Esso Australia Resources Pty Ltd

JUR DRILLING ENVIRONMENT PLAN

CURRENT VERSION

Vol	Rev	Title	Doc Number	Status	Date
1	0	Description of Environment	AUGO-EV-EMM-001	Issued for acceptance	19/8/19
2a	0	Impacts and Risks	AUGO-EV-EMM-005	Issued for acceptance	19/8/19
3	0	ER Impacts and Risks	AUGO-EV-EMM-003	Issued for acceptance	19/8/19
	0	OPEP	AUGO-EV-ELI-001	Issued for acceptance	21/8/19
	0	OSMP	AUGO-EV-EPL-001	Issued for acceptance	19/8/19
4a	0	Environmental Performance & Implementation Strategy	AUGO-EV-EMM-006	Issued for acceptance	19/8/19

REVISION HISTORY

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4a	0	Environmental Performance & Implementation Strategy	AUGO-EV-EMM-006	Issued for acceptance	19/8/19

Preface

1.1 Purpose of this document

This preface document provides an overview of the JUR Drilling EP and incorporates the summary table required by regulation 11(4). It is designed to assist the reader to navigate the four volumes which make up the JUR Drilling Environment Plan (EP).

1.2 Overview of the Environment Plan Structure

I. Structure of the Environment Plan

Esso Australia Resources Pty Ltd (Esso), a wholly owned subsidiary of ExxonMobil Australia Pty Ltd, is the operator for the Gippsland Basin Joint Venture (Esso and BHP Billiton Petroleum (Bass Strait) Pty Ltd (BHP)) and the Kipper Unit Joint Venture (Esso, BHP, and MEPAU A Pty Ltd). In connection with these joint ventures, Esso operates 23 offshore platforms and installations in the Bass Strait and 600km of subsea pipelines. Esso receives services, including personnel, from Esso Australia Pty Ltd (EAPL), which is also a wholly owned subsidiary of ExxonMobil Australia Pty Ltd.
Esso also undertakes project work across its offshore assets and permit areas, including those owned jointly by the Gippsland Basin Joint Venture participants and the Kipper Unit Joint Venture participants. Exploration and development drilling or other project activities are also planned or may be undertaken in the future.

All offshore activities as defined by the Offshore Petroleum and Greenhouse Gas Storage Act, 2006 (OPGGS Act) and the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations, 2009 (OPGGS(E)R), require an accepted Environment Plan to enable them to proceed. All these activities take place in Bass Strait and are operated by Esso using the same management systems and processes. Therefore there is direct replication of processes, information and systems described each time an Environment Plan is submitted. In an effort to eliminate the replication and streamline the process, Esso has standardised the sections of the Environment Plans that are identical between activities and now presents these separately to the activity specific information. The Environment Plan is now presented in four separate volumes which will, necessarily, still need to be read as one to provide all the information required for an Environment Plan, however can and will be maintained separately as and when is necessary.

Environment Plan

Volume 1 - Description of the Environment

Applies to all Esso activities

- Describes the total *combined* geographic area which may be affected by *all and any* of the activities undertaken by Esso

Section 1	Introduction
Section 2	Description of the Environment (Reg 13(2) and Reg 13(3))
Section 3	Legislative and other requirements (Reg 13(4))
Appendix A	Environmental Policy (Reg 16(a))
Appendix B	References
Appendix C	EPBC Protected Matters Search Reports

Volume 2 - Description of the Activity, Impacts and Risks

Activity specific

- Provides activity specific scope
- Describes activity specific impacts and risks and measures taken to manage the impacts and risks

Section 1	Details of Titleholder (Reg 15)
Section 2	Description of Activity (Reg 13(1))
Section 3	Impact and Risk Assessment Methodology
Section 4	Activity Specific Description of Environment (Reg 13(2) and Reg 13(3))
Section 5	Impact Assessment (Reg 13(5), Reg 6(a) & Reg 6(b))
Section 6	Risk Assessment (Reg 13(5), Reg 6(a) & Reg 6(b))
Appendix A	Stakeholder Consultation Reports
Appendix B	EPBC Act Listed Species and Search Reports

Volume 3 - Emergency Preparedness and Response

Applies to all Esso activities

- Describes Esso's Emergency Preparedness and Response activities and arrangements as they apply to all activities

Section 1-9	Description of Emergency Response Activities(Reg 13(1)) Potential Impact Assessment of Response Activities (Reg 13(5b), Reg 13(6)) Arrangements for responding to and monitoring oil pollution (Reg 14(8AA)) Arrangements and capability for monitoring oil pollution and inform response activities (Reg 14(8AAd), Reg 14(8D))
Appendix A	Oil Pollution Emergency Plan
Appendix B	Oil Spill Monitoring Plan

Volume 4 - Implementation Strategy

Activity specific

- Describes activity specific implementation plan including performance monitoring, consultation and reporting

Section 1	Environmental Performance – Operations and Emergency Response Preparedness (Reg 13(7))
Section 2	Implementation Plan (Reg 14(1), Reg 14(8A, 8B & 8C), Reg 10A(e)) Reporting(Reg 14(2), Reg 26C) Environmental Management System (Reg 14(3)) Roles and Responsibilities (Reg 14(5)) Training (Reg 14(5)) Emergency Response (Reg 14(4)) Monitoring of performance outcomes and standards (Reg 14(3)) Monitoring of emissions and discharges Stakeholder Consultation and Community Engagement (Reg 11, Reg 16(b)) Environmental legislative compliance
Appendix A	Relevant Stakeholders

Figure 0-1 Environment Plan Structure for Esso activity submissions under OPGGS(E)R.

II. Standardised information across all activities

The standardised sections of the Environment Plans that are identical between activities are described below:

Volume 1 - Description of the Environment

Volume 1 describes the environment within a geographic area (henceforth called the Described Area (DA)) which encompasses the combined breadth of all credibly conceivable worst case discharge scenarios (WCDS) that could arise from any activity undertaken by Esso.

Each project will have a different WCDS. Project specific stochastic oil spill modelling will be used to determine the geographic area potentially impacted by that particular project.

Volume 1 uses the combined geographic area from all the conceivable individual activities and is then used to determine the total DA.

Note that by definition, no single credible spill scenario could potentially impact the whole of the DA. Information contained in Volume 1 includes:

- Description of the Environment (Reg 13(2) and Reg 13(3))
- Legislative and other requirements (Reg 13(4))
- Describes the total combined geographic area which may be affected by all and any of the activities undertaken by Esso
- Esso's Corporate environmental policy (Reg 16(a))

Volume 3 - Emergency Preparedness and Response

Esso prepares for and manages emergency situations, including oil spills, under its safety management system, OIMS System 10-2 (refer Implementation Strategy). The purpose of OIMS System 10-2 is to ensure that Esso establishes effective response to emergencies and business disruptions that threaten the safety, security and health of the public, contractors and employees, the environment, asset integrity, and critical business operations. The system and its processes address all sites for which Esso has responsibility and are designed to respond to all emergency situations, regardless of the specific activity and is therefore applied consistently across all activities.

Information contained in Volume 3 includes:

- Description of the activities that may be undertaken in response to an oil spill, should one occur (Reg 13(1));
- Impact and Risk Assessment of the oil spill response activities (Reg 13(5) & Reg 13(6));
- A description of Esso's capability to respond to an oil spill, including arrangements with other organisations that can provide additional resources (Reg 14(8AA);
- An assessment of the adequacy of Esso's capability to respond in a timely manner to any oil spill arising from any and all of Esso's offshore petroleum activities (Reg 14(8AA).

