing	Temporal overlap of IMR campaigns and platform resupply and EMBAs with Drilling Program activities.	Spatial overlap of Operations infrastructure, IMR campaigns and platform resupply and EMBAs with Drilling Program activities.
Beach Energy	Bass Operations	Bass	Existing and future Operations	Ongoing	Temporal overlap of IMR campaigns and platform resupply and EMBAs with Drilling Program activities.	Spatial overlap of Operations infrastructure, IMR campaigns and platform resupply and EMBAs with Drilling Program activities.
Beach Energy	Well Completion and Intervention	Otway	Proposed	2025-2026	No temporal overlap of Drilling Program with Well Completion and Intervention Development Drilling Program (as activities undertaken by same rig).	No spatial overlap of Drilling Program with Well Completion and Intervention Program (as activities undertaken by same rig).
Beach Energy	Well Completion and Intervention Program	Bass	Proposed	2026	No temporal overlap of Drilling Program with Well Completion and Intervention Program (as activities undertaken by same rig).	No spatial overlap of Drilling Program with Well Completion and Intervention Program (as activities undertaken by same rig).
Beach Energy	Offshore Gas Victoria Development	Otway	Proposed	2026 - 2027	No temporal overlap as Drilling Program at Otway will be completed prior to main installation and commissioning commences. Early installation work associated with existing pipeline may overlap with Drilling Program for short period during Jan to March 2026 in VIC/P43.	Spatial overlap of Drilling Program and Development as Development includes Otway wells. Permanent infrastructure is covered in Otway Operations.
Beach Energy	Offshore Gas Victoria Development	Bass	Proposed	2026 -2027	No temporal overlap as Drilling Program at Bass will be completed prior to main installation and commissioning commences.	Spatial overlap of Drilling Program and Development as Development includes Bass wells.

OGV Drilling Program

Titleholder	Activity	Basin	Status	Timing Window	Potential Temporal Overlap with the Drilling Program	Potential Spatial Overlap with the Drilling Program
					Early brownfield work associated with existing platform may overlap with Drilling Program for short period during Jan to March 2026.	Permanent infrastructure is covered in Bass Operations.
Cooper Energy	CHN Operations	Otway	Exiting Operations	Ongoing	Potential temporal overlap of IMR campaigns EMBAs with Drilling Program activities.	Potential spatial overlap of IMR campaigns EMBAs with Drilling Program activities.
Cooper Energy	Drilling	Otway	Proposed	2024-2026	Titleholders are part of a rig consortium which has signed an agreement with Transocean to bring a semi-submersible rig to the offshore Otway Basin in 2025. Thus, consecutive drilling/P&A activities will occur, but no concurrent drilling activities will occur.	
Conoco Phillips	Drilling	Otway	Proposed	2024-2026 (~30-40 days per well, max 6 wells)		
Woodside Energy	Minerva Decommissioning (P&A)	Otway	Proposed	2024-2025 (< 2 months)		
CGG- Regia	Seismic Survey	Otway	Proposed	2024-2028	Consecutive drilling/P&A activities will occur. Concurrent drilling activities unlikely. Concurrent seismic operations unlikely. Consecutive seismic surveys likely. Concurrent seismic survey and drilling/P&A activities likely.	Unlikely direct spatial overlap of drilling/P&A areas. Unlikely direct spatial overlap of seismic survey areas. Possible overlap of seismic survey area and drilling/P&A activities. Unlikely overlap of sound EMBAs of concurrent seismic survey and drilling/P&A at single location. Possible overlap of light EMBAs associated with concurrent seismic survey and drilling/P&A at a single location.
			60 days acquisition 90 days in field One survey between November – May) or Two separate surveys April – June, and or September – November.			
TGS -NOPEC Geophysical Company	Seismic Survey	Otway	Proposed	2023-2027		

Table 7-21: CIA Scoping Tool

Receptors	Planned Environmental Aspects							CIA – Scoping Assessment					
	Physical Presence	Seabed Disturbance	Light Emissions	Underwater Sound	Atmospheric Emissions including GHG	Marine Discharges – Rig and Vessels	Marine Discharges – Drilling and P&A	Acceptable Level	Potential for Cumulative Impact Spatial Extent	Potential for Cumulative Impact Temporal Extent	Scoping Assessment Outcome	Level of Certainty of Scoping Assessment	Cumulative Cause-effect Pathway
Australian Marine Parks			✓					Not inconsistent with SE Marine Parks Network Management Plan.	Y Zeehan and Boags AMPs	Y Activities planned to be undertaken during periods of biologically important behaviours for conservation values	The Zeehan AMP is overlapped by the Beach Drilling Program light and sound EMBAs, the Beach OGV Development (Otway), COPA Drilling Project, TGS MSS and potentially the Beach Otway OGV Development light and sound EMBAs. The Boags AMP is overlapped by the Beach Drilling Program light EMBA and potentially the Beach Bass OGV Development light EMBA. Zeehan AMP values potentially impacted by light are seabirds and for sound are migrating blue whales and humpback whales. Boags AMP values potentially impacted by light are seabirds.	High	Identified for seabirds and whales and further assessment required to determine if impacts are material.
State Marine Protected Areas			✓					Not inconsistent with	Y Twelve Apostles Marine National Park	N Period of activities	The Twelve Apostles Marine National Park is overlapped by the Beach Drilling Program light EMBA. Light sensitive receptors relevant to the values of the Twelve Apostles Marine National Park are invertebrates and fish. Impacts to invertebrates and fish from light is only predicted up to 200 m from the light source and the Operational Area where rig and vessel lighting will occur is ~18 km from the Twelve Apostles Marine National Park.	High	None identified
Maritime Archaeological Heritage		✓						No disturbance of maritime archaeological heritage.	N Only single drilling operation at any one time	N Control Measures in place to detect and prevent interactions	The Drilling Program Operational Area overlaps one known shipwreck. Other projects may overlap known maritime archaeological heritage and potentially unknown maritime archaeological heritage. Impacts to maritime archaeological heritage are not predicted from seismic surveys. Drilling and infrastructure installation activities required to undertake seabed surveys prior to seabed disturbance. Impacts to maritime archaeological heritage are not a planned event and therefore cumulative impacts are not predicted.	High	None identified
Key Ecological Features		✓					✓	Temporary, small-scale, and recoverable impacts.	N Limited to weeks-months after individual activity	N Limited to weeks-months after individual activity	For the Drilling Program the northern T/30P Operational Area overlaps the West Tasmania Canyons KEF were up to two wells may be drilled. Based on the greatest diversity of habitat is between 200 m and 350 m impacts from light emissions are not predicted. Seabed surveys will be undertaken of the KEF prior to the commencement of the Drilling Program within the KEF to allow for the consideration of seabed habitat type in the final selection of well locations to avoid area of high relief outcrops, reefs or sponge beds. Thus, impacts from the Drilling Program are predicted to be at a very small scale, which is not predicted to be material to contribute to cumulative impacts.	High	Identified but impacts not material no further assessment required.
Benthic Habitats and Communities							✓	Temporary, small-scale, and recoverable impacts.	N Limited to individual activity area	N Limited to weeks-months after individual activity	Impacts to benthic habitats and communities from seabed disturbance including drill cuttings and cement discharges are predicted to be within 500 m of each well location. Thus, impacts from the Drilling Program are predicted to be at a very small scale, which is not predicted to be material to contribute to cumulative impacts.	High	Identified but impacts not material no further assessment required.

Receptors	Planned Environmental Aspects							CIA – Scoping Assessment					
	Physical Presence	Seabed Disturbance	Light Emissions	Underwater Sound	Atmospheric Emissions including GHG	Marine Discharges – Rig and Vessels	Marine Discharges – Drilling and P&A	Acceptable Level	Potential for Cumulative Impact Spatial Extent	Potential for Cumulative Impact Temporal Extent	Scoping Assessment Outcome	Level of Certainty of Scoping Assessment	Cumulative Cause-effect Pathway
Plankton			✓			✓	✓	Temporary, small-scale, and recoverable impacts.	N Limited to individual activity area with exception of multiple seismic operations	N Recovery days post activity	Discharges to the water column are not predicted to impact water quality at a cumulative scale and therefore will not impact plankton at an ecological integrity level. Continuous noise from drilling, vessel and installation operations not predicted to impact plankton. Impacts from VSP are not predicted. Impacts from geophysical surveys are predicted to result in impacts at very small scale, this is not predicted to be material to contribute to cumulative impacts.	High	None identified
Invertebrates		✓	✓				✓	Temporary, small-scale, and recoverable impacts.	N Limited to individual activity area with exception of multiple seismic operations	N Limited to weeks-months after individual activity	Continuous noise from drilling and vessels are not predicted to impact invertebrates. Light impacts to invertebrates are within 200 m of vessel/rig lighting and is not material in the area where squid fishing occurs. Impacts to benthic invertebrates from seabed disturbance including drill cuttings and cement discharges are predicted to be within 500 m of each well location. Thus, impacts from the Drilling Program are predicted to be at a very small scale, which is not predicted to be material to contribute to cumulative impacts.	High	None identified
Fish and Sharks			✓	✓		✓	✓	Not inconsistent with EPBC Act Management Plans and Recovery Plans. Temporary, small-scale and recoverable impacts.	N Limited to individual activity with exception of multiple seismic operations	N No periods of biologically important behaviours for sensitive species s	No cumulative impact effect pathway identified. Light impacts to fish are within 200 m of vessel/rig lighting and underwater sound impacts within 160 m of well location. Discharges to the water column are not predicted to impact water quality at a cumulative scale and therefore will not impact fish and sharks at an ecological integrity level. Thus, impacts from the Drilling Program are predicted to be at a very small scale, which is not predicted to be material to contribute to cumulative impacts.	High	None identified
Birds			✓					Not inconsistent with EPBC Act Management Plans and Recovery Plans. Temporary, small-scale, and recoverable impact.	Y BIAs for sensitive species	Y Periods of biologically important behaviours for sensitive species	There is potential for cumulative impacts associated with light (vessel/rig lighting and flaring) depending on location of activities and sensitive receptors, i.e. foraging, migrating, and breeding birds.	High	Identified and further assessment required to determine if impacts are material.
Marine Reptiles			✓	✓		✓	✓	Not inconsistent with EPBC Act Management Plans and Recovery Plans. Temporary, small-scale, and recoverable impacts.	N No BIAs or critical habitat	N No periods of biologically important behaviours for sensitive species	Individuals in the area are expected to be transient, with no BIAs, critical habitat, or biologically important behaviours within the Bass and Otway Basin. Lighting doesn't impact in water navigation or behaviours and impacts from noise will be temporary and recoverable. Sound impacts for the Drilling Program are restricted to within 100 m of the well location. Discharges to the water column are not predicted to impact water quality at a cumulative scale and therefore will not impact turtles at an ecological integrity level. Thus, impacts from the Drilling Program are predicted to be at a very small scale, which is not predicted to be material to contribute to cumulative impacts.	High	Identified but impacts not material no further assessment required.

Receptors	Planned Environmental Aspects							CIA – Scoping Assessment					
	Physical Presence	Seabed Disturbance	Light Emissions	Underwater Sound	Atmospheric Emissions including GHG	Marine Discharges – Rig and Vessels	Marine Discharges – Drilling and P&A	Acceptable Level	Potential for Cumulative Impact Spatial Extent	Potential for Cumulative Impact Temporal Extent	Scoping Assessment Outcome	Level of Certainty of Scoping Assessment	Cumulative Cause-effect Pathway
Marine Mammals				✓		✓	✓	Not inconsistent with EPBC Act Management Plans and Recovery Plans. Temporary, small-scale, and recoverable impacts.	Y BIAs for sensitive species	Y Periods of biologically important behaviours for sensitive species	There is potential for cumulative impacts associated with underwater sound depending on location of activities and sensitive receptors, i.e. foraging, and migrating endangered species. Although sound impacts are restricted to within typically 10s of kms around individual activities, activities may be occurring consecutively over a period of time and seismic and drilling at one location have the potential to occur concurrently.	High	Identified and further assessment required to determine if impacts are material.
Coastal Communities and Onshore Tourism Activities								Temporary, small-scale, and low intensity.	N	N	No cumulative impact effect pathway identified. The likelihood of visibility of multiple activities from a single vantage point is considered low given the distances offshore it is not predicted that a rig and vessels would be distinguishable from other existing vessel traffic.	High	None identified.
Offshore Petroleum Activities	✓							Temporary, small-scale, and low intensity.	N	N	Other activities are scheduled and or operate within their own exclusions zones/petroleum titles. Notice to mariners will provide advanced warning and opportunity to plan transit route. At most avoidance of a single seismic survey vessel and towed equipment, and a single drilling location at any given time with minimal impact.	High	Identified but impacts not material no further assessment required.
Offshore Renewable Energy Activities	✓							Temporary, small-scale, and low intensity.	N	N	No cumulative impact effect pathway identified. There are no reasonably foreseeable future projects/activities in offshore Otway Basin.	High	None identified.
Defence Activities	✓	✓						Temporary, small-scale, and low intensity.	Y Displacement from concurrent and consecutive activities	Y Displacement from concurrent and consecutive activities	Cumulative effect pathway identified but impacts not material. Industry standard controls in place such as notice to mariners will provide advanced warning and opportunity to plan transit route. At most avoiding a single seismic survey vessel and towed equipment, and a single drilling location at any given time with minimal impact. Drilling and installation activities are required to undertake seabed surveys prior to seabed disturbance which include techniques to identify UXO. Impacts to UXO are not predicted from seismic surveys. Impacts to UXO are not planned event and therefore cumulative impacts not predicted.	High	Identified but impacts not material no further assessment required.
Shipping	✓							Temporary, small-scale, and low intensity.	Y Displacement from concurrent and consecutive activities	Y Displacement from concurrent and consecutive activities	Cumulative effect pathway identified but impacts not material. The area of impact is small compared to the area available for shipping. Industry standard controls in place such as notice to mariners will provide advanced warning and opportunity to plan transit route. At most avoiding a single seismic survey vessel and towed equipment, and a single drilling location at any given time with minimal impact.	High	Identified but impacts not material no further assessment required.
Marine Tourism	✓							Temporary, small-scale, and low intensity.	Y Displacement from concurrent and consecutive activities	Y Displacement from concurrent and consecutive activities	Cumulative effect pathway identified but impacts not material. The area of displacement is small compared to area available for tourism. Industry standard controls in place such as notice to mariners will provide advanced warning and opportunity to plan transit route. At most avoiding a single seismic survey vessel and towed equipment, and a single drilling location at any given time with minimal impact.	High	Identified but impacts not material no further assessment required.