The Oil Pollution Emergency Plan (OPEP) is included in Appendix A of Volume 3 and includes:

- Description of the specific arrangements in place for responding to and monitoring oil pollution arising from any of Esso's offshore petroleum activities (Reg 14(8AA).
- The Oil Spill Monitoring Plan (OSMP) is included in Appendix B of Volume 3 and includes:
- Description of the specific arrangements for monitoring oil pollution which also informs response activities (Reg 14(8AAd) & Reg 14(8D).

III. Activity specific information

The information which will vary between activities is the specific scope of work that will be undertaken, defined by the OPGGS(E)R as the description of the Activity (R13(1)), and its associated impacts and potential risks (R13(5), R13(6) and R13(7)). For each work scope, all activity specific information relating to these regulations will be provided in Volume 2, Description of the Activity, Impacts and Risks.

Volume 2 - Description of the Activity, Impacts and Risks

Information contained in Volume 2 includes:

- Details of Titleholder (Reg 15)
- Description of Activity (Reg 13(1))
- Description of the activity specific environment that may be affected (R13(2)a)
- Impact and Risk Assessment (Reg 13(5), Reg 6(a) & Reg 6(b))

Volume 4 - Implementation Strategy

Esso operates in accordance with the proprietary ExxonMobil Operations Integrity Management System (OIMS). OIMS consists of 11 Elements, each of which has globally defined corporate expectations. These are implemented through formally documented Management Systems. This provides for all the standard recognised requirements of safety management systems, beginning with Management Leadership, Commitment and Accountability (Element 1) and incorporating a continuous cycle of assessment and improvement (Element 11). Regardless of the specific activity, Esso will consistently use OIMS to implement all activities. However the activity specific organisation structure and roles and responsibilities of personnel in relation to the implementation, management and review of the environment plan defined by the OPGGS(E)R as the Implementation Strategy for the environment plan (R14), will vary for each project. This information will be provided in Volume 4, Implementaton Strategy.

Information contained in Volume 4 includes:

- Environmental Performance (Reg 13(7))
- Monitoring of performance outcomes and standards (Reg 14(3))
- Implementation Plan (Reg 14(1), Reg 10A(e) and Reg 14(8A, 8B & 8C)
- Environmental Management System (Reg 14(3))
- Roles and Responsibilities & Training (Reg 14(5))
- Incident reporting and recording requirements (Reg 26, 26A, 26AA & 26B) and Reporting (Reg 14(2) & 26C)
- Consultation (Reg 11 & Reg 16b)

1.3 EP Summary Requirement

This JUR Drilling EP summary has been prepared from material provided in this EP. The summary consists of the following as required by regulation 11(4):

EP Summary material requirement	Relevant section of EP containing EP Summary material
The location of the activity	Volume 2 Section 2.1
A description of the receiving environment	Volume 1 Section 2 Volume 2 Section 4
A description of the activity	Volume 2 Section 2
Details of the environmental impacts and risks	Volume 2 Section 5 Volume 2 Section 6
The control measures for the activity	Volume 2 Section 5 Volume 2 Section 6 Volume 4 Section 1
The arrangements for ongoing monitoring of the titleholders environmental performance	Volume 4 Section 2.6
Response arrangements in the oil pollution emergency plan	Volume 3, including appendices
Consultation already undertaken and plans for ongoing consultation	Volume 2 Appendix A Volume 4 Section 2.8
Details of the titleholders nominated liaison person for the activity	Volume 2 Section 1.1

1.4 Summary of the Table of Contents of each Volume of the EP

This JUR Drilling EP is comprised of four volumes. The table of contents of each volume is summarised here for convenience.

Table of Contents Volume 1 – Description of the Environment

Table of Contents Volume 2 – Impacts and Risks

Table of Contents Volume 3 – Emergency Response Impacts and Risks

Table of Contents Volume 4 – Environmental Performance and Implementation Strategy

Esso Australia Resources Pty Ltd

DESCRIPTION OF THE ENVIRONMENT
BASS STRAIT ENVIRONMENT PLAN

Volume 1

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	Name	Position	Signature	Date
Prepared by:	LS	Env & Reg. Advisor		
Endorsed By:	Carolyn Thomas	Offshore Risk, Environment and Regulatory Supervisor	On File	
Document Owner:	Carolyn Thomas	Offshore Risk, Environment and Regulatory Supervisor	On File	
Approved By	Simon Kemp	Offshore Asset Manager	On File	

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DOCUMENT REVIEW AND UPDATE:

The Document Owner is responsible for maintaining and controlling changes to this document in accordance with the Document Management Manual (AUGO-PO-DMM-001). In the course of using this document, users may identify opportunities to improve its content. They are requested to provide suggestions to the Document Owner.

This document should be reviewed for accuracy and currency on a 5 yearly basis commencing from the original formal issue date. Major revisions to this manual are to comply with the OIMS System Manual/Process Management of Change procedures.

DISTRIBUTION:

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Abbreviations

Abbreviation	Description
ABWMIS	Australian Ballast Water Management Information System
AFFF	Aqueous Film-Forming Foam
AFMA	Australian Fisheries Management Authority
ALARP	As Low As Reasonably Practicable
AMOSC	Australian Marine Oil Spill Centre
AMP	Australian Marine Parks
AMSA	Australian Maritime Safety Authority
ANZECC	Australian and New Zealand Environment and Conservation Council
APASA	Asia Pacific Applied Science Association
APPEA	Australian Petroleum Production and Exploration Association
AQIS	Australian Quarantine Inspection Service
BIA	Biologically Important Area
AS/NZS	Australian Standards / New Zealand Standards
ANZECC	Australian and New Zealand Environment and Conservation Council
ATBA	Area To Be Avoided
BIA	Biologically Important Area
BBMT	Barry Beach Marine Terminal
BHPB	BHP Billiton Petroleum (Bass Strait) Pty Ltd
BOM	Bureau of Meteorology
Bonn Convention	Convention on the Migratory Species of Wild Animals 1979
BSCZSF	Bass Strait Central Zone Scallop Fishery
BSEP	Bass Strait Environment Plan
BSOA	Bass Strait Operating Area
CAMBA	Chinese Australia Migratory Bird Agreement
CASA	Civil Aviation Safety Authority
CITES	Convention on International Trade in Endangered Species of Wildlife and Flora 1973
CMR	Commonwealth Marine Reserve
CVIT	Commonwealth Victoria Inshore Trawl
DA	Described Area
DEH	Department of Environment and Heritage
DEPI	Department of Environment and Primary Industries (previously Department of Sustainability and the Environment or DSE and Department of Primary Industries or DPI)
DoE	Department of the Environment (formerly Department of Sustainability, Environment, Water, Population & Communities or SEWPaC)
DoI	Department of Industry (previously Department of Resources, Energy and Tourism or DRET)
DoIRD	Department of Infrastructure and Regional Development (formerly Department of Infrastructure and Transport)

Abbreviation	Description
DSDBI	Department of State Development, Business and Innovation (Energy and Resources portfolio formerly located with Department of Primary Industries or DPI)
DTPLI	Department of Transport, Planning and Local Infrastructure (formerly Department of Transport or DoT)
DoEE	Department of the Environment and Energy
EAC	East Australian Current
EAPL	Esso Australia Pty Ltd
EARPL	Esso Australia Resources Pty Ltd
ECD	Ecological Character Description
ECDTS	East Coast Deepwater Trawl Sector
EGBPA	Esso Gippsland Basin Permit Area
EMM	Environment Management Manual
EMBA	Environment that may be Affected
EPA	Environment Protection Authority
EPBC	Environment Protection and Biodiversity Conservation Act, 1999
GABTS	Great Australian Bight Trawl Sector
GBJV	Gippsland Basin Joint Venture
GHTS	Gillnet, Hook and Trap Sector
GVP	Gross Value Production
HLA	Halibut
IMCRA	Integrated Marine and Coastal Regionalisation of Australia
IUCN	International Union for Conservation of Nature
JAMBA	Japan Australia Migratory Bird Agreement
KFA	Kingfish A
KEF	Key Ecological Feature
KFB	Kingfish B
km	kilometres
KPA	Kipper Subsea Facility
KTT	Kipper, Tuna, Turrum
LAC	Limits of Acceptable Change
LEFCOL	Lakes Entrance Fishing Co-operative Limited
MARPOL 73/78	International Convention for the Prevention of Pollution from Ships
MEPAU	Mitsui E&P Australia Pty Ltd
MEPC	Marine Environment Protection Committee
MKA	Mackerel
MNES	Matters of National Environmental Significance
MLA	Marlin A
MLB	Marlin B
MMboe	million barrels of oil equivalent
m	metres

Abbreviation	Description
mm	millimetres
m/s	metres per second
MPA	Marine Protected Area
MSL	Mean Sea Level
MT	Metric Ton
NEPM	National Environment Pollution Measures
NOPSEMA	National Offshore Petroleum Safety and Environmental Management Authority
NOPTA	National Offshore Petroleum Titles Authority
NSW	New South Wales
OIMS	Operations Integrity Management System
OPEP	Oil Pollution Emergency Plan
OPGGS Act	Offshore Petroleum and Greenhouse Gas Storage Act, 2006
OPGGS(E)R	Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations, 2009
PA	Planning Area
psu	Practical Salinity Units
PSZ	Petroleum Safety Zone
RAMSAR	Convention on Wetlands of International Importance
ROKAMBA	Republic of Korea Migratory Birds Agreement
SESSF	Southern and Eastern Scalefish and Shark Fishery
SETF	South Eastern Trawl Fishery
SSHE	Safety, Security, Health & Environment
SNA	Snapper
TAS	Tasmania
TEC	Threatened Ecological Communities
TSPA	Tasmanian Threatened Species Protection Act 1995
TNA	Tuna
UNESCO	United Nations Educational, Scientific and Cultural Organization
VIC	Victoria
WCDS	Worst Credible Discharge Scenario
WKF	West Kingfish
WTN	West Tuna

1 Introduction

1.1 Overview

This Description of the Environment has been prepared in accordance with the requirements of the Commonwealth Offshore Petroleum and Greenhouse Gas Storage Act 2006 and the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations, 2009 (OPGGS(E)R) per the amended Act and Regulations as at 01 January 2015. The Environment Plan development has been guided by N04750-GN1344 Environment Plan Content Requirements (NOPSEMA 2016).

1.2 Regulatory Context

The OPGGS(E)R have prescribed requirements for the description of the environment. Table 1-1 lists the requirements of the regulations and identifies the sections in this description of the environment where the requirements are addressed.

Table 1-1 OPGGS(E)R requirements for the description of the activity with references to where these items are addressed

Regulation	Requirement	Relevant section where this is addressed
13(2)	The Environment plan must:	
13(2)(a)	Describe the existing environment that may be affected by the activity	1.4 Definition of Described Area 2 Description of the Environment
13(2)(b)	Include details of the particular relevant values and sensitivities (if any) of that environment'	2.2 Values and Sensitivities
13(3)	Particular relevant values and sensitivities may include	
13(3)(a)	the world heritage values of a declared World Heritage property within the meaning of the EPBC Act	2.2.1 World Heritage
13(2)(b)	the national heritage values of a National Heritage place within the meaning of that Act	2.2.2 National Heritage
13(2)(c)	the ecological character of a declared Ramsar wetland within the meaning of that Act	2.2.3 Wetlands of International Importance
13(2)(d)	the presence of a listed threatened species or listed threatened ecological community within the meaning of that Act	2.3.1 Fauna 2.2.4 Threatened Ecological Communities
13(2)(e)	the presence of a listed migratory species within the meaning of that Act	2.3.1 Fauna
13(2)(f)	any values and sensitivities that exist in, or in relation to, part or all of:	
13(2)(f)(i)	a Commonwealth marine area within the meaning of that Act; or	2.2.5 Commonwealth Marine Areas 2.2.7 Key Ecological Features (KEF)
13(2)(f)(ii)	(ii) Commonwealth land within the meaning of that Act	2.2.8 National Parks and Reserves

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 Regulation 13(2) of the OPGGS(E)R, this document describes the physical setting, ecological receptors, and social receptors, of the receiving environment.

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

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

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

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

(d) the presence of a listed threatened species or listed threatened ecological community within the meaning of that Act;

(e) the presence of a listed migratory species within the meaning of that Act;

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

(g) a Commonwealth marine area within the meaning of that Act; or

(h) Commonwealth land within the meaning of that Act.

1.3 Environmental Policy

It is Esso's policy is to conduct its business in a manner that is compatible with the balanced environmental and economic needs of the communities in which it operates. Esso is committed to continuous efforts to improve environmental performance throughout its operations.

Accordingly, Esso's policy is to:

- Comply with all applicable environmental laws and regulations and apply responsible standards where laws and regulations do not exist;
- Encourage concern and respect for the environment, emphasize every employee's responsibility in environmental performance, and ensure appropriate operating practices and training;
- Work with government and industry groups to foster timely development of effective environmental laws and regulations based on sound science and considering risks, costs and benefits, including effects on energy and product supply;
- Manage its business with the goal of preventing incidents and of controlling emissions and wastes to below harmful levels and design, operate, and maintain facilities to this end;
- Respond quickly and effectively to incidents resulting from its operations, cooperating with industry organizations and authorized government agencies;
- Conduct and support research to improve understanding of the impact of its business on the environment, to improve methods of environmental protection, and to enhance its capability to make operations and products compatible with the environment;
- Communicate with the public on environmental matters and share its experience with others to facilitate improvements in industry performance; and
- Undertake appropriate reviews and evaluations of its operations to measure progress and to ensure compliance with this environmental policy.

A copy of Esso's Environmental Policy is provided in Appendix A.

1.4 Definition of Described Area

In accordance with Regulation 13(2)a of the OPGGS(E)R and NOPSEMA A652993 (NOPSEMA, 2019), the Planning Area (PA) is defined as the outer edge of all simulations in stochastic modelling, using the worst case discharge scenario (WCDS) and the lowest relevant threshold for the furthest reaching fate of hydrocarbons. While modelling carries some inherent uncertainty, the Planning Area as defined:

- Represents the area that could be affected by any oil spill; and
- Is conservative, as the lowest threshold relevant to any receptor is used.

Each specific activity will define its own PA in Volume 2 of the Environment Plan. The Described Area is the *combined* breadth of *all* credibly conceivable PAs for specific operational activities and project activities to be undertaken by Esso. By definition:

- the limits of each specific PA is expected to fall within the DA and therefore, all information required to describe the environment will be contained in this Volume 1; and
- no single activity is expected to potentially impact the entire DA.

In the event that the PA for a future activity is found to reach beyond the edge of the DA, the DA will be expanded and the Description of Environment (this Volume 1) will be revised.

Using the criteria described above, the DA is shown in Figure 1-1. The DA encompasses the Southeast Marine Bioregion and the Temperate East Marine Bioregion. The IMCRA provincial bioregions encompassed by the DA are also shown in Figure 1-1.