Receptors	Planned Environmental Aspects							CIA – Scoping Assessment					
	Physical Presence	Seabed Disturbance	Light Emissions	Underwater Sound	Atmospheric Emissions including GHG	Marine Discharges – Rig and Vessels	Marine Discharges – Drilling and P&A	Acceptable Level	Potential for Cumulative Impact Spatial Extent	Potential for Cumulative Impact Temporal Extent	Scoping Assessment Outcome	Level of Certainty of Scoping Assessment	Cumulative Cause-effect Pathway
Recreational Fishing	✓							Temporary, small-scale, and low intensity.	Y Displacement from concurrent and consecutive activities	Y Displacement from concurrent and consecutive activities	Cumulative effect pathway identified but impacts not material. The area of displacement is small compared to area available for recreational fishing. Industry standard controls in place such as notice to mariners will provide advanced warning and opportunity to plan transit route. At most avoiding a single seismic survey vessel and towed equipment, and a single drilling location at any given time with minimal impact.	High	Identified but impacts not material no further assessment required.
Commercial Fisheries	✓	✓						Affected persons will not be worse off because of the activity.	Y Displacement from concurrent and consecutive activities	Y Displacement from concurrent and consecutive activities	Cumulative effect pathway identified. Displacement of fishers operating in fisheries with spatial extent that may be overlapped by a number of offshore activities, i.e. displaced by multiple exclusion zones (rig and seismic survey) or different exclusion zone over time. Although displacement impacts are restricted to within typically 2 kms around individual activities, drilling may be occurring consecutively over a period of time and seismic and drilling at one location have the potential to occur concurrently. Minor behavioural disturbances are predicted to commercial fish species from underwater sound and cumulative impacts are not predicted.	High	Identified and further assessment required to determine if impacts are material.
First Nations Values and Sensitivities	✓	✓	✓	✓	✓	✓	✓	Not inconsistent with Indigenous Protected Area (IPA) Plans. Temporary, small-scale, and recoverable impacts.	Y Sea Country	Y Period of activities	As per the assessment of ecological receptors cumulative effect pathways where identified for whales and birds which have been identified as a cultural value. Impacts from the Drilling Program to other cultural values identified such as fish, eels, dolphins, and seals are at a very small scale, which is not predicted to be material to contribute to cumulative impacts. Impacts to submerged cultural heritage are not predicted from the Drilling Program based on a seabed survey will be undertaken prior to Drilling to identify any cultural heritage and if identified Beach will consult with the relevant First Nations groups and determine any exclusion areas or further cultural heritage management procedures that may be required	High	Identified for whales and birds and further assessment required to determine if impacts are material.

Table 7-22: Detailed CIA

Aspect	Interaction with Other Users	Light		Underwater Sound	
Receptor	**Commercial fishers**	**Seabirds and Shorebirds**	**Orange-bellied Parrot**	**Blue Whale**	**Southern Right Whale**
Conservation (or other) value and Status	Socio-economic value to local communities and national economy. The Drilling Program overlaps where there is fishing intensity for: • SESSF: Commonwealth Trawl - < 5 vessels • SESSF: Commonwealth Gillnet Hook Trap Sector Shark Gillnet – up to 8 vessels • Southern Squid Jig Fishery – up to 5 vessels • Victorian Giant Crab – up to 15 vessels • Victorian Southern Rock Lobster Fishery - up to 13 vessels Note, Beach will implement an activity limitation where wells will not be located in water depths >400 m (CM09: Drilling Program). This limitation reduces any potential impact to commercial trawl and giant crab fisheries that were identify by SETFIA (2023) as having most fishing effort between the 400 and 1,000 m isobath.	The following overlap the light EMBA for the Project Area. Foraging/Feeding behaviour and/or BIAs: • Antipodean, black-browed, Buller's, Campbell, Gibson’s, Indian yellow-nosed, northern Buller’s, northern royal, Salvin's, shy, southern royal, wandering, and white-capped albatrosses. • Common diving petrel, northern giant petrel, southern giant-petrel, and white-faced storm-petrel. • Flesh-footed, short-tailed, and wedge-tailed shearwaters. • White-fronted tern. Breeding behaviour: • Short-tailed shearwater, black-faced cormorant, and little penguin. Breeding BIA: • Wedge-tailed shearwaters. Roosting behaviour: • Little curlew, painted snipe, Swinhoe's snipe. Short-tailed shearwater (muttonbird) also identified cultural value.	Listed as Critically Endangered and Marine under the EPBC Act and noted as a species of cultural significance. The Drilling Program light EMBA overlaps the likely distribution and probable migration route for the orange-bellied parrot.	Listed as Endangered under the EPBC Act. The Drilling Program Operational Area and sound EMBA overlaps the blue whale foraging and annual high use foraging BIA.	Listed as Endangered under the EPBC Act and noted as a species of cultural significance in the draft National Recovery Plan for the Southern Right Whale (CoA 2022). The Drilling Program Operational Area and sound EMBA overlaps the southern right whale migration BIA. The Drilling Program Operational Area and sound EMBA do not overlap the southern right whale reproduction BIA.
Legislative or Other requirements	OPGGS Act 2006 (Cth).	National Recovery Plan for Albatrosses and Petrels (DCCEEW 2022e). Wildlife Conservation Plan for Seabirds (DCCEEW 2020). Wildlife Conservation Plan for Migratory Shorebirds (DoE 2015b). National Light Pollution Guidelines for Wildlife (CoA 2023).	National Recovery Plan for the Orange-bellied Parrot (DoE 2016) National Light Pollution Guidelines for Wildlife (CoA 2023).	Conservation Management Plan for the Blue Whale (DoE 2015) Guidance on key terms within the Blue Whale Conservation Management Plan (DAWE 2021a)	Conservation Management Plan for Southern Right Whale (DSEWPaC 2012b) Draft National Recovery Plan for the Southern Right Whale (CoA 2022)

Aspect	Interaction with Other Users	Light		Underwater Sound	
Receptor	**Commercial fishers**	**Seabirds and Shorebirds**	**Orange-bellied Parrot**	**Blue Whale**	**Southern Right Whale**
Threatening Processes Relevant to Aspect	NA	Light emissions are identified as a threat in the National Recovery Plan for Albatrosses and Petrels but marine infrastructure interactions, including those associated with artificial light, are classified as having no risk category priority and affecting 'Nil' species in Australian jurisdiction. The National Recovery Plan for Albatrosses and Petrels also states that light associated with coastal developments at or adjacent to breeding sites represents a moderate threat to short-tailed shearwater. Light pollution, including from gas flaring, is listed as a threat to seabirds in the Wildlife Conservation Plan for Seabirds, with potential for consequences affecting individuals but not whole populations.	The National Recovery Plan for the Orange-bellied Parrot identifies illuminated boats and structures within the migration route as a barrier to migration (weak evidence for impact, moderate risk rating).	Conservation Management Plan for the Blue Whale identifies anthropogenic noise interference as a threat.	Conservation Management Plan for the Southern Right Whale and draft National Recovery Plan for the Southern Right Whale identify noise interference as a threat.
Relevant Spatial and Temporal Extent	Fishery Management Areas for the duration of the Project.	The Wildlife Conservation Plan for Migratory Shorebirds identifies light as part of anthropogenic disturbance as threat. Foraging BIAs for seabirds cover either all or a large proportion of the SE Marine Bioregion. Seabird breeding behaviour and shorebird roosting behaviour is likely to occur along the coast of Victoria.	Probable Migration Route September-November (Southward); February-mid-March (northwards).	Underwater sound EMBA overlap foraging and annual high use foraging BIAs, where blue whales are typically present from January to April though whales may be present from November to June.	Overlap of underwater sound EMBA with migration BIA where southern right whales are typically present from April to October.
Relevant Actions from Legislative or Other Requirements	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 out those activities in a manner that does not interfere with navigation or fishing (among others).	National Recovery Plan for Albatrosses and Petrels: no relevant actions. Wildlife Conservation Plan for Seabirds: Mitigate against impacts of light pollution around breeding colonies. Wildlife Conservation Plan for Migratory Shorebirds: no actions. National Light Pollution Guidelines for Wildlife recommend: 1. Always using Best Practice Lighting Design to reduce light pollution and minimise the effect on wildlife. 2. Undertaking an Environmental Impact Assessment for effects of artificial light on listed species for which artificial light has been demonstrated to affect behaviour, survivorship or reproduction.	The National Recovery Plan for the Orange-bellied Parrot recommends: Assess the risk of barriers, being illuminated structures or boats, on the probable migration route. Manage threat if the risk rating warrants action. National Light Pollution Guidelines for Wildlife recommend: 1. Always using Best Practice Lighting Design to reduce light pollution and minimise the effect on wildlife. 2. Undertaking an Environmental Impact Assessment for effects of artificial light on listed species for which artificial light has been demonstrated to affect behaviour, survivorship or reproduction.	Conservation Management Plan for the Blue Whale states that anthropogenic noise in BIAs will be managed such that any blue whale continue to utilise the area without injury, and is not displaced from a foraging area. DAWE (2021a) details that underwater anthropogenic noise should not: • Stop or prevent any blue whale from foraging. • Cause any blue whale to move on when foraging. • Stop or prevent any blue whale from entering a foraging area.	Draft National Recovery Plan for the Southern Right Whale: Actions within and adjacent to southern right whale BIAs and habitat critical to the survival of southern right whales should demonstrate that is does not prevent any southern right whale from utilising the area or cause injury (PTS, TTS) and/or disturbance. NOTE: Legal definition of 'Should' means expected course of action or policy to be followed unless inappropriate for a particular circumstances. NOTE: No habitat critical to the survival of southern right whales have been identified.
Baseline Environment Condition	Fisheries overlap with existing shipping channel and area with existing oil and gas activity. Fisheries in the area historically have sustainable stock status.	Existing lighting in the area includes fishing vessels, shipping traffic, existing offshore oil and gas platforms and coastal developments. The shipping channel for	The orange-bellied parrot migratory route is within the shipping channel for vessels coming from Melbourne to Tasmania - one of the busiest shipping routes in offshore Australia.	The BIAs overlap existing shipping channel, area of high commercial fishing effort, and existing oil and gas activity.	The BIAs overlap existing shipping channel, area of high commercial fishing effort, and existing oil and gas activity.