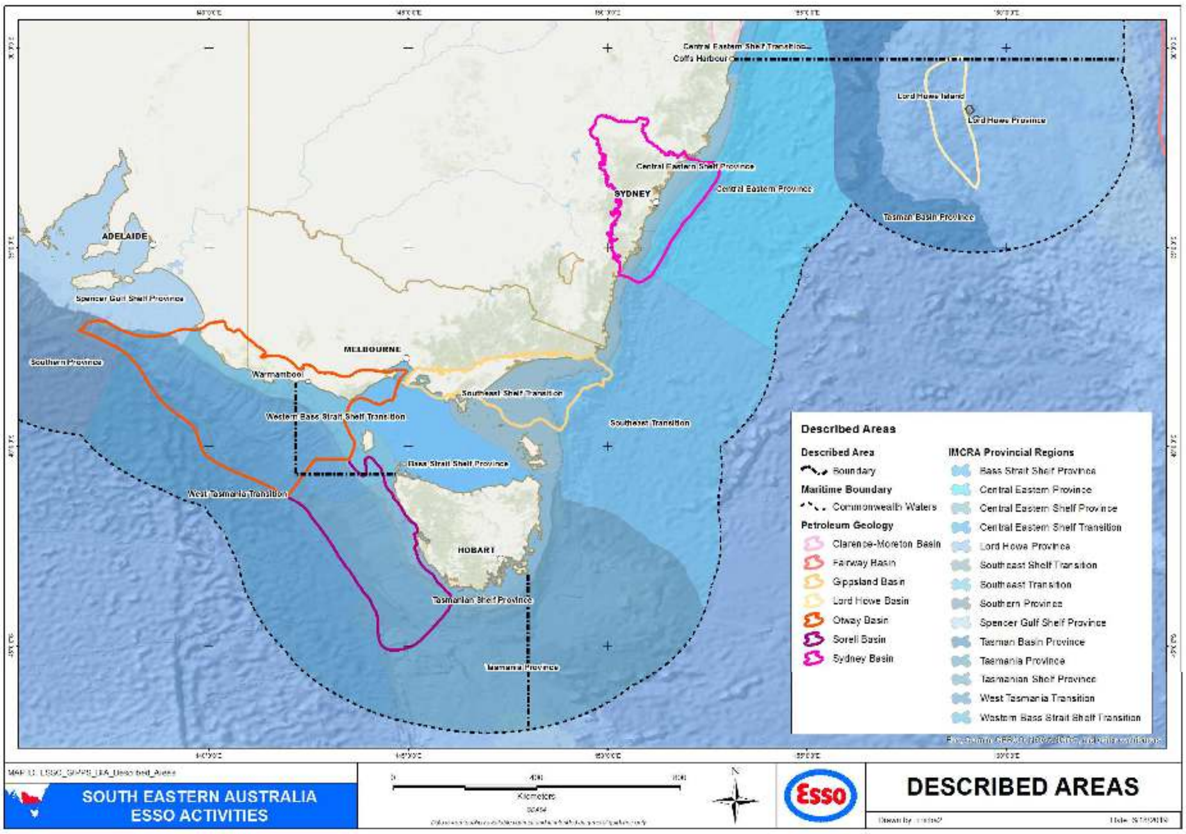


Figure 1-1 Described Area (DA)

1.5 Esso Bass Strait Permit Area

Esso's operations and project activities are undertaken within its permit areas in the Gippsland Basin in Bass Strait. Figure 1-2 shows the Esso Gippsland Basin Permit Areas (EGBPA) and Table 1-2 lists the location of the existing facilities and pipelines.

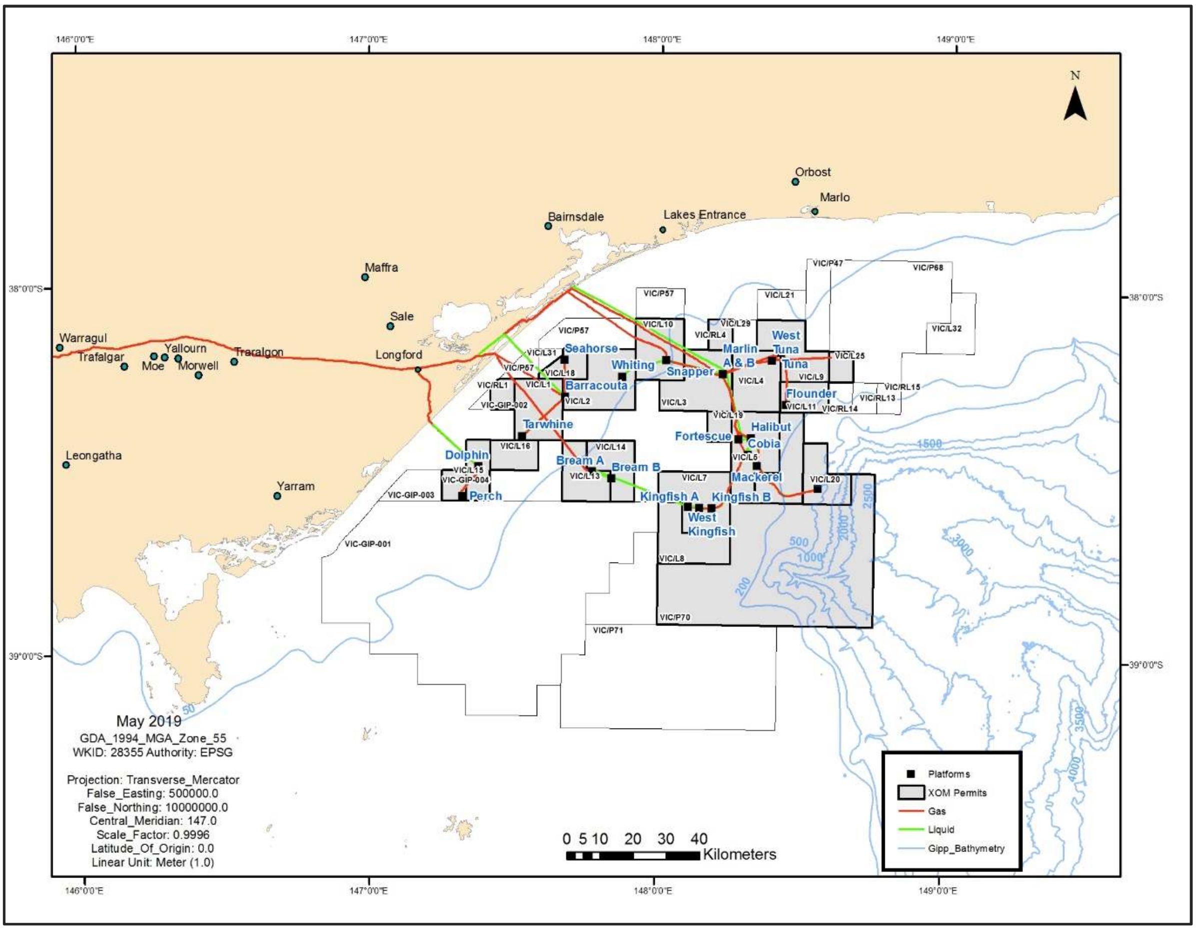


Figure 1-2 Esso Gippsland Basin Permit Area

Table 1-2 Esso's Bass Strait Facility locations (GDA94)

Production License No.	Facility Name	Code	Distance from coast (km)	Water depth (m)	Latitude	Longitude
VIC/L01	Tarwhine subsea facility	TWA[1]	22	~43	38° 24' 11" S	147° 31' 46" E
VIC/L02	West Barracouta	BTW	22	46	38° 19' 05" S	147° 36' 57" E
VIC/L02	Barracouta platform	BTA	~23	~46	38° 17' 48" S	147° 40' 33" E
VIC/L02	Whiting platform	WTA	~34	~54	38° 14' 24" S	147° 52' 25" E
VIC/L03	Marlin A platform	MLA	~42	~59	38° 13' 50" S	148° 13' 14" E
VIC/L03	Marlin B platform	MLB			38° 13' 46" S	148° 13' 16" E
VIC/L04	West Tuna platform	WTN	~45	~61	38° 11' 31" S	148° 23' 20" E
VIC/L04	Riser Access Tower	WTN-RAT			38° 11' 29" S	148° 23' 23" E
VIC/L05	Halibut platform	HLA			38° 24' 15" S	148° 19' 12" E
VIC/L05	Fortescue platform	FTA	~62-68	~69-93	38° 24' 26" S	148° 16' 41" E
VIC/L05	Cobia platform	CBA			38° 26' 58" S	148° 18' 33" E

VIC/L05	Mackerel platform	MKA			38° 28' 45" S	148° 20' 33" E
VIC/L07	Kingfish A platform	KFA[2]	~77	~77	38° 35' 46" S	148° 08' 40" E
VIC/L07	Kingfish B platform	KFB	~77	~78	38° 35' 49" S	148° 11' 17" E
VIC/L07	West Kingfish platform	WKF	~72	~76	38° 35' 35" S	148° 06' 20" E
VIC/L09	Tuna platform	TNA	~43	~59	38° 10' 10" S	148° 25' 10" E
VIC/L10	Snapper platform	SNA	~32	~55	38° 11' 37. " S	148° 01' 31" E
VIC/L11	Flounder platform	FLA	~58	~93	38° 18' 40" S	148° 26' 22" E
VIC/L13	Bream A platform	BMA	~46	~59	38° 29' 59" S	147° 46' 20" E
VIC/L14	Bream B platform	BMB[3]	~51	~61	38° 31' 06" S	147° 50' 21" E
VIC/L15	Dolphin platform	DPA[6]	~21	~38	38° 29' 14" S	147° 22' 39" E
VIC/L17	Perch platform	PCA[6]	~24	~42	38° 34' 09" S	147° 19' 21" E
VIC/L18	Seahorse subsea facility	SHA[4]	12	~42	38° 11' 42" S	147° 40' 27" E
VIC/L20	Blackback subsea facility	BKA	~87	~402	38° 32' 21" S	148° 33' 20" E
VIC/L25	Kipper subsea facility	KPA[5]	-	95	38° 10' 52" S	148° 35' 37" E

1 *TWA subsea facility is located approximately 17 km to the south west of the BTA platform*
2 *The KFA platform is located approximately 3.5 km from the WKF platform and 4 km from the KFB platform.*
3 *The BMB platform is located approximately 7 km east of BMA*
4 *The SHA subsea facility is located approximately 11 km to the north of the BTA platform*
5 *KPA subsea facility is located approximately 18 km to the east of the WTN platform*
6 *The PCA and DPA platforms are 9 km apart, and approximately 40 km and 33 km west of BMA respectively*

2 Description of the Environment

2.1 Physical Environment

Esso's operations are located in Bass Strait, the region of the continental shelf that separates mainland Australia from Tasmania. The physical environment of the Described Area (DA) is described in this section.

2.1.1 Climate and Meteorology

Average summer air temperatures in coastal Victoria (Yarram Airport) range from early morning lows of 11 to 13°C, to afternoon highs of 23 to 26°C (BOM, 2017). Average winter temperatures range from minimums of 5°C to maximums of 15°C in the afternoons. Offshore (on Deal Island in central Bass Strait), milder conditions occur with an average summer range of 13 to 21°C and an average winter range of 9 to 14°C (BOM, 2017).

Average monthly rainfall along the Gippsland coast (Yarram Airport) ranges from 36 mm in January (highest 112 mm) to 60 mm in June (highest 174 mm). Offshore (on Deal Island in central Bass Strait) monthly rainfall ranges from 41 mm in January (highest 162 mm) to 78 mm in June (highest 247 mm) and shows a similar pattern to the coastal region (Lakes Entrance) with slightly higher winter rainfall: 38 mm in January (highest 90 mm) to 101 mm in June (highest 298 mm) (BOM, 2017).

Wind speeds are in the range of 10 to 30 km per hour, with maximum gusts reaching 100 km per hour. The wind direction is predominately westerly during winter, westerly and easterly during spring and autumn (when wind speeds are highest) and easterly during summer. Strong south-easterly winds can be generated by low pressure systems known as 'east coast lows'. Although these occur relatively infrequently (once or twice per year), the longer fetch of these winds increases their potential for generating extreme wave conditions (BOM, 2017).

There are three main and one minor types of storm which can generate severe wave conditions in the study area of Bass Strait. These are (Esso, 1989 and Cardno, 2017):

South-east storms: are generally associated with what has become known as an “east-coast low”. East-coast lows are generally associated with very strong east to south-east winds (speeds in excess of 80 knots have been measured off the New South Wales coastline) and high rainfall. South-east storms resulting from east-coast lows occur relatively infrequently (on average 1 to 2 per year), and not all travel far enough south to cause concern in Bass Strait. The waves they generate are however, unrestricted by fetch or water depth. As such they have the greatest potential for generating extreme wave conditions in eastern Bass Strait.

South-west storms: occur relatively frequently (typically several severe storms per year). Due to fetch and depth limitation, it is unlikely that extreme design-wave conditions will occur during a south-west storm.

South storms: are generally associated with low-pressure systems in the western part of the Tasman Sea. During the peak of the storm the Tasman Sea lows generate very strong south south-east through to south south-west winds in Bass Strait. During storm development however, the wind can have a significant south-east or south-west component, depending on the origin of the low. Southerly storms occur at about the same frequency as south-east storms. Southerly storms are considered to have a greater potential than the south-west storms for generating extreme wave conditions.

Small-scale Bass Strait Lows: can generate south east, south or south west waves, depending on their origin and location. These storms can be quite severe (e.g., the January 1986 storm), but due to fetch limitations are unlikely to be the cause of extreme design-wave conditions.

2.1.2 Oceanography

2.1.2.1 Currents and Tides

Currents in the Gippsland Basin are tide and wind driven. Tidal movements predominantly have a northeast–southwest orientation. Tidal flows come from the east and west during a rising (flood) tide, and flow out to the east and west during a falling (ebb) tide. Tidal streams are dominated by the lunar tidal constituent, which has a period of 12.4 hours. The main tidal components vary in phase by about three to four hours from east to west. Most of this phase change occurs between Lakes Entrance and Wilsons Promontory. Timing of the high tide, for example, can vary by up to three hours across this region. Tides in the area from Lakes Entrance to Gabo Island are, however, relatively weak in comparison to other areas of Bass Strait (GEMS, 2005).

Bass Strait is characterised by shallow water and tidal currents. While there is a slow easterly flow of waters in Bass Strait, there is also a large anticlockwise circulation. The shallowness of the water means that these waters more rapidly warm in summer and cool in winter than other waters of the Region.

Wind driven currents in Gippsland Basin can be caused by the direct influence of weather systems passing over Bass Strait (wind and pressure driven currents) and the indirect effects of weather systems passing over the Great Australian Bight (GEMS, 2005). Figure 2-1 shows the annual combined tidal and ocean current rose plot derived from five-year current dataset and modelling near the Blackback well location (RPS, 2018a).