Aspect	Interaction with Other Users	Light		Underwater Sound	
Receptor	**Commercial fishers**	**Seabirds and Shorebirds**	**Orange-bellied Parrot**	**Blue Whale**	**Southern Right Whale**
		vessels coming from Melbourne to Tasmania is one of the busiest shipping routes in offshore Australia.			
Acceptable Level	Commercial fishers are not economically disadvantaged as a result of oil and gas activities in the offshore Otway and Bass Basins.	Cumulative light does not impact breeding for seabirds, or roosting colonies for shorebirds, or populations of other species that forage in the area.	Light from cumulative sources does not affect migration of the orange-bellied parrot at a population level.	The activity will be carried out in a manner that will not be inconsistent with the Conservation Management Plan for the Blue Whale such that blue whales can continue to utilise the area without injury and [are] not displaced from a foraging area.	The activity will be carried out in a manner that will not be inconsistent with the draft National Recovery Plan for the Southern Right Whale (DCCEEW 2022a) such that actions within and adjacent to southern right whale BIAs should demonstrate that it does not prevent any southern right whale from utilising the area or cause injury (TTS and PTS) and/or disturbance.
Other Reasonably Foreseeable Projects/ Activities Relevant to Aspect	SESSF: Commonwealth Trawl Sector Otter Board, SESSF: Commonwealth Trawl Sector Danish-seine and Southern Squid Jig Fishery potential cumulative impact from exclusion zones associated with: • One seismic survey occurring concurrently with drilling/P&A activities and/or Project installation activities. • Consecutive drilling/P&A activities and/or Project installation activities. • Project infrastructure. Victorian Giant Crab and Southern Rock Lobster Fisheries potential cumulative impact from exclusion zones associated with: • Two successive seismic surveys. • One seismic survey occurring concurrently with drilling/P&A activities and/or Project installation activities. • Consecutive drilling/P&A activities and/or Project installation activities. • Project infrastructure.	Potential for overlap with foraging BIAs and shoreline breeding and roosting areas from a single seismic survey, single drilling operation and installation or IMR activities and sequential activities. For drilling this would be a rig with one vessel present at a drill location and one vessel transiting to port, for a seismic survey would be up to three vessels and for installation or IMR would be up to two vessels.	The probable migration route is overlap by activity light EMBAs. No illuminated structures or vessels will occur within the probable migration route. Spatial: Potential overlap between Regia seismic and 1 drilling activity with light EMBA overlapping the route - for one season (while seismic is occurring). Temporal: Consecutive drilling operations over an extended period of time may have light EMBAs that overlap the probable migration route.	With the current uncertainty on the timing of some other projects and the distance of underwater sound EMBAs, there is the potential for cumulative impact if the following occur within the migration BIA during the biologically relevant periods (nominally November to June): • Overlap between one seismic survey and one drilling activity for one season. • Consecutive drilling/P&A activities over a number of seasons. • Consecutive seismic surveys in one season or over a number of seasons.	Cumulative impacts from Beach's activities to the southern right whale reproduction BIA are not predicted as the Beach sound EMBAs do not overlap with this area. With the current uncertainty on the timing of some other projects and the distance of underwater sound EMBAs, there is the potential for cumulative impact if the following occur within the migration BIA during the biologically relevant periods (nominally April - October): • Overlap between one seismic survey and one drilling activity for one season. • Consecutive drilling/P&A activities over a number of seasons.
Description of Cumulative Impact (including spatial/temporal extent)	Commercial fishers may potentially be displaced within relevant Fishery Management Areas in the offshore Otway Basin by the proposed Project and other reasonably foreseeable seismic surveys and drilling/P&A activities. Drilling, seismic, installation and IMR activity exclusions will only apply while the activity is being undertaken and a 500 m exclusion zone will apply to wells and subsea infrastructure. Beach has undertaken previous drilling, installation, IMR and Operations in the area with little displacement to commercial fishers based on the consultation and notification controls implemented that will also be applied to the Project.	Potential for cumulative impacts associated within foraging BIAs and shoreline breeding and roosting areas from operational lighting associated with: • Drilling - rig with one vessel present at a drill location and one vessel transiting to port. • Seismic survey - up to three vessels. • Installation or IMR - up to two vessels. Though 20 km is used for operational lighting for the impact assessment all vessels and the rig will have a Light Management Plan restricting the amount of light that is emitted.	For seismic, cumulative impacts from light emissions on the probable migration route would be of short duration only when acquiring in the eastern side of the area at night, concurrently with a single drilling operation. Seismic program is limited to a maximum of 90 days, with 60 days of acquisition. Temporal: Light EMBA from a single drill rig overlapping varying spatial extents of the probable migration route over a period of years. Beach has been operating in the Otway and Bass Basins and undertaking similar activities to the Project activities with no evidence of orange-bellied parrot presence recorded. Other operators including previous seismic surveys have also not had evidence of orange-bellied	Without appropriate detection and actions in place there is the potential that blue whales could be exposed to underwater sound from two sources (seismic and drilling) within the foraging BIA that could result in them expending more energy to move away from the sound source to forage or restrict the area of foraging. This could also occur for consecutive years whilst drilling/P&A activities are undertaken within the Otway and Bass Basins. Cumulative impacts resulting in an increase in the likelihood of PTS and TTS for foraging blue whales is not predicted	Without appropriate detection and actions in place there is the potential that southern right whales could be exposed to underwater sound from two sources (seismic and drilling) within the migration BIA that could result in them expending more energy to move away from the sound source when migrating to and from coastal breeding areas. This could also occur for consecutive years whilst drilling/P&A activities are undertaken within the Otway and Bass Basins. Cumulative impacts resulting in an increase in the likelihood of PTS and TTS for a migrating southern right whale is not predicted due to the small distances to the

Aspect	Interaction with Other Users	Light		Underwater Sound	
Receptor	**Commercial fishers**	**Seabirds and Shorebirds**	**Orange-bellied Parrot**	**Blue Whale**	**Southern Right Whale**
		Flaring may be undertaken but cumulative impacts are unlikely due to the short term nature (1 – 2 days) that it will be undertaken. The cumulative impact of light emissions from petroleum activities would be very low in comparison to the light emissions associated with existing shipping and fishing operations within the Otway and Bass areas. In addition, the majority of these vessels are not required to operate in accordance with a Light Management Plan.	parrot presence recorded. In addition orange-bellied parrot numbers continue to increase. The cumulative impact of light emissions from petroleum activities would be very low in comparison to the light emissions associated with existing shipping and fishing operations within the migration route. In addition, the majority of these vessels are not required to operate in accordance with a Light Management Plan.	due to the small distances to the PTS and TTS noise criteria for drilling activities.	PTS and TTS noise criteria for drilling activities.
Certainty of Assessment	Given the intensity of fishing in the area, and the overlap of fishery management areas with the proposed activities of multiple titleholders, the assessment of cumulative impacts is made with a high level of predictability and certainty.	Beach has been operating in the Otway and Bass Basins and undertaking similar activities to the Project activities without incident to date of birds being attracted to rigs or vessels. Other operators including previous seismic surveys have also not had incidents of bird attraction. Thus, the assessment of cumulative impacts is made with a high level of predictability and certainty.	There is no published information available on the sensitivity of the orange-bellied parrot to light, and only anecdotal evidence exists regarding the impact of barriers to migration (DELWP 2016a). This introduces some uncertainty into the assessment of cumulative impacts.	There is a high level of predictability and certainty in the limited potential for cumulative impacts, given the requirements in place for each activity to prevent impacts.	There is a high level of predictability and certainty in the limited potential for cumulative impacts, given the requirements in place for each activity to prevent impacts.
Existing Control Measures	A single MODU has been contracted to conduct drilling/P&A activities in the region, mitigating the potential for concurrent impacts from these activities. Titleholders overlapping fishery management areas with recorded fishing intensity are required to consult with affect parties and typically have ongoing notifications processes and a compensation protocol in place to ensure fishers are no worse off as a result of their proposed activity. CM03: Consultation for Implementation of EP CM04: Fair Ocean Access Procedure	A single rig has been contracted to conduct drilling/P&A activities in the region, mitigating the potential for concurrent impacts from these activities. Titleholders with light EMBAs overlapping bird foraging, breeding, or roosting BIAs or where behaviours are identified are required to have a light management plan that meets the requirements of the National Light Pollution Guidelines. CM07: Light Management Plan	A single rig has been contracted to conduct drilling/P&A activities in the region, mitigating the potential for concurrent impacts from these activities. Titleholders with Light EMBAs overlapping or adjacent to the orange-bellied parrot migration route are required to have a light management plan that meets the requirements of the National Light Pollution Guidelines. CM07: Light Management Plan	A single rig has been contracted to conduct drilling/P&A activities in the region, mitigating the potential for concurrent impacts from these activities. Titleholders are required to undertake their activity in a manner that is not inconsistent with the in force Conservation Management Plan for the Blue Whale. CM08: Whale Management Procedure	A single rig has been contracted to conduct drilling/P&A activities in the region, mitigating the potential for concurrent impacts from these activities. Titleholders are required to undertake their activity in a manner that is not inconsistent with the in force Conservation Management Plan for Southern Right Whale. CM08: Whale Management Procedure
Additional Control Measures / Environmental Performance Standards	Beach will undertake to continue to work with other titleholders, fishing associations and fishers, to design an application process for compensation that minimises the potential for cumulative impacts associated with commercial fishers having to make multiple applications to multiple titleholders.	Beach will work with other titleholders with the aim of minimising the potential for cumulative impacts associated with light emissions, should activity timings overlap biologically important periods for light sensitive species. Observations, incidents, and opportunities for improvement regarding light management and bird interactions will be reported to other petroleum titleholders.	Beach will work with other titleholders with the aim of minimising the potential for cumulative impacts associated with light emissions, should activity timings overlap biologically important periods for light sensitive species. Observations, incidents, and opportunities for improvement regarding light management and bird interactions will be reported to other petroleum titleholders.	Beach will work with other the titleholders with the aim of minimising the potential for cumulative impacts associated with underwater sound, should activity timings overlap biologically important periods for blue whales. Observation, incidents, and opportunities for improvement regarding underwater sound management and whale interactions will be reported to other petroleum titleholders.	Beach will work with other the titleholders with the aim of minimising the potential for cumulative impacts associated with underwater sound, should activity timings overlap biologically important periods for southern right whales. Observation, incidents, and opportunities for improvement regarding underwater sound management and whale interactions will be reported to other petroleum titleholders.
Residual Cumulative Consequence	**Minor (1)**	**Minor (1)**	**Minor (1)**	**Minor (1)**	**Minor (1)**

Aspect	Interaction with Other Users	Light		Underwater Sound	
Receptor	**Commercial fishers**	**Seabirds and Shorebirds**	**Orange-bellied Parrot**	**Blue Whale**	**Southern Right Whale**
ALARP Achieved	Yes - The residual consequence is lower order – Minor (1). Additional control measures were considered and adopted to minimise the consequence of impacts and are considered effective and appropriate to the predicted cumulative environmental impact.	Yes - The residual consequence is lower order – Minor (1). Additional control measures were considered and adopted to minimise the consequence of impacts and are considered effective and appropriate to the predicted cumulative environmental impact.	Yes - The residual consequence is lower order – Minor (1). Additional control measures were considered and adopted to minimise the consequence of impacts and are considered effective and appropriate to the predicted cumulative environmental impact.	Yes - The residual consequence is lower order – Minor (1). Additional control measures were considered and adopted to minimise the consequence of impacts and are considered effective and appropriate to the predicted cumulative environmental impact.	Yes - The residual consequence is lower order – Minor (1). Additional control measures were considered and adopted to minimise the consequence of impacts and are considered effective and appropriate to the predicted cumulative environmental impact.
Acceptable Level Achieved	Yes – Following completion of the CIA process, the residual lower order – Minor (1) consequence is considered acceptable because: •Good practice controls are defined and will be implemented. •The activities will be managed in accordance with relevant company, Commonwealth, international, and Industry standards, guidelines, and requirements.	Yes – Following completion of the CIA process, the residual lower order –Minor (1) consequence is considered acceptable because: • Limited spatial extent of effect compared to area available for foraging. Most species forage during daylight. • The National Recovery Plan for Albatrosses and Petrels states that marine infrastructure interactions, including those associated with artificial light, are classified as having no risk category priority and affecting 'Nil' species in Australian jurisdiction. • The Drilling Program light EMBA does not overlap the shoreline of the Wedge-tailed shearwater breeding BIA. This species is not listed as threatened and periodic changes in ambient light is unlikely to cause behavioural changes or result in injury/mortality to this species. • Good practice controls are defined and will be implemented. • Adequate procedures and guidelines are in place to minimise impacts. • The activities will be managed in accordance with relevant company, Commonwealth, international, and Industry standards, guidelines, and requirements.	Yes – Following completion of the CIA process, the residual lower order – Minor (1) consequence is considered acceptable because: • The impact of light emissions from a seismic vessel overlapping the light emission from a rig are predicted to result in increases in ambient light that are short-term, fully recoverable and do not represent illuminated structures or boats within the migration route. • Light from drilling activities will only occur from a single location, with limited overlap with the probable migration route and do not represent illuminated structures or boats within the migration route. • Good practice controls are defined and will be implemented. • Adequate procedures and guidelines are in place to minimise impacts. • The activities will be managed in accordance with relevant company, Commonwealth, international, and Industry standards, guidelines, and requirements.	Yes – Following completion of the CIA process, the residual lower order – Minor (1) consequence is considered acceptable because: • Titleholders are required to undertake their activity in a manner that is not inconsistent with the in force Conservation Management Plan for the Blue Whale. • Good practice controls are defined and will be implemented. • Adequate procedures and guidelines are in place to minimise impacts. • The activities will be managed in accordance with relevant company, Commonwealth, international, and Industry standards, guidelines, and requirements.	Yes – Following completion of the CIA process, the residual lower order – Minor (1) consequence is considered acceptable because: • Titleholders are required to undertake their activity in a manner that is not inconsistent with the in force Conservation Management Plan for Southern Right Whale. • Good practice controls are defined and will be implemented. • Adequate procedures and guidelines are in place to minimise impacts. • The activities will be managed in accordance with relevant company, Commonwealth, international, and Industry standards, guidelines, and requirements.

7.15 Environmental Performance Outcomes, Standards and Measurement Criteria

As detailed in the OPGGS(E)R the EP must set out the EPOs for the activity against which the performance of the titleholder in protecting the environment is to be measured. In addition, the EP must set EPSs for the control measures identified in the impact and risk assessment and include measurement criteria that the titleholder will use to determine whether each EPO and EPS is met.

The EPOs for the Drilling Program are listed below with the controls and associated EPS and measurement criteria detailed in Table 7-23.

- EPO1: Undertake the activity in a manner that will not interfere with other marine users to a greater extent than is necessary for the exercise of right conferred by the titles granted.
- EPO2: No death or injury to listed threatened or migratory species from the activity.
- EPO3: Biologically important behaviours can continue while the activity is being undertaken.
- EPO4: Anthropogenic noise in biologically important areas will be managed such that:
  - Any blue whale continues to utilise the area without injury, and is not displaced from a foraging area.
  - It does not prevent any southern right whale from utilising the area or cause injury (TTS and PTS) and/or disturbance.
- EPO5: No substantial reduction of air quality within local airshed caused by atmospheric emissions produced during the activity.
- EPO6: Seabed and associated biota disturbance will be within the Operational Areas.
- EPO7: No impact to submerged cultural heritage*.
- EPO8: No impact to water quality at a distance > 500 m from the vessel or rig from planned marine discharges.
- EPO9: No introduction of a known or potential invasive marine species.
- EPO10: No unplanned discharge of waste to the marine environment.
- EPO11: No spills of chemicals or hydrocarbons to the marine environment.

* In addition to EPO7, all the other EPOs define the performance of Beach in protecting First Nations Cultural Values and Sensitivities as identified in Section 6.6.3.

Table 7-23: Environmental Performance Standards and Measurement Criteria

Environmental Performance Outcome	Control Measure #	Environmental Performance Standard	Measurement Criteria
• EPO1: Undertake the activity in a manner that will not interfere with other marine users to a greater extent than is necessary for the exercise of right conferred by the titles granted. • EPO2: No death or injury to listed threatened or migratory species from the activity. • EPO3: Biologically important behaviours can continue while the activity is being undertaken. • EPO4: Anthropogenic noise in biologically important areas will be managed such that: o Any blue whale continues to utilise the area without injury, and is not displaced from a foraging area. o It does not prevent any southern right whale from utilising the area or cause injury (TTS and PTS) and/or disturbance. • EPO5: No substantial reduction of air quality within local airshed caused by atmospheric emissions produced during the activity. • EPO8: No impact to water quality at a distance > 500 m from the vessel or rig from planned marine discharges. • EPO10: No unplanned discharge of waste to the marine environment. • EPO11: No spills of chemicals or hydrocarbons to the marine environment.	CM01: Marine Assurance Process	The rig and vessels will meet relevant maritime laws and includes pre-commencement rig and vessel inspections of class certification requirements under the Navigation Act 2012 and associated Marine Orders, including but not limited to: • Marine Order 21 Safety and Emergency Arrangements. • Marine Order 27 Safety of Navigation and Radio Equipment. • Marine Order 30 Prevention of Collisions. • Marine Order 31: SOLAS and non-SOLAS Certification. • Marine Order 42 Carriage, Stowage and Securing of Cargoes and Containers. • Marine Order 57: Helicopter Operations. • Marine Order 70 Seafarer Certification. • Marine Order 91 Marine Pollution Prevention - Oil • Marine Order 95 Marine Pollution Prevention – Garbage. • Marine Order 96: Marine Pollution Prevention – Sewage. • Marine Order 97 Marine Pollution Prevention – Air Pollution. • Marine Order 98: Marine Pollution – Anti-fouling Systems.	Bunker receipts showing use of very low sulphur fuel. Ship Energy Efficiency Management Plan Oil record book Garbage record book Certification documentation Vessel and rig inspection
		Oil contaminated water shall be treated via a MARPOL (or equivalent) approved oily water separator and only discharge if oil content less than 15 ppm.	Oil record book Vessel and rig inspection
		If ODS are present on the rig or vessels, the rig or vessel will have ODS handling procedures as per MARPOL Annex VI, including maintenance of ODS record book where rechargeable systems containing ODS are recharged or repaired.	ODS handling procedures ODS record book Vessel and rig inspection
		Rig and vessels will have Preventative Maintenance System that provides a status on the maintenance of equipment and detailed manufacturer's specification on maintenance procedures for: • Equipment detail as a control in this EP will be inspected to ensure effective operation. • Power generation and propulsion systems on the MODU and vessels will be inspected to ensure efficient operation.	Preventative Management System records Vessel and rig inspection
		Materials and equipment that have the potential to spill onto the deck or marine environment will be stored within a contained area.	Vessel and rig inspection
		Waste or materials with potential to be windblown shall be stored in covered containers.	Vessel and rig inspection
		Rig and vessels shall have a SMPEP (or equivalent appropriate to class) which is: • Implemented in the event of a spill to deck or marine environment. • Tested as per the vessel test schedule. Spill response kits will be available and routinely checked to ensure adequate stock is maintained.	SMPEP Vessel and rig inspection Vessel and rig exercise schedule
• EPO1: Undertake the activity in a manner that will not interfere with other marine users to a greater extent than is necessary for the exercise of right conferred by the titles granted. • EPO2: No death or injury to listed threatened or migratory species from the activity.	CM02: Vessel and Rig Operating Procedures	Bulk solids transferred in accordance with bulk transfer procedures to reduce the risk of an unintentional release bulk product (powder) to sea during tank venting. The procedures include standards for: • Certified equipment with confirmed integrity (e.g. hose and valves). • Transfer process (e.g. safety, communication, monitoring, inventory, emergency shut down procedures, procedural documents, and spill incident details).	Bulk transfer procedures
		Bunkering and bulk liquids will be transferred in accordance with bulk transfer procedures to reduce the risk of an unintentional release to sea during transfer. The procedures include standards for: • Certified equipment with confirmed integrity (e.g. hose and valves). • Transfer process (e.g. safety, communication, monitoring, inventory, emergency shut down procedures, procedural documents, and spill incident details)	Bulk transfer procedures

Environmental Performance Outcome	Control Measure #	Environmental Performance Standard	Measurement Criteria
• EPO3: Biologically important behaviours can continue while the activity is being undertaken. • EPO5: No substantial reduction of air quality within local airshed caused by atmospheric emissions produced during the activity. • EPO10: No unplanned discharge of waste to the marine environment. • EPO11: No spills of chemicals or hydrocarbons to the marine environment.		A 500 m radius Petroleum Safety Zone (PSZ) will be published in the Government Notices Gazette for each new location for the duration of the drilling and will remain in place for those wells which are suspended for future production. A 2 km radius cautionary zone will be in place around the rig when on location and will be monitored by a support vessel.	PSZ gazette Daily report
		At least one support vessel will remain with the rig during the Drilling Program, weather permitting.	Daily report
		Vessel speeds within the Operational Area will be restricted to ≤ 10 knots.	Vessel log
		All lifting gear used for deployment and retrieval of equipment over the rig and vessels is load rated for the working load.	Lifting gear rating and load records
		If deemed safe and effective to do so, support vessels can assist in the recovery of lost materials or waste.	Daily report
		AMSA JRCC and other marine users will be notified in the event of loss of materials with potential to affect safe navigation.	Notification records
• EPO1: Undertake the activity in a manner that will not interfere with other marine users to a greater extent than is necessary for the exercise of right conferred by the titles granted. • EPO7: No impact to submerged cultural heritage.	CM03: Consultation for Implementation of EP	As per Section 4.1.16 Beach will undertake consultation for the implementation of the EP which will include at a minimum: • Notification to all relevant person regarding acceptance of the EP by NOPSEMA. • Commencement of activities, exclusion zones, vessel details, pre-lay of anchors and buoys, movement of drilling rig to new locations, during activity and cessation notification requirements. • On-water communication processes, including SMS messages and radio communication. • Consultation with relevant First Nations groups (section 6.6.2) regarding identified cultural heritage and cultural landscapes in accordance with CM05: Seabed Survey. • Consultation with commercial fishing associations (and individual commercial fishers where identified) regarding well locations, the ongoing communication of Beach activities to their members, and applying CM04: Beach Fair Ocean Access Procedure.	Notification records Consultation records
• EPO1: Undertake the activity in a manner that will not interfere with other marine users to a greater extent than is necessary for the exercise of right conferred by the titles granted.	CM04: Beach Fair Ocean Access Procedure	The Beach Fair Ocean Access Procedure (Appendix D for overview) shall be implemented with fishers who have identified they fish in the area and have a commercial loss due to Beach's activities.	Consultation records
• EPO1: Undertake the activity in a manner that will not interfere with other marine users to a greater extent than is necessary for the exercise of right conferred by the titles granted. • EPO6: Seabed and associated biota disturbance will be within the Operational Areas. • EPO7: No impact to submerged cultural heritage.	CM05: Seabed Survey	A seabed survey will be undertaken prior to the commencement of the Drilling Program to allow for the consideration of the following in the final selection of well locations and drill rig position and location of mooring equipment: • Seabed habitat type to avoid areas of high relief outcrops, reefs or sponge beds that are likely to be associated with site-attached fish. • Shipwrecks and other maritime archaeological heritage. • Submerged cultural heritage and cultural landscapes. • Location of the Superloop Indigo Central telecommunications cable for wells in T/30P to avoid any impacts to the cable. • Location of unexploded ordinances. Data from seabed surveys will be provided to an appropriately qualified underwater archaeologist to identify submerged cultural heritage and landscapes and provide an Underwater Cultural Heritage Report to Beach. Beach will assess the report and identify any areas of overlap and potential risks from proposed activities defined in this EP. Beach will share relevant information and assessments from the Seabed Survey, relevant to submerged cultural heritage and landscapes with relevant First Nations groups as identified in Section 6.6.2. Should any submerged cultural heritage be identified, Beach will report the findings in accordance with the *Underwater Cultural Heritage Act* 2018, and will consult with the relevant First Nations groups (as identified in Section 6.6.2) and determine any exclusion areas or further cultural heritage management procedures that may be required. Should any potential submerged cultural landscapes be identified, in consultation with the qualified underwater archaeologist, Beach will assess the report and identify any areas of overlap and potential risks from proposed activities defined in this EP. Beach will also consult with relevant First Nations groups (see 6.6.2) and determine any exclusion areas or further cultural heritage management procedures that may be required.	Seabed survey records Consultation records Underwater Cultural Heritage Report Exclusion areas, if required Cultural heritage management procedures, if required

Environmental Performance Outcome	Control Measure #	Environmental Performance Standard	Measurement Criteria
• EPO1: Undertake the activity in a manner that will not interfere with other marine users to a greater extent than is necessary for the exercise of right conferred by the titles granted. • EPO6: Seabed and associated biota disturbance will be within the Operational Areas. • EPO7: No impact to submerged cultural heritage.	CM06: Drill Rig Mooring Plan CM09: Drilling Program	The following will be considered in the final selection of well locations, drill rig position and location of mooring equipment: • Seabed habitat type to avoid areas of high relief outcrops, reefs or sponge beds that are likely to be associated with site-attached fish. • Shipwrecks and other maritime archaeological heritage. • Submerged cultural heritage. • Location of the Superloop Indigo Central telecommunications cable for wells in T/30P to avoid any impacts to the cable. • Location of unexploded ordinances.	Drill Rig Mooring Plan Drilling Program final well locations
		Pre-laid anchors will have a surface buoy with navigation lighting and the position of the buoys will be included in the notification to AHS to be included in the AUSCOAST Warnings.	Drill Rig Mooring Plan
		Planned retrieval of all mooring equipment, including transponders, from the sea floor as soon as reasonably practicable within 3 months following the completion of the Drilling Program.	Drill Rig Mooring Plan
• EPO2: No death or injury to listed threatened or migratory species from the activity. • EPO3: Biologically important behaviours can continue while the activity is being undertaken.	CM07: Light Management Plan	Beach will contract a suitably qualified specialist to develop and support the implementation of a Light Management Plan for the rig and vessels, as per the National Light Pollution Guidelines for Wildlife. At a minimum the plan will cover: • Requirements to minimise non-essential lights and outward facing lights ensuring safety navigational lighting and safe work condition requirements are met. • Program for handling grounded birds. • Reporting requirements.	Light Management Plan Rid and vessel inspection
• EPO2: No death or injury to listed threatened or migratory species from the activity. • EPO3: Biologically important behaviours can continue while the activity is being undertaken. • EPO4: Anthropogenic noise in biologically important areas will be managed such that: o Any blue whale continues to utilise the area without injury, and is not displaced from a foraging area. o It does not prevent any southern right whale from utilising the area or cause injury (TTS and PTS) and/or disturbance.	CM08: Whale Management Procedure	The Whale Management Procedure (Appendix H) will be implemented to minimise anthropogenic noise threats to relevant whale species.	Whale Management Procedure MMO records
• EPO1: Undertake the activity in a manner that will not interfere with other marine users to a greater extent than is necessary for the exercise of right conferred by the titles granted. • EPO8: No impact to water quality at a distance > 500 m from the vessel or rig from planned marine discharges.	CM09: Drilling Program	• Beach will implement an activity limitation where wells will not be located in water depths >400 m.	Drilling Program final well locations
		• Only water based drilling fluids will be used for the Drilling Program. • Solids control equipment consisting of shale shakers and centrifuges will be used once the riser is in place to reduce the concentration of drilling fluid on cuttings prior to discharge. • Shale shakers will be fitted with screens that meet American Petroleum Institute (API) standards for particle size cut points.	Drilling Program records
		Barite will have low concentrations of mercury and cadmium (less than 1 mg/kg and 3 mg/kg respectively).	Drilling Program records
		Residual water based drill fluids, brine, completion fluids, cement, barite and bentonite will be used for subsequent wells, provided to the next operator at the end of the program, or if these options are not feasible, discharged to the marine environment.	Drilling Program records