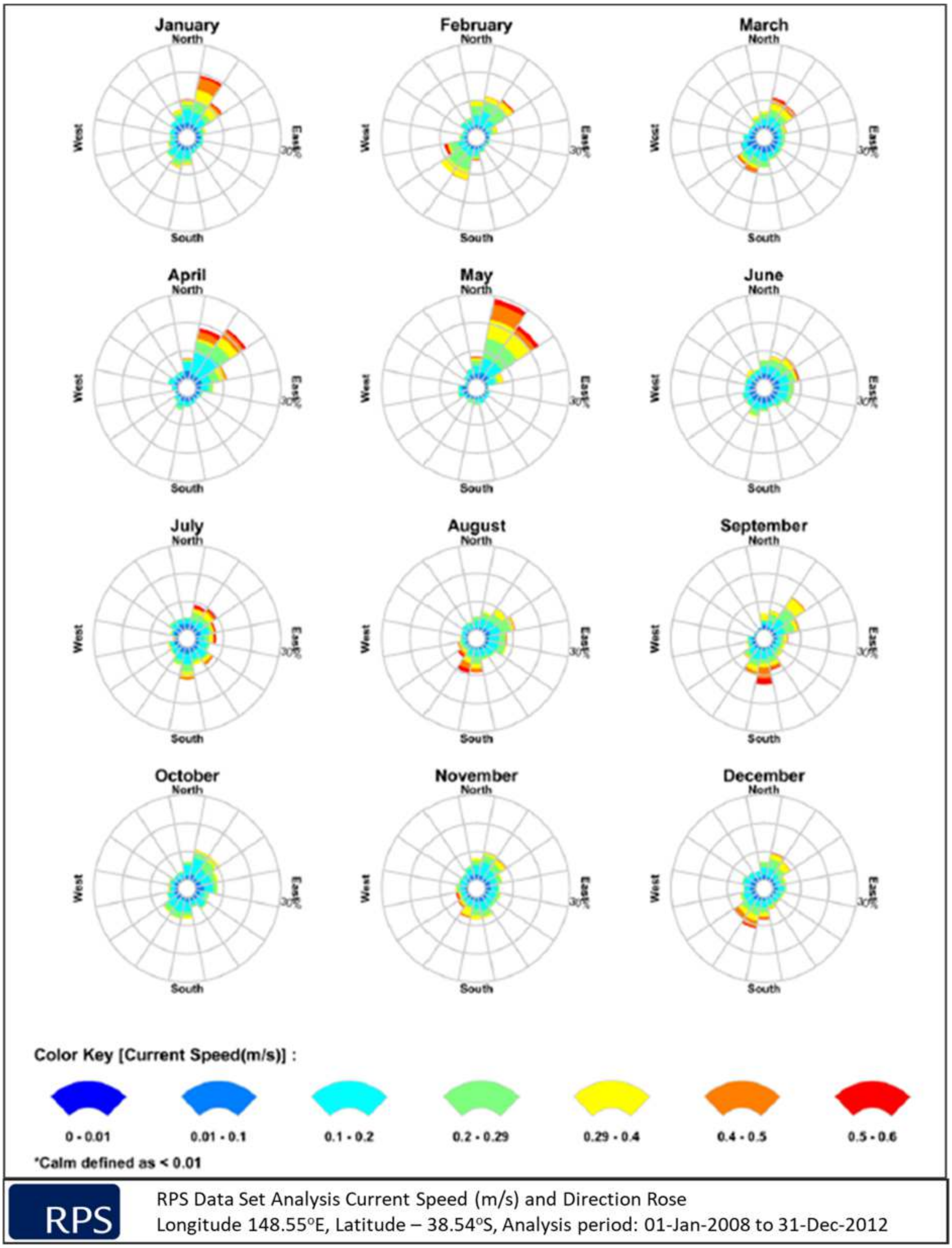


Figure 2-1 Monthly surface current rose plots near Blackback wells.

The colour key shows the current magnitude (m/s), the compass direction provides the current direction flowing *towards* and the length of the wedge gives the percentage of the record for a particular speed and direction combination (RPS, 2018a).

The eastern parts of the Region are strongly influenced by the East Australian Current (EAC) that flows southward adjacent to the east coast of New South Wales, Victoria and Tasmania, carrying warm equatorial waters (Refer Figure 2-2 and Figure 2-3). The EAC is up to 500 m deep and 100 km wide, and is strongest in summer when it can flow at up to 5 knots. In winter it flows at 2–3 knots as the oceanographic and climatic drivers in the Coral Sea diminish. The EAC tends to form ocean eddies that rotate around warm, central cores that can be up to 200 km across, and may persist for months. Eddies form more frequently off the south coast of New South Wales than other areas, but are also common along the east coast of Tasmania. The eddies can cross the continental shelf, and when mixing with shelf break waters, create upwellings that form isolated areas of enhanced productivity 200–300 km in diameter. Seasonal and transient upwellings are important ecological features of the Region. The closest to the Bass Strait operations is the Upwelling East of Eden, a key ecological feature for the high productivity and aggregations of marine life (refer Section 4.6.2 for further details). The EAC also affects sea surface temperatures on the eastern Tasmanian shelf, which can vary substantially among years depending on the relative influence of subtropical waters.

At the shelf break east of Bass Strait, nutrient-rich waters rise to the surface in winter as part of the processes of the Bass Strait Water Cascade, where the eastward flushing of the shallow waters that are more saline and slightly warmer than surrounding Tasman Sea waters form an undercurrent that cascades down the continental slope (refer Section 4.6.4 for further details). The cascading water has a displacing effect causing nutrient rich waters to rise which in turn leads to increased primary productivity in those areas. The cascading water also concentrates nutrients and some fish and whales are known to aggregate along its leading edge.

Further offshore, in the south east part of the operational area, currents are driven by two parameters, the Sub-Antarctic Water movement, coming from the south, and the Bass Strait Water movement from the west (Tomczak, 1985; Rochford, 1975; in Gibbs et al, 1991). The presence of deepwater currents is documented in the Blackback Oceanographic Study (Lawson & Treloar 1996), Kingfish B Wave, Current and Wind data (Lawson & Treloar 1987 1990) and Metocean Design Criteria for Bass Strait Fixed Platforms (Esso 1990).

Esso undertook a comprehensive current measurement program in the Blackback study area using seven current meters moored three metres above the seabed over a 12 month period (Lawson & Treloar 1996) to provide an understanding of the regional oceanography of the Bass Strait shelf and continental slope, particularly the relative importance of tidal, wind-driven and density-generated currents and the influence of regional topography on currents in the study area.

Tidal current analysis indicated general seabed current alignment normal to the bathymetry, at speeds of around 0.2 to 0.3 m.sec-1. The dominance of the bathymetry was most evident at the current meter sites located within a clearly defined valley.

Analysis of residual, non-tidal current vectors during significant storm periods has confirmed that wind driven currents are the strongest currents in the continental shelf areas but are of progressively lesser significance lower down the continental slope. The study has also provided evidence of flow of water from the continental shelf down the continental slope, conforming to the Bass Strait Cascade, as evidenced by high easterly currents and minimum vertical variation in temperature from the shelf to depths of 500 m (Refer to Section 2.2.7.4 for detail on the Bass Cascade). Currents during these cascade flows were stronger than background tidal currents and were the strongest currents recorded lower down the continental slope.

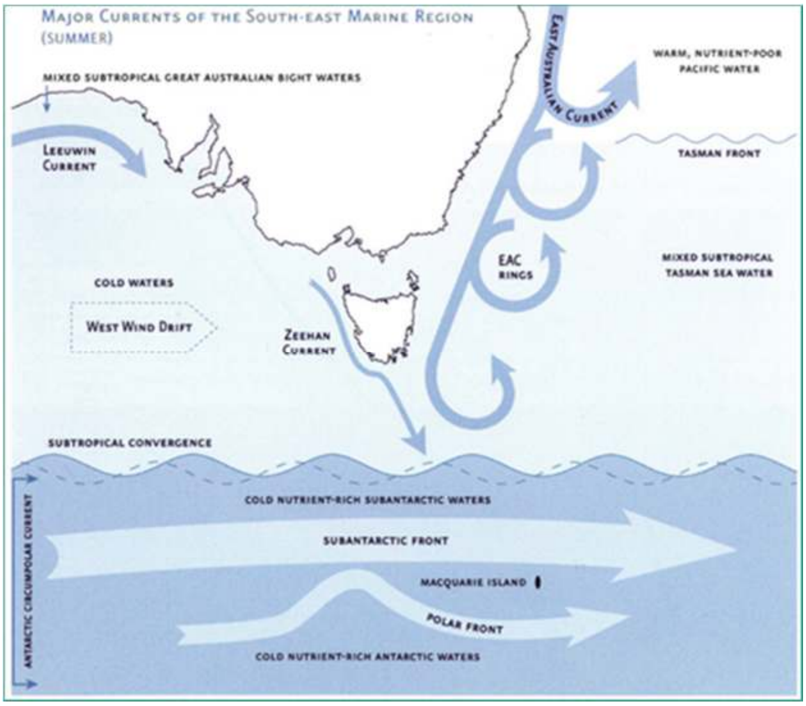


Figure 2-2 Major ocean currents in south-eastern Australian waters summer

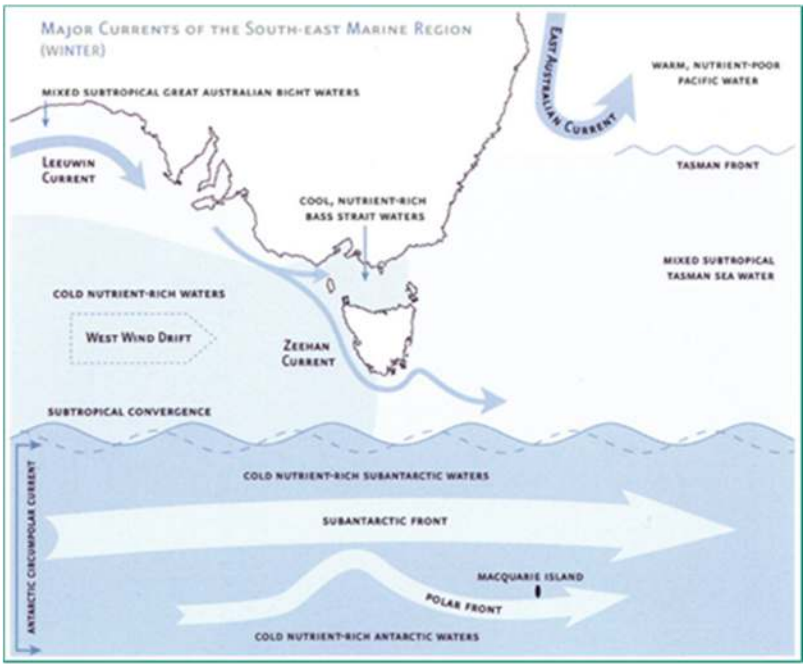


Figure 2-3 Major ocean currents in south-eastern Australian waters winter

2.1.2.2 Water Temperatures and Density Stratification

Temperatures in the subsurface waters of Bass Strait range from about 13°C in August/September to 16°C in February/March. Surface temperatures can exceed 20°C at times in late summer due to the warmer waters of the East Australia Current entering the strait. Water temperatures in the operational area are expected to follow this pattern (Jones 1980). Table 2-1 shows the monthly average sea surface temperatures and salinity as obtained from the World Ocean Atlas 2013 database which shows the same range of temperatures as those previously recorded. Monthly average sea surface temperatures were shown to range from 14°C (August, September) and 20°C (March). Salinity remained consistent throughout the year ranging from 35 to 36 psu (RPS, 2018a).

Table 2-1 Average monthly sea surface temperature and salinity nearby Blackback well location within the 0-5m water depth.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Temperature (°C)	19	20	20	19	18	16	15	15	14	15	16	18
Salinity (psu)	35	35	36	36	35	36	36	36	35	36	36	36

Waters are generally well mixed, but surface warming sometimes causes weak stratification in calm summer conditions. During these times, mixing and interaction between varying water masses leads to variations in horizontal water temperature and a thermocline (temperature profile) develops. The thermocline acts as a low friction layer separating the wind driven motions of the upper well mixed layer from the bottom well mixed layer. As a result, upwelling of cold water on the northern shores of Bass Strait can occur (Jones 1980).

Information on density and temperature profiles of the deeper area of the Blackback field has been obtained by Lawson and Treloar (1996a). Temperatures measured at the seabed confirmed a decrease in temperature with depth of measurement. The survey also showed a period (July to September) of uniformity of temperature at all measured depths, indicating flow down the continental slope (Bass Strait Cascade). The range of water temperatures observed at the seabed is from a maximum of 17°C at 93 m to a minimum of 7°C at 480 m. The minimum temperatures at depth were recorded in summer, possibly because of stronger stabilising stratification and absence of the cascade of relatively warmer water during winter.

2.1.2.3 Waves

Bass Strait is a high energy environment exposed to frequent storms and significant wave heights. High wave conditions are generally associated with strong west to southwest winds caused by the eastward passage of low pressure systems across Bass Strait. Storms may occur several times a month resulting in wave heights of 3 to 4 m or more. In severe cases, southwest storms can result in significant wave heights of greater than 6 m (Jones 1980).

Wave data have been analysed for the ten year period from 1977 to 1987 (Lawson & Treloar 1987). Wave conditions at Blackback exhibit an increased wave climate, in excess of those experienced at further inshore facilities due to the increased fetch length of waves approaching from the south west. Higher wave conditions are generally associated with strong west to south west winds caused by the eastward passage of low pressure systems across Bass Strait. These may occur several times per month and can result in significant wave heights of three to four metres or more. In severe cases, south west storms can result in significant wave heights of up to six to seven metres.

Extreme design wave conditions are associated with east coast low pressure systems. These can result in very strong east to south east winds in eastern Bass Strait. The 1989 Metocean Design Criteria Report (Esso 1990) gives a design significant wave height of 9.0 m and a corresponding maximum wave height of 17.5 m.

2.1.2.4 Bathymetry

The EGBPA is located in Bass Strait, the region of the continental shelf that separates mainland Australia from Tasmania. The bathymetry in the EGBPA is concave shaped, with a shallower rim on the eastern and western end of the EGBPA and a deeper centre. The seabed bathymetry across the region is highly variable. A steep nearshore profile (0 to 20 m water depth) extends to a less steep inner (20 to 60 m water depth) and moderate profile (60 to 120 m water depth), concluding with a flat outer shelf plain (greater than 120 m water depth) in the western part (central Bass Strait) and a steep slope into the Bass Canyon in the east. The Esso Bass Strait Operations are distributed across this area from the Dolphin platform located closest to the coast at approximately 21 km and in approximately 38 m water depth out to the Baldfish and Sculpin fields that are approximately 90-100 km offshore and are in 665 and 2,300m respectively. Refer to Figure 1-2 which shows the bathymetry in the EGBPA.

2.2 Values and Sensitivities in the DA

This sections summarises the relevant values and sensitivities in the DA as required by regulation 13(2)(b) of the OPGGS(E)R.