Environmental Performance Outcome	Control Measure #	Environmental Performance Standard	Measurement Criteria
		The BOP shall be routinely function and pressure tested in accordance with industry standards and preventative maintenance will be in accordance with manufacturer's specifications and in alignment with Drilling Contractors preventative maintenance system. Pre-operational function and pressure test to be conducted and may be witnessed by additional third-party prior to campaign.	BOP test records
		Prior to the commencement of the Drilling Program a register of suitable relief well rigs will be compiled and updated monthly during the program, or more frequently should any change in status of available rigs occur.	Relief Well Rig Register
• EPO2: No death or injury to listed threatened or migratory species from the activity. • EPO3: Biologically important behaviours can continue while the activity is being undertaken. • EPO5: No substantial reduction of air quality within local airshed caused by atmospheric emissions produced during the activity.	CM10: (Contingency) Well Testing Program	• Flaring will be limited to a maximum of 48 hours for one well as a contingency only (Yolla 7). • Initial flow will be conducted in good visibility conditions as per Beach WECS. • A check will be undertaken to ensure no birds are on or near to the flare boom prior to commencing flaring. • A flaring system and air compressors will be used to atomise hydrocarbons to minimise smoke during combustion and aid in the reduction of atmospheric emissions. • A minimum standard for the destruction efficiency of the flare will be specified in the minimum equipment requirements.	Well Testing Program records
• EPO5: No substantial reduction of air quality within local airshed caused by atmospheric emissions produced during the activity.	CM11: Procurement Vetting Process	Beach via its Procurement Vetting Process will assess suppliers emissions management and via this process support low emission vessels if available.	Procurement vetting records
• EPO8: No impact to water quality at a distance > 500 m from the vessel or rig from planned marine discharges.	CM12: Chemical Management Procedure	All chemicals that will or could be discharged to the marine environment must be assessed prior to use to ensure the lowest toxicity, most biodegradable and least accumulative chemicals are selected which meet the technical requirements of the application as per the Beach Chemical Management Procedure.	Chemical assessment records
• EPO11: No spills of chemicals or hydrocarbons to the marine environment.	CM13: Beach Offshore Oil Pollution Emergency Plan	Emergency spill response capability is maintained in accordance with the NOPSEMA accepted OPEP	OPEP Outcomes of internal audits and tests demonstrate preparedness
		Implement spill response in accordance with relevant EPOs and EPSs in the accepted OPEP.	EMT log
	CM14: Beach Offshore Operational and Scientific Monitoring Plan	Operational and scientific monitoring capability is maintained in accordance with the NOPSEMA accepted OSMP.	OSMP Outcomes of internal audits and tests demonstrate preparedness
	CM15: Well Engineering and Construction Management System	Drilling, completions, well testing and P&A planning and operations will be conducted in compliance with the Well Engineering and Construction Management System (WECS) that ensures: • Beach well activities are fit for purpose with operational and well life cycle risks managed to a level that is as low as reasonably practicable. • Changes are made in a controlled manner as per the Beach Management of Change Standard. • Appropriate standards are adhered to. • Sufficiently resourced and competent organisation is in place.	Well Engineering and Construction Management System implementation records
	CM16: Source Control Contingency Plan (SCCP), inclusive of Relief Well Plan	• Emergency spill response capability is maintained in accordance with the SCCP and Relief Well Plan. • The SCCP will be consistent with the International Oil and Gas Producers (IOGP) Report 594 - Subsea Well Source Control Emergency Response Planning Guide for Subsea Wells (2019). • Relief Well Plan will be developed in line with industry guidelines, i.e. UK Offshore Energies (OEUK)	SCCP Relief Well Plan Outcomes of internal audits and tests demonstrate preparedness
	CM17: NOPSEMA Accepted Well Operations Management Plan	Well integrity shall be maintained in accordance with the NOPSEMA accepted Well Operations Management Plan (WOMP).	NOPSEMA accepted WOMP

Environmental Performance Outcome	Control Measure #	Environmental Performance Standard	Measurement Criteria
	CM18: NOPSEMA accepted Rig Safety Case	The Offshore Petroleum and Greenhouse Gas Storage (Safety) Regulations 2009 (OPGGS(S)) set out the requirements for the contents of safety cases. The rig requires an Australian Safety Case detailing the control in place to prevent a major accident event. The Rig Safety Case: • Identifies the hazards and risks. • Describes how the risks are controlled. • Describes the safety management system in place to ensure the controls are effectively and consistently applied.	NOPSEMA accepted Rig Safety Case
• EPO9: No introduction of a known or potential invasive marine species.	CM19: Beach Domestic IMS Biofouling Risk Assessment Process	Drill rig and support vessels mobilised from domestic waters to undertake activities within the Operational Areas will complete the Beach Domestic IMS Biofouling Risk Assessment Process as detailed in the Beach Introduced Marine Species Management Plan (S400AH719916) prior to the initial mobilisation into the Operational Areas.	Domestic IMS Biofouling Risk Assessment records

8 Implementation Strategy

The OPGGS(E)R requires that the EP must contain an implementation strategy for the activity.

The Beach Operations Excellence Management System (OEMS) will be used to govern the activity. The OEMS provides guidance on how Beach will meet the requirements of its Environmental Policy (Figure 8-1). The Beach OEMS has been developed considering Australian/New Zealand Standard ISO 14001:2016 Environmental Management Systems. The OEMS is an integrated management system and includes all HSE management elements and procedures.

8.1 Operations Excellence Management System

The OEMS documents Beach's Environmental Policy, 11 OEMS Elements (the Elements) and 30 OEMS Standards (the Standards). It provides a management framework for achieving the requirements in a systematic way but allows flexibility to achieve this in a manner that best suits the business. The OEMS 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)
- AS 4801 (Occupational Health and Safety Management Systems)

At the core of the OEMS are the 11 Elements and associated Standards that detail specific performance requirements that incorporate all the requirements for the implementation of the Environmental Policy (Figure 8-1) and management of potential HSE impacts and risks (Figure 8-2, Table 8-1). The Elements, via the nominated expectations, sponsor 30 Beach OEMS Standards, which provide more granular minimum compliance rule sets under which the company operates. At the business level, the system is complemented by asset and site procedures and plans such as this EP.

The application of OEMS Elements and Standards relevant to the activity and the requirements of the OPGGS(E)R are described in the following sections.

Whilst Beach is the titleholder for the Drilling Program, the rig and vessel contractor maintains operational control as per the requirements of their management system.

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

Application

This policy applies to all personnel associated with Beach activities.

Morné Engelbrecht
Chief Executive Officer
April 2023

Figure 8-1: Beach's Environmental Policy

Figure 8-2: Beach OEMS

Table 8-1: Beach OEM Elements and Standards

Element		Standard
1	Partners, Leadership and Authority	Leadership Standard
		Technical Authority Standard
		Joint Venture Management Standard
2	Financial Management and Business Planning	Integrated Planning Standard
		Phase Gate Standard
		Hydrocarbon Resource Estimation and Reporting Standard
		Financial Management Standard
3	Information Management and Legal Requirements	Regulatory Compliance Standard
		Document Management Standard
		Information Management Standard
4	People, Capability and Health	Training and Competency Standard
		Health Management Standard
5	Contracts and Procurement	Contracts and Procurement Standard
		Transport and Logistics Standard
6	Asset Management	Asset Management Standard
		Maintenance Management Standard
		Well Integrity Management Standard
		Well Construction Management Standard
		Project Management Standard
7	Operational Control	Operational Integrity Standard
		Process Safety Standard
		Management of Change Standard
8	Risk Management and Hazard Control	Risk Management Standard
		Safe Systems of Work
		Emergency and Security Management Standard
9	Incident Management	Incident Management Standard
10	Environment and Community	Environment Management Standard
		Community Engagement Standard
11	Assurance and Reporting	Sustainability Standard
		Assurance Standard

8.2 Responsibilities of Employees and Contractors

8.2.1 Roles and Responsibilities

Element 1 Partnerships, Leadership and Authority focuses on ensuring the organisation is equipped, structured, and supported to ensure a healthy, efficient, and successful company. Communications with internal and external bodies, including joint venture partners, is essential to delivering successful projects and operations. The leadership styles and actions demonstrated within Beach will influence the performance of all staff and contractors. Clear levels of authority are necessary to remove organisational ambiguity and to support effective decision making.

Beach's Chief Operating Officer has the ultimate responsibility for ensuring that Beach has the appropriate organisation in place to meet the commitments within this EP. However, the Drilling Manager has the responsibility and delegated authority to ensure that adequate and appropriate resources are allocated to comply with OEMS and this EP.

The roles responsible for the implementation, management and review of this EP are detailed in Table 8-2.

Roles and responsibilities for an oil pollution emergency response are described in the OPEP.

Table 8-2: Roles and Responsibilities for Key Role for the EP Implementation

Role	**Responsibilities**
Onshore	
Chief Operating Officer	• Responsible for HSE performance of all Beach activities. • Ensures policies and systems are in place to guide the company's environmental performance. • Ensures adequate resources are available for the safe operation of all facilities and operations. • Ensures that the OEMS continues to meet the evolving needs of the company.
Drilling Manager	Ensures: • Compliance with the Environment Policy, regulatory and other requirements, and this EP. • Whale Management Procedure is implemented, records obtained, and reporting undertaken. • Records associated with the Drilling Program are maintained as per Section 8.6.2. • Personnel who have specific responsibilities pertaining to the implementation of this EP or Oil Pollution Emergency Plan (OPEP) know their responsibilities and are competent to fulfil their designated role. • Assurance Processes as detailed in Section 8.3.2 are undertaken to confirm that control measures detailed in the EP are effective in reducing the environmental risks of the Drilling Program to ALARP and acceptable levels, and EPOs and EPSs are continually met. • Environmental impacts and risks associated with the Drilling Program have been identified and any new or increased impacts or risks are managed via the Management of Change process detailed in Section 8.3.4. • Incidents are managed and reported as per Section 8.3.1. • Leads the investigation and reporting of any environmental incidents . • EP Performance Report is submitted to NOPSEMA as per Section 8.3.7.

Role	Responsibilities
	• Changes to equipment, systems, and documentation where there may be a new or change to an environmental impact or risk or a change that may impact the EP are assessed using the Management of Change process detailed in Section 8.3.4. • Oil spill response arrangements are tested as per the OPEP. • Audits and inspections are undertaken in accordance with Section 8.3.3.
Beach Drilling Superintendent	• Drilling Program is carried out in accordance with regulatory requirements and this EP. • Ensure the Whale Management Procedure is communicated to all MMOs, Beach Senior Drilling Supervisor, Beach personnel offshore and all 3rd party and drilling contractor personnel on the rig, all helicopter crew and all Vessel Captains and vessel crew. • Rig personnel are competent to fulfil their designated role. • HSE issues are communicated via systems such as the daily report and daily pre-start meetings. • Environmental incidents are managed and reported as per Section 8.3.1. • Emissions and discharges identified in Section 8.3.8 are recorded, reviewed, and provided to the Drilling Manager. • Drilling Manager is informed of any changes to equipment, systems, and documentation where there may be a new or change to an environmental impact or risk or a change that may impact the EP as per Section 8.3.4. • Weekly rig inspections are undertaken to ensure ongoing compliance with the EP as per Section 8.3.3 and communicate outcome and any non-conformance to Drilling Manager.
Head of Environment	• Ensures this EP is revised as required. • Whale Management Procedure Document Owner. Accountable to define the requirements of the business process, ensures appropriate performance metrics are defined and reviewed, tracks lessons learned, and drives continuous improvement. • Reviews EP audits. • Reviews and approves reportable incident reports to the regulators. • Reviews changes to operations for their environmental and regulatory implications.
Drilling Program Environment Advisor	• Maintains ongoing communications with the Drilling Manager regarding regulatory requirements and environmental management in general. • Prepares environmental inductions and training packages. • Monitors environmental performance against this EP. • Undertakes Assurance Processes as detailed in Section 8.3.2 to confirm that control measures detailed in the EP are effective in reducing the environmental risks of the Drilling Program to ALARP and acceptable levels, and the EPOs and EPSs are continually met. • In relation to the Whale Management Procedure: ◦ Coordinate the training and implementation of the Whale Management Procedure offshore. ◦ Ensures the requirements for the implementation of the Whale Management Procedure are in place prior to the commencement of the Drilling Program. ◦ Reviews the MMO daily report to ensure detection and actions meet the requirements of the Whale Management Procedure. ◦ Coordinates and documents the review of effectiveness and compliance with the Whale Management Procedure. ◦ Forwards report detailing marine mammal sightings, actions taken as per the Whale Management Procedure, and reasons actions not taken to relevant persons who requested access to this information.

Role	Responsibilities
	◦ Forwards record of marine mammal sightings to DCCEEW Australian Marine Mammal Centre Division. • Prepares and submits monthly recordable incident reports to the regulators. • Prepares reportable incident reports for submission to the regulators. • Supports the Management of Change (MoC) process with regard to environmental issues. • Supports the investigation and reporting of any environmental incidents. • Prepares and submits reportable incident reports to the regulators. • Reviews changes to the Drilling Program with the Head of Environment.
Community Relations Manager	• Ensure that relevant persons (as defined in Section 4) are consulted about the Drilling Program to allow the relevant person to make an informed assessment of the possible consequences of the activity on their functions, interests, or activities. • Ensure that any requests for updates about the activity that were identified during the EP preparation consultation phase are implemented. • Ensure consultation for implementation of the EP (Section 4.16) is undertaken. • Maintains a record of stakeholder consultation including how any objection or claim relevant to the Drilling Program was assessed and communicated to the relevant person. • Reports stakeholder objections or claims to the Drilling Manager and Drilling Program Environment Advisor for assessment. • Keeps relevant persons informed of emergency events that may impact their functions or interests.
Offshore	
Rig Senior Drilling Supervisor	Ensures: • Drilling Program is carried out in accordance with regulatory requirements and this EP. • Rig personnel complete the Drilling Program induction. • Whale Management Procedure is implemented on the rig and: ◦ Maintain open communication with MMOs. ◦ Regularly (daily or more often as operational changes dictate) communicate the status of the activities (i.e. commencing, underway, or at Safe Point) to MMOs. ◦ Liaise with the MMO and decide whether actions within this procedure can safely be implemented and take action accordingly. ◦ Document reasons for not following this procedure and report same to the Beach Drilling Superintendent and the Beach Environmental Advisor. ◦ Provides input into the review of effectiveness and compliance with the Whale Management Procedure. • Rig personnel are competent to fulfil their designated role. • HSE issues are communicated via systems such as the daily report and daily pre-start meetings. • Environmental incidents are managed and reported as per Section 8.3.1. • Emissions and discharges identified in Section 8.3.8 are recorded and provided to the Drilling Superintendent. • Drilling Superintendent is informed of any changes to equipment, systems, and documentation where there may be a new or change to an environmental impact or risk or a change that may impact the EP as per Section 8.3.4. • Weekly rig inspections are undertaken to ensure ongoing compliance with the EP as per Section 8.3.3.
Vessel Master	Ensures:

Role	Responsibilities

	• Vessel operations are carried out in accordance with regulatory requirements and this EP.
	• Vessel personnel complete the Drilling Program induction.
	• Whale Management Procedure is implemented on the vessel and:
	  ◦ Maintains open communication with MMOs.
	  ◦ Liaise with MMO and decide whether actions within the Whale Management Procedure can safely be implemented and take action accordingly.
	  ◦ Documents reasons for not following the Whale Management Procedure and report same to the Beach Rig Senior Drilling Supervisor
	  ◦ Provides input into the review of effectiveness and compliance with the Whale Management Procedure.
	• Vessel personnel are competent to fulfil their designated role.
	• HSE issues are communicated via systems such as the daily report and daily pre-start meetings.
	• Emissions and discharges identified in Section 8.3.8 are recorded and provided to the Rig Drilling Supervisor.
	• Environmental incidents are reported to the Rig Drilling Supervisor within required timeframes as per Section 8.3.1.
	• Rig Drilling Supervisor is informed of any changes to equipment, systems, and documentation where there may be a new or change to an environmental impact or risk or a change that may impact the EP as per Section 8.3.4.
	• Oil spill response arrangements are in place and tested as per the vessel's SMPEP or equivalent.

Rig and 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. • Immediately communicate whale sighting to MMOs.
Marine Mammal Observers (MMOs)	• Undertake observations and reporting in accordance with the Whale Management Procedure. • Provide advice to the Rig Drilling Supervisor and Vessel Master (or delegate) on the requirements of the Whale Management Procedure. • Provide input into the review of effectiveness and compliance with the Whale Management Procedure.

8.2.2 Competencies and Training

Element 4 People, Capability and Health focuses on ensuring the people within the business are fully equipped with the competencies required to perform their assigned duties and are physically and mentally prepared.

Each employee or contractor with responsibilities pertaining to the implementation of this EP shall have the appropriate training and competencies to fulfil their designated role.

To ensure that personnel are aware of the EP requirements for the Drilling Program all offshore personnel will complete a general induction, as a minimum. Records of completion of the induction will be recorded and maintained as per Section 8.6.2. The induction will at a minimum cover:

- Description of the environmental sensitivities and conservation values of the operational areas and surrounding waters.
- Controls to be implemented to ensure impacts and risks are of an acceptable level and ALARP.
- Requirement to follow procedures and use risk assessments/ job hazard assessments to identify environmental impacts and risks and appropriate controls.
- Requirements for interactions with fishers and/or fishing equipment.
- Requirement for responding to and reporting environmental hazards or incidents.
- Locations of known maritime and cultural heritage sites and the process to follow if a maritime and cultural heritage site is identified.
- Cultural Heritage sensitivities relating to the Operational Areas.
- Whale Management Procedure requirements including detection of whales and actions required.
- Lighting requirements including:
  - Turn off lights when not in use.
  - Close blinds/curtains.
  - Where feasible direct lighting inward/downward facing.
- Procedure for handling grounded birds and reporting requirements.
- Overview of emergency response and spill management plans.

In addition to the Drilling Program induction, each employee or contractor with specific responsibilities pertaining to the implementation of this EP shall be made aware of their responsibilities, and the specific control measures required to maintain environmental performance and legislative compliance.

8.2.3 Contracts and Procurement

Element 5 Contracts and Procurement addresses the acquiring of external services and materials, and the transportation of those materials. It ensures Beach's business interests are met while maintaining compliance with all legal obligations and retaining HSE performance as the top priority.

Beach undertakes a pre-qualification of all contractors in which their HSE systems are reviewed to ensure that the contractor's HSE management system (HSEMS) is adequate for meeting their legal obligations and has identified the significant risks and control measures related to the scope of work being undertaken for Beach. This process includes verifying evidence of HSEMS implementation.

Training and competency of contractor personal engaged to work on the Drilling Program shall be managed in accordance with the contractor's HSEMS (or equivalent).

Section 8.2.3 details how contractors will be assessed to ensure they have the capabilities and competencies to implement the control measures identified in Section 7.

8.2.4 Communications

The Drilling Manager has responsibility for ensuring that systems are in place to facilitate the communication of HSE issues. Communication is typically via the daily report and daily operations meetings; and through weekly HSE meetings.

The meetings are used to identify and communicate:

- Environmental Performance.
- Issues associated with implementation of the EP.
- Any proposed changes to equipment, systems, or methods of operation of equipment, where these may be HSE implications.
- Any proposals for the continuous improvement of environmental protection.

8.3 Monitoring and Reporting

Element 11 Assurance and Reporting, establishes that the company must apply the requirements of relevant policies, and the commitments detailed in the OEMS standards throughout its activities. An assurance process therefore exists to systematically quantify compliance with those commitments, and with the underlying procedures and systems. This Element also documents Beach's approach to sustainability and reporting company performance using established sustainability performance metrics.

The Assurance Management Standard describes the "Three Lines of Defence" assurance model employed by Beach to govern its activities and ensure compliance with its commitments and standards. The standard defines Beach's requirements for the establishment and management of risk-based assurance activities at all levels within the company. The assurance process establishes the adequacy and effectiveness of Beach's risk controls and quantifies the status of compliance against our obligations. It ensures the organisation proactively closes any gaps in performance so it can address those issues before harm is manifested. As such, the assurance programme identifies improvement opportunities in business processes and risk controls.

The Standard describes the need to have assurance plans across the business, and for the assurance activities to take place on multiple levels of the organisation. This approach collectively ensures the operational activities Beach perform are compliant with its procedures, standards and ultimately with governing policies and legislative obligations. The holistic results of the assurance programme are reportable to the Board and Committees.

8.3.1 Incident Reporting

Element 9 Incident Reporting defines how Beach classifies, investigates, reports, and learns from incidents. An incident is any unplanned event or change that results in potential or actual adverse effects or consequences to people, the environment, assets, reputation, or the community.

Standard 9.1 defines the requirement for incident notification, reporting and subsequent investigation requirements. It ensures that incident classification is applied consistently across the company, and that the appropriate level of investigation and approval authority is implemented. The standard describes the requirement for identifying and assigning remedial actions, and for communicating key learnings throughout the business. As such, the standard also defines the requirement for adequate training for those persons involved in performing investigations.

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.

Incident reports and corrective actions are managed using the Beach Incident Management System.

Reportable and recordable incidents are identified by the incident notification processes. In addition, recordable incidents are also identified as per the assurance processes detailed in Section 8.3.2.

As part of the review and investigation of incidents additional, or increased, environmental impacts or risks may be identified. These are managed as per the Management of Change process detailed in Section 8.3.4.

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. 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	Drilling Manager

<table>
<tr><th>Requirement</th><th>Timing</th><th>Contact</th><th>Responsible Person</th></tr>
<tr><td colspan="4">Reportable incident
As defined within the OPGGS(E)R, a reportable incident is an incident relating to the activity that has caused, or has the potential to cause, moderate to significant environmental damage. In the context of the Beach Environmental Risk Matrix moderate to significant environmental damage is defined as any incident of actual or potential consequence category Serious (3) or greater. These risks include:
• Loss of well integrity resulting in a condensate spill or otherwise.
• Vessel collision resulting in a loss of containment or otherwise.
• Introduction of marine pests to the operational area.
In addition the following that does not have an actual or potential consequence category Serious (3) or greater will be reported as a reportable incident:
• Injury of death of a protected species.</td></tr>
<tr><td>Notification
The notification must contain:
• all material facts and circumstances concerning the incident;
• any action taken to avoid or mitigate the adverse environmental impact of the incident; and
• the corrective action that has been taken or is proposed to be taken to stop control or remedy the reportable incident.
As soon as practicable after notification of a reportable incident, a written record of the notification must be given to:
• NOPSEMA (The Regulator)
• NOPTA (Titles Administrator)
• DEECA (Vic) (Department of Responsible State Minister for Vic titles)
• Department of State Growth who has delegated to EPA Tasmania (Department of Responsible State Minister for Tas titles)</td><td>Within two hours of becoming aware of incident</td><td>• NOPSEMA – 1300 674 472
• NOPSEMA – submissions@nopsema.gov.au
• DEECA ERR (Vic)– ERRChiefInspector@ecodev.vic.gov.au (0419 597 010)
• EPA (Tas): incidentresponse@epa.tas.gov.au (1800 005 171)
• NOPTA – reporting@nopta.gov.au</td><td>Drilling Manager</td></tr>
<tr><td>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;</td><td>Not later than 3 days after the first occurrence of the incident</td><td>• NOPSEMA – submissions@nopsema.gov.au</td><td>Drilling Manager</td></tr>
</table>

<table>
<tr><th>Requirement</th><th>Timing</th><th>Contact</th><th>Responsible Person</th></tr>
<tr><td>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.</td><td></td><td></td><td></td></tr>
<tr><td>Written incident reports to be submitted to NOPTA, DEECA and EPA (Tas) (for incidents in Commonwealth waters).</td><td>Within 7 days of written report submission to NOPSEMA</td><td>DEECA ERR (Vic)– ERRChiefInspector@ecodev.vic.gov.au (0419 597 010)
EPA (Tas): incidentresponse@epa.tas.gov.au (1800 005 171)
NOPTA – reporting@nopta.gov.au</td><td>Drilling Manager</td></tr>
<tr><td>Vessel spill to marine environment
All discharges /spills or probable discharges/spills to the marine environment of oil or oily mixtures, or noxious liquid substances in the marine environment from vessels.
Reporting info: http://www.amsa.gov.au/forms-and-publications/AMSA1522.pdf.</td><td>Verbal notification ASAP</td><td>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/</td><td>Vessel Master</td></tr>
<tr><td>Australian Marine Park (AMP)
In the event an AMP may be exposed to hydrocarbons</td><td>Verbal notification ASAP</td><td>Marine Park Compliance Duty Officer – 0419 293 465
Notification must be provided to the Director of National Parks (DNP) and include:
titleholder details
time and location of the incident (including name of marine park likely to be affected)
proposed response arrangements as per the OPEP (e.g. dispersant, containment, etc.)
confirmation of providing access to relevant monitoring and evaluation reports when available
contact details for the response coordinator.
Note: DNP may request daily or weekly Situation Reports, depending on the scale and severity of the pollution incident.</td><td>EMT Lead (or delegate)</td></tr>
</table>

Requirement	Timing	Contact	Responsible Person
Vessel strike with cetacean	Within 72 hours	• DCCEEW – online National Ship Strike Database https://data.marinemammals.gov.au/report/shipstrike	Vessel Master
	ASAP for cetacean injury assistance	• DEECA Whale and Dolphin Emergency Hotline – 1300 136 017 • Seals, Penguins or Marine Turtles 136 186 (Mon-Fri 8am to 6pm) or AGL Marine Response Unit 1300 245 678.	Vessel Master / Drilling Program Environment Advisor
Injury to or death of EPBC Act-listed species	Within seven days	• DCCEEW – 1800 803 772 • EPBC.Permits@environment.gov.au	Drilling Program Environment Advisor
Suspected or confirmed Invasive Marine Species introduction	Verbal notification ASAP	• Agriculture Victoria 136 186 marine.pests@agriculture.vic.gov.au • DRET Invasive Species Branch 03 6165 3777 invasivespecies@nre.tas.gov.au	Drilling Program Environment Advisor
Identification of any historic shipwrecks, aircraft, or relics	Written notification within 1 week	• Written notification via the notification of discovery of an historic shipwreck or relic online submission form. • Notification to the Victorian Department of Transport and Planning, Planning Implementation and Heritage Department via email. • Notification to the Tasmanian Parks and Wildlife Service, via email.	Drilling Manager
Identification of any First Nations cultural heritage relics or sites	Online notification within 24 hours after identification	• DCCEEW Australasian Underwater Cultural Heritage Database, online Notification of Discovery of Underwater Cultural Heritage online form.	Community Relations Manager
Identification of any unexploded ordnance	Written notification within 1 week	• Written notification via email to offshore.petroleum@defence.gov.au	Drilling Manager

8.3.2 EP Assurance

Table 8-4 provides a summary of the processes (specific measures) undertaken by Beach to ensure that for the duration of the Drilling Program:

- The environmental impacts and risks of the activity continue to be identified and reduced to a level that is ALARP.
- Control measures detailed in this EP are effective in reducing the environmental impacts and risks of the activity to ALARP and an acceptable level.
- Environmental performance outcomes and standards set out in this EP are being met.