The OPGGS(E)R require petroleum activities to be carried out in a manner; consistent with the principles of ecologically sustainable development as set out in section 3A of the Environment Protection and Biodiversity Conservation Act (EPBC Act). Protected matters, or matters of national environmental significance (MNES) must be described and considered.

Table 2-2 provides a summary of the relevant MNES that have been identified as existing in the DA, or in the case of floral and faunal species, may exist within the DA. Additional detail of each MNES is provided in other parts of this volume as indicated in the table.

Table 2-3 summarises the values and sensitivities of other protected matters within the DA.

Table 2-2 Relevant Matters of National Environmental Significance in the DA

Matters of National Environmental Significance Value/sensitivity	Receptor Type	Features present within the Described Area
World Heritage	Cultural feature - Historic site	Tasmania Darlington Probation Station (2.2.1.1) Port Arthur Historic (2.2.1.2)
	Natural place	New South Wales Lord Howe Island Group (2.2.1.3)
National Heritage	National Heritage place or site	Victoria The Great Ocean Road and Scenic Environs (2.2.2.1) Tasmania Port Arthur Historic Site (as above) (2.2.1.2) New South Wales Bondi Beach (2.2.2.4) Kurnell Peninsula (2.2.2.5) Kamay-Botany Bay: botanical collection sites (2.2.2.6) Royal National Park and Garawarra State Conservation Area (2.2.2.7) Lord Howe Island Group (as above) (2.2.1.3)
Wetlands of International Importance (Ramsar)	Wetlands	Victoria Gippsland Lakes (2.2.3.1) Corner Inlet (2.2.3.2) Western Port (2.2.3.8) Tasmania Logan Lagoons (2.2.3.3) East Cape Barren Islands Lagoon (2.2.3.4) Flood Plain Lower Ringarooma (2.2.3.5) Lavinia (2.2.3.10) Little Waterhouse Lakes (2.2.3.9) Apsley Marshes (2.2.3.7) Moulting Lagoon (2.2.3.6)

		New South Wales Myall Lakes (2.2.3.11) Hunter Estuary Wetlands (2.2.3.12) Towra Point (2.2.3.13)
Listed Threatened Species and, Listed Migratory Species	Sea Birds and Shorebirds	Refer Section 0
	Fish	Refer Section 2.3.1.1
	Sharks and Rays	Refer Section 2.3.1.1.1
	Marine Mammals	Refer Section 2.3.1.3
	Marine Reptiles	Refer Section 2.3.1.4
Listed Threatened Ecological Communities	Giant Kelp Marine Forests	Giant Kelp Marine Forests of South East Australia Refer Section 2.2.4.1
	Littoral Rainforest	Coastal Vine Thicket and Littoral Rainforests Refer Section 2.2.4.2
	Saltmarsh	Subtropical and Temperate Coastal Saltmarsh Refer Section 2.2.4.3
Commonwealth Marine Areas	Australian Marine Parks	Southeast Marine Region East Gippsland Marine Park (2.2.6.1) Beagle Marine Park (2.2.6.2) Apollo Marine Park (2.2.6.6) Boags Marine Park (2.2.6.5) Flinders Marine Park (2.2.6.3) Freycinet Marine Park (2.2.6.4) Franklin Marine Park (2.2.6.8) Huon Marine Park (2.2.6.9) Zeehan Marine Park (2.2.6.7) South Tasman Marine Park (2.2.6.14) Temperate East Marine Region Jervis Bay Marine Park (2.2.6.13) Hunter Marine Park (2.2.6.12) Central Eastern Marine Park (2.2.6.11) Lord Howe Marine Park (2.2.6.10)
	Key Ecological Feature	Big Horseshoe Canyon (2.2.7.1) Upwelling East of Eden (2.2.7.2) East Tasmania subtropical convergence zone (2.2.7.3) Bass Cascade (2.2.7.4) Seamounts of South and East of Tasmania (2.2.7.5) Shelf Rocky Reefs Southeast Marine Region (2.2.7.6) Tasmantid Seamount Chain (2.2.7.8) Lord Howe Seamount Chain (2.2.7.9) Tasman Front and eddy field (2.2.7.10) West Tasmania Canyons (2.2.7.7) Shelf Rocky Reefs Temperate East Marine Region (2.2.7.11) Canyons on the Eastern Continental Slope (2.2.7.3)

Table 2-3 Values and Sensitivities of Other Protected Areas or Places in the DA

Other Protected Areas Value/sensitivity	Receptor Type	Relevant features present within the Described Area
Social/Cultural/ Conservation	National Parks and Reserves	Victoria • Cape Howe Marine Park National (2.2.8.1) • Gabo Island Lighthouse Reserve (2.2.8.2) • Croajingolong National Park (2.2.8.5) • Point Hicks Marine Park National Park (2.2.8.6) • Beware Reef Marine Sanctuary (2.2.8.7) • Cape Conran Coastal Park (2.2.8.8) • The Lakes National Park & Gippsland Lakes Coastal Park (2.2.8.9) • Ninety Mile Beach Marine National Park (2.2.8.10) • Corner Inlet and Nooramunga Marine and Coastal Parks (2.2.8.11) • Corner Inlet Marine National Park (2.2.8.12) • Wilsons Promontory Marine Park and Wilsons Promontory National Park (2.2.8.13) • Cape Liptrap Coastal Park (2.2.8.14) • Bunurong Marine and Coastal Park and Bunurong Marine National Park (2.2.8.15) • French Island Marine National Park (2.2.8.17) • Phillip Island Nature Park (2.2.8.16) • Churchill Island Marine National Park (2.2.8.18) • Yaringa Marine National Park (2.2.8.19) • Mornington Peninsula National Park (2.2.8.20) • Great Ottway National Park (2.2.8.21) • Port Campbell National Park and Bay of Islands Coastal Park (2.2.8.22) **Tasmania** • Hogan Group National Park (2.2.8.23) • West Moncoeur Island & East Moncoeur Island (2.2.8.24) • Curtis Island Nature Reserve and Devils Tower Nature Reserve (2.2.8.25) • Kent Group National Park (2.2.8.26) • Logan Lagoon Conservation Area (2.2.8.27) • Strzelecki National Park (2.2.8.28) • Rocky Cape National Park (2.2.8.31) • Narawntapu National Park (2.2.8.32) • Mount William National Park (2.2.8.33) • Freycinet National Park & Wye River State Reserve (2.2.8.34) • Ile des Phoques Nature Reserve (2.2.8.35) • Maria Island National Park (2.2.8.35) • Tasman National Park & Reserves (2.2.8.36) • Lavinia State Reserve (2.2.8.29)

		• Hunter Island Group (2.2.8.30) New South Wales • Lord Howe Island Permanent Park Preserve (2.2.8.37) • Muttonbird Island Nature Reserve (2.2.8.38) • Bongil Bongil National Park (2.2.8.39) • Jagun Nature Reserve (2.2.8.40) • Gaagal Wanggaan (South Beach) National Park (2.2.8.41) • Hat Head National Park (2.2.8.42) • Limeburners Creek National Park (2.2.8.43) • Sea Acres National Park (2.2.8.44) • Crowdy Bay National Park and Watson Taylors Lake (2.2.8.45) • Darawank, Khappinghat and Kattang Nature Reserves (2.2.8.46) • Booti Booti National Park and Wallis Lake (2.2.8.47) • Myall Lakes National Park Little Broughton Island and Stormpetrel Nature Reserves (2.2.8.48) • Tomaree National Park (2.2.8.49) • Worimi Conservation Lands (2.2.8.50) • Glenrock State Conservation Area and Awabakal Nature Reserve (2.2.8.51) • Munmorah State Conservation Area and Bird Island