Non-compliances and opportunities for improvements identified via the assurance processes in Table 8-4 and the following sections are communicated to the Drilling Manager to report and action in a timely manner.

Tracking of non-compliances and actions is undertaken using Beach's incident management system, which includes assigning a responsible person for ensuring the action is addressed and closed out. Any additional, or increased, impacts or risks identified are managed as per the Management of Change process detailed in Section 8.3.4.

Where an assurance process identifies a breach of an EPO or EPS in the EP this will be reported as a recordable incident as per Table 8-3.

Table 8-4: Drilling Program EP Assurance Processes

Process	Frequency	Responsible
EP Assurance Checks covering: • EPOs, EPS and implementation strategy requirements. See Section 8.3.2.	Prior to commencement of the Drilling Program	Drilling Program Environment Advisor
Incident reviews and investigations covering: • Review of all incidents to identify any recordable incidents and reportable incidents and any additional, or increased, environmental impacts or risks.	Weekly	Drilling Program Environment Advisor
• Reporting and investigation of incidents to identify recordable and reportable incidents and any additional, or increased, environmental impacts or risks. See Section 8.3.1.	As required	Drilling Manager with support from Drilling Program Environment Advisor
Activity impact and risk review to ensure impacts and risks can be manage to ALARP and an acceptable level and any additional, or increased, environmental impacts or risks identified.	As required	Drilling Manager
EP Performance Report covering: • Review of EPOs and EPs. See Section 8.3.7.	Annually	Drilling Program Environment Advisor
Activity emissions and discharge records See Section 8.3.8.	As detailed in Section 8.3.8.	Drilling Manager

8.3.3 Audits and Inspections

Environmental performance will be reviewed in several ways to ensure that for the duration of the EP:

- EPOs, EPSs and implementation strategy requirements are met.
- Controls measures are effective in reducing the environmental impacts and risks of the activity to ALARP and acceptable levels.
- Any additional, or increased, impacts or risks are identified.

A pre-mobilisation assurance check is undertaken prior to commencement of the Drilling Program. The assurance check consists of reviewing the EPs EPOs, EPSs, implementation strategy and Whale Management Procedure requirements.

In addition, the following will be undertaken:

- Rig and vessel weekly offshore inspection throughout the Drilling Program to ensure ongoing compliance with relevant EP requirements. Inspection will include, but not be limited to:
- Spill preparedness such as spill kit checks.

- Waste management.
- Review of any new or changed chemicals that maybe discharged offshore.
- Validation that compliance with EPOs and EPSs is maintained.

Non-compliances and opportunities for improvements identified via assurance checks or any other means are communicated to the Drilling Manager to report and action in a timely manner. Any additional, or increased, impacts or risks identified are managed as per the Management of Change process detailed in Section 8.3.4.

Tracking of non-compliances and actions is undertaken using Beach's incident management system which includes assigning a responsible person for ensuring the action is addressed and closed out.

Where an assurance check identifies a breach of an EPO or EPS in the EP this will be reported as a recordable incident as per Section 8.3.1.

The assurance checks inform the annual performance report submitted to the relevant regulator as per Section 8.3.7.

8.3.4 Management of Change Standard

Standard 7.3 defines the minimum planning and implementation requirements for technical and organisational change at Beach. It details the requirement for holistic assessment of the change, the requirement for consultation with stakeholder's dependent upon the nature of the change, and the need for clear accountability for the change. Risk associated with change is mitigated by ensuring change is appropriately approved, effectively implemented, formally assured, and closed out upon completion. Any changes must be classified as either temporary or permanent.

The intent of the Management of Change (MoC) Standard is that all temporary and permanent changes to the organisation, personnel, systems, procedures, equipment, products, and materials are identified and managed to ensure HSE risks arising from these changes remain at an acceptable level.

Changes to equipment, systems and documentation are managed in accordance with the MoC Standard 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 documented procedures where there is an HSE impact, regulatory documents and organisational changes that impact personnel in safety critical roles.

Not all changes require a technical MoC review. Each change is assessed on a case-by-case basis. The potential environmental impacts and/or risks are reviewed by a member of the Beach Environment Team to determine whether the MoC review process is triggered using the Environmental Management of Change Offshore Environment Plans Procedure (CDN/ID 18446109).

Where the MoC review processes identifies a change in impacts, risks, or controls compared to those described and assessed in Chapter 6, and triggers a regulatory requirement to revise this EP, the revision shall be defined, endorsed, completed and communicated in accordance with the MoC Standard.

8.3.5 Environment Plan Review

Beach may determine that a review of this EP is required when one or more of the following occurs:

- Changes to impacts and risks and/or controls identified during the Drilling Program.
- 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.
- Changes or new environmental requirements.
- 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 in understanding of the existing environment such as:
  - EPBC Act listed threatened and migratory species.
  - Part 13 statutory instruments (recovery plans, threat abatement plans, conservation advice, wildlife conservation plans).
  - Marine protected areas and/or plans.
  - First Nations cultural heritage/values, Native Title, IPAs, ILUAs and management/Sea Country Plans.
  - Commercial fishing and marine users.
- Changes to impacts, risk and controls identified through the Risk Management Processes as per Section 2 and Section 7.1.
- New information or changes in information from relevant persons, research, studies, protected species, legal and other requirements. This shall be achieved by:
  - Subscription to regulator and relevant industry distribution lists (such as AEP and IOGP).
  - Subscription to the NOPSEMA website to identify any new petroleum activities within the Otway or Bass Basin that may overlap with the Drilling Program locations and timings.
  - Annual review of the EP inclusive of relevant regulatory requirements.
  - Consultation for Implementation of EP as per Section 4.16.

Any revisions to the EP are to be assessed against the criteria for submission of a revised EP to NOPSEMA as detailed in 8.3.6 and Management of Change as per Section 8.3.4 shall be evaluated.

8.3.6 Environment Plan Revision

In accordance with the OPGGS(E)R, if a revision of this EP is required it shall be submitted to NOPSEMA as per the regulatory requirements in Table 8-5.

Table 8-5: Regulatory requirements for submission of a revised EP

OPGGS(E)R	EP Revision Submission Requirements
38	With the regulator's approval before the commencement of a new activity.
39(1)	Before the commencement of any significant modification or new stage of the activity that is not provided for in the EP as currently in force.
39(2)	Before, or as soon as practicable after, the occurrence of any significant new or significant increase in environmental impact or risk; or The occurrence of a series of new or a series of increases in existing environmental impacts or risks which, taken together, amount to the occurrence of a significant new or significant increase in environmental impact or risk.
39(3)	A change in titleholder that results in a change in the manner in which the environmental impacts and risks of an activity are managed.

Revisions and re-submission of the EP generally centre around 'new' activities, impacts or risks and 'increased' or 'significant' impacts and risks. Beach defines these terms in the following manner:

New impact or risk – one that has not been assessed in Section 7.

Increased impact or risk – one with greater extent, severity, duration, or uncertainty than is detailed in Section 7.

Significant change –

- The change to the activity design deviates from the EP to the degree that it results in new activities that are not intrinsic to the existing Activity Description in Section 3.
- The change affects the ability to achieve ALARP or acceptability for the existing impacts and risks described in Section 7.
- The change affects the ability to achieve the EPO and EPS contained in Section 7.

A change in the activities, knowledge, or requirements applicable to the activity are considered to result in a 'significant new' or 'significant increased' impact or risk if any of the following criteria apply:

- The change results in the identification of a new impact or risk and the assessed level of risk is not 'Low', acceptable and ALARP.
- The change results in an increase to the assessed impact consequence or risk rating for an existing impact or risk described in Section 7.
- There is both scientific uncertainty and the potential for significant or irreversible environmental damage associated with the change.

While an EP revision is being assessed by NOPSEMA, any activities addressed under the existing accepted EP are authorised to continue. Additional guidance is provided in NOPSEMA Guideline When to submit a proposed revision of an EP (N-04750-GL1705).

Minor EP Revisions

Minor revisions to this EP that do not require resubmission to NOPSEMA will be made where:

- Minor administrative changes are identified that do not impact on the environment (e.g., document references, contact details, etc.).
- A review of the activity and the environmental risks and impacts of the activity do not trigger a requirement for a revision, as outlined in Table 8-5.
- Minor revisions to the EP will not be submitted to the regulators for formal assessment. Minor revisions will be tracked in the document control system.

8.3.7 Annual Performance Report

In accordance with OPGGS(E)R, Beach will submit a report on the environmental performance of the Drilling Program to NOPSEMA. Performance will be measured against the EPOs and EPSs described in this EP. The report will be submitted annually not more than three months after the anniversary date of the EP acceptance by NOPSEMA. The interval between reports after that will not be more than one year.

8.3.8 Emissions and Discharge Records

In accordance with OPGGS(E)R, emissions and discharges shall be recorded for the duration of the Drilling Program.

Table 8-6 details the types of emissions and discharges that shall be recorded including the monitoring method and frequency of reporting. Air emissions (from fuel combustion) are reported annually as part of statutory *National Greenhouse and Energy Reporting Act* (NGER) 2007 reporting and National Pollution Inventory (NPI) reporting.

Table 8-6: Emissions and Discharges Monitoring Requirements

Emission / Discharge	Monitoring parameter	Recording method	Reporting frequency	Responsibility
Fuel	Volume used	Daily report	Daily	Rig Contractor Vessel Contractor
Bilge	Volume discharged	Oil record Book	As required	
Sewage	Volume discharged	Garbage record book	As required	
Putrescible food	Volume discharged	Garbage record book	As required	
Waste	Volume sent to shore for disposal and recycling	Garbage record book	As required	
Drill fluids and cuttings	% ROC Volume discharged Volume sent to shore	Daily report	Daily	Service Provider

Emission / Discharge	Monitoring parameter	Recording method	Reporting frequency	Responsibility
Cement	Volume discharged Volume sent to shore	Daily report	Daily	Service Provider
Completion fluids	Volume discharged Volume sent to shore	Daily report	Daily	Service Provider
P&A well fluids	Volume discharged Volume sent to shore	Daily report	Daily	Service Provider
Flaring	Volume flared	Daily report	Daily	Service Provider

8.3.9 Marine Mammal Sighting Reports

Marine mammal sightings will be recorded and submitted to DCCEEW via the National Marine Mammal Data Portal. Sightings will be submitted annually not more than three months after the anniversary date of the EP acceptance by NOPSEMA. The interval between reports after that will not be more than one year.

8.4 Oil Pollution Emergency Response

Standard 8.3 defines the minimum performance requirements to effectively manage credible emergency and security events, and to enable an efficient recovery to normal operations following such an event. The Standard defines the prevention, preparedness, response, and recovery principles to be applied, the organisational structures to support emergency and security measures, and the training and testing protocols that must be in place to assure Beach maintains a state of readiness.

The emergency response framework to be applied to the Drilling Program is outlined in the following sections.

8.4.1.1 Emergency Response Framework

The Beach Crisis and Emergency Management Framework consists of a tiered structure whereby the severity of the emergency triggers the activation of emergency management levels. The emergency response framework contains three tiers based on the severity of the potential impact, as outlined in Figure 8-3. This framework is described in the Beach Emergency Management Plan (EMP) (CDN/ID 18025990).

The responsibilities of the Emergency Response Team (ERT), Emergency Management Team (EMT) and Crisis Management Team (CMT) are outlined in Table 8-7.

The key emergency response arrangements for the activity are outlined herein.

<u>Beach Emergency Management Plan</u>

The Beach EMP provides the standard mechanism for the EMT to operate from and includes guidance on effective decision-making for emergency events, identification, assessment, and escalation of events and provides training and exercise requirements. The EMP provides information on reporting relationships for command, control, and communications, together with interfaces to emergency services specialist response groups, statutory authorities, and other external bodies. The roles and responsibilities are detailed for onshore and offshore personnel involved in an emergency, including the response teams, onshore support teams, visitors, contractors, and employees. The EMP details the emergency escalation protocol depending on the nature of the emergency.

Associated with the EMP are the Emergency Response Duty Roster and Contact Lists. These documents constitute a suite of emergency response documents that form the basis for Beach's response to an emergency situation.

Drilling Program Emergency Response Plan

For the Drilling Program Beach will prepare a bridging emergency response plan (Bridging ERP) that bridges to the emergency response measures in the vessel and rig contractor's vessel and rig-specific ERPs to ensure that all emergency management functions are accounted for. The Bridging ERP will be supported by the Beach EMP.

The Bridging ERP will describe the emergency roles and responsibilities for those on the rig and vessels, and outline the actions to be taken for potential Drilling Program specific scenarios (e.g., loss of containment, vessel collision, fire, person overboard, fatality, etc). The Bridging ERP will define the communication requirements to notify both Beach, contractor companies and external bodies of the incident so as to obtain assistance where needed and to fulfil reporting obligations.

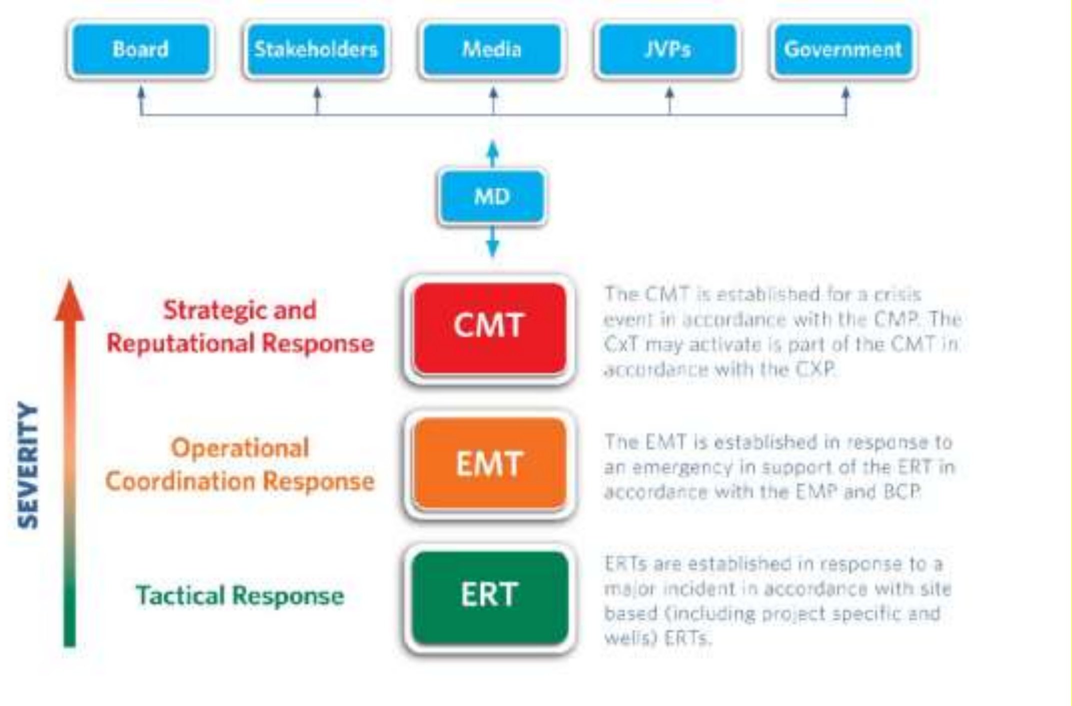

Figure 8-3: Beach Crisis and Emergency Management Framework

Table 8-7: Responsibilities of the Beach Crisis and Emergency Management Teams

Team	Base	Responsibilities
CMT	Adelaide head office	• Strategic management of Beach's response and recovery efforts in accordance with the Crisis Management Plan.

Team	Base	Responsibilities
		• Provide overall direction, strategic decision-making as well as providing corporate protection and support to activated response teams. • Activate the Crisis Management Team (CMT) if required.
EMT	Adelaide, Melbourne	• Provide operational management support to the Emergency Response team to contain and control the incident. • Implement the Business Continuity Plan. • Liaise with external stakeholders in accordance with the site-specific Emergency Response Plan. • Regulatory reporting.
ERT	Site Vessel	• Respond to the emergency in accordance with the site-specific ERP.

8.4.2 Oil Pollution Emergency Plan

Oil spill response arrangements associated with the Drilling Program are detailed in the Beach Offshore Oil Pollution Emergency Plan (OPEP) (CDN/ID 18986979/VIC 1000 SAF PLN).

Section 8.3.3 and the OPEP Section 10 On-Going Response Preparedness and Exercises detail the processes that Beach will undertake to ensure that oil spill response requirements can be met during the Drilling Program.

The rig and vessels used for the Drilling Program will have a Shipboard Marine Pollution Emergency Plan (SMPEP) or equivalent.

8.4.3 Operational and Scientific Monitoring Plan

Operational and scientific monitoring arrangement associated with Drilling Program are detailed within the Offshore Operational and Scientific Monitoring Plan (OSMP) (CDN/ID S4100AH717908) and OGV Drilling Program OSMP Addendum (V-1000-P1-RP-0003).

8.4.4 Testing of Spill Response Arrangements

The OPEP details the oil spill response testing arrangements.

8.5 Environment and Community

Element 10 focuses on the measures the organisation must take to ensure that it upholds its reputation as a responsible and ethical company and continues its open and transparent engagements with its communities and stakeholders which includes relevant persons. Beach operates in environmentally sensitive areas, in close proximity to communities, with potential impacts on stakeholders. Beach has an obligation to ensure that potential impacts from its activities are clearly identified, minimised to ALARP, and mitigated where there is an economic loss to a stakeholder directly impacted by Beach activities.

8.5.1 Environment Management Standard

Standard 10.1 ensures that Beach implements appropriate plans and procedures to conduct its operations in an environmentally responsible and sustainable manner. The standard defines the requirement to assess environmental impacts and risks that may result from the company's operations and for site-specific management plans to protect the environment from harm. The standard covers land disturbance, reinstatement, and rehabilitation activities, and defines obligations for management of biodiversity, water systems, air quality, noise and vibration, amenities and waste.

This EP provides the key means of satisfying this OEMS standard. Two process identified as controls in Section 7, the Beach Domestic IMS Biofouling Risk Assessment Process and the Beach Chemical Management Procedure are described below.

8.5.2 Beach Domestic IMS Biofouling Risk Assessment Process

Scope

The rig, vessels and submersible equipment mobilised from domestic waters to undertake the Drilling Program within the Operational Area must complete the Beach Domestic IMS Biofouling Risk Assessment Process as detailed in the Beach's Introduced Marine Species Management Plan (CDN/ID 18985823) 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 the rig and 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 commencing the Drilling Program within the Operational Area.
- Identify the potential IMS risk profile of the rig, vessels, and submersible equipment prior to deployment within the Operational Area.
- Identify potential deficiencies of IMS controls prior to entering the Operational Area.
- Identify additional controls to manage IMS risk.
- Prevent the translocation and potential establishment of IMS into non-affected environments (either to or from the Operational Area).

Screening Assessment

Prior to the initial mobilisation of the rig, 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 Australian State or Territory legislation must be met.
- If mobilising from a high or uncertain risk area, the rig / vessel / submersible equipment 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 antifouling coatings based upon manufacturers specifications.
- Vessels must have a biofouling control treatment system in use for key internal seawater systems.

- Rig 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 rig / vessel / submersible equipment 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 rig / vessel / submersible equipment 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 the rig / vessel / submersible equipment includes:

- The age, type and condition of the rig / vessel / submersible equipment.
- Previous cleaning and inspection undertaken and the outcomes of previous inspections.
- Assessment of internal niches with potential to harbour IMS.
- The rig / vessel / equipment history since previous inspection.
- The origin of the rig / vessel / submersible equipment 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).
- For vessels, the application, age and condition of antifouling coatings.
- Presence and condition of internal seawater treatment systems.
- Assessment of Biofouling Management Plan and record book against IMO Biofouling Guidelines.
- Where appropriate, undertake in-water inspections.

8.5.3 Chemical Management Procedure

The Hazardous Materials and Secondary Containment Directive addresses the management of hazardous substances and dangerous goods (termed “hazardous materials”) on Beach controlled sites/facilities.

The Beach Hazardous Chemicals Management Procedure and Hazardous Materials Risk Assessment (CDN/ID 8743319) are used to assess all chemicals used at Beach to minimise the potential incidents arising from the storage and handling of hazardous chemicals. This includes chemicals used during the

Drilling Program that could be discharged to the marine environment to ensure that the impacts and risks associated with offshore discharges are reduced to ALARP and an acceptable level. It considers aquatic toxicity, bioaccumulation, and persistence data, along with the discharge concentration, duration, frequency, rate, and volume to assess chemicals that may or will be discharged to the marine environment. The assessment and outcome is recorded on the Offshore Chemical Register.

Figure 8-4 provides a summary of the offshore chemical environmental risk assessment process.

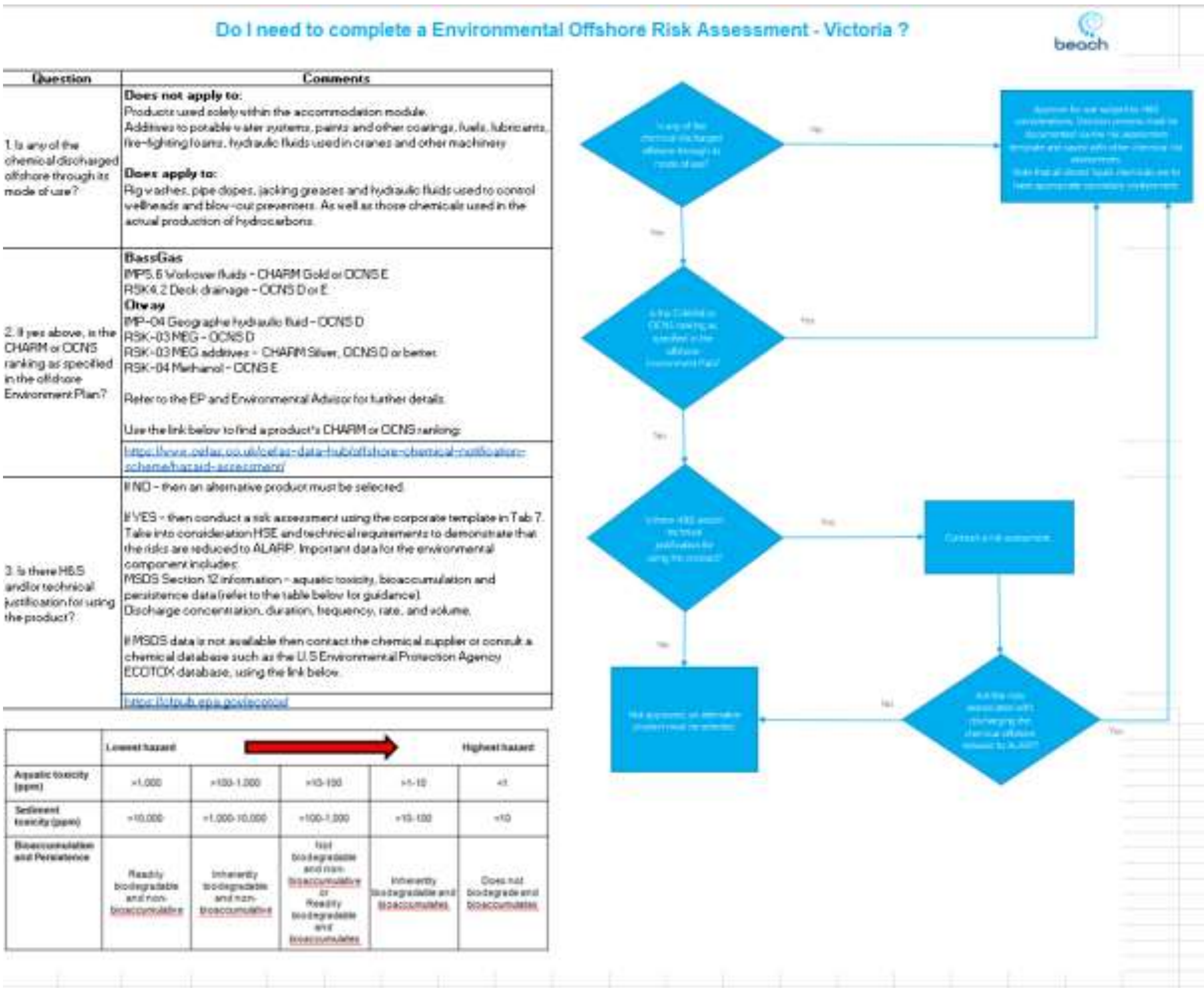

Figure 8-4: Hazardous Materials Risk Assessment, Section 6a Environmental Criteria - Vic

8.5.4 Community Engagement

Standard 10.2 defines the minimum requirements for the conduct of Beach and its staff within the community, and the commitments to plan and execute effective community engagement in the course of its business. Beach staff will conduct themselves as ambassadors for the company and engage positively and respectfully with the community.

The standard describes the obligation of the company to proactively engage with the community at the outset of any activity that may have an impact on that community, and to develop a stakeholder engagement plan to manage that engagement.

Stakeholder consultation specific to the Drilling Program is detailed in Section 4.

8.6 Records Management

Element 3 Information Management and Legal describes the measures Beach must take to ensure ongoing compliance with regulatory and legal obligations in order to protect the Company's value and reputation, and to maintain Beach's licences to operate. Beach's ability to safely perform its duties in line with its legal obligations relies on robust management of documents and information.

8.6.1 Regulatory Compliance

Standard 3.1 Regulatory Compliance describes the responsibilities of each stakeholder and the processes for identifying, maintaining, managing and reporting Beach's regulatory compliance obligations. The Standard details the minimum requirements of a system to ensure effective Regulator engagement can be maintained across all its activities including permissions, project execution, operating and reporting.

Section 4.5 of this EP details the key environmental requirements applicable to the Drilling Program. The acceptability discussion for each aspect is assessed in Section 7 and specifically details the environmental requirements pertaining to each aspect.

8.6.2 Document Management

Standard 3.2 Document Management specifies the minimum requirements to ensure that all Beach documents and records are managed in alignment with legal, regulatory and stakeholder requirements. It requires documents to be classified, developed, authorised, published, stored, accessed, reviewed and disposed consistently and in a manner that complies with company and statutory obligations. The document management system will clearly support the safe and efficient operations of the Company.

Documents and records relevant to the implementation of this EP are stored and maintained in the Beach document control system ('TeamBinder') for a minimum of five years. These records will be made available to regulators in electronic or printed form upon request.

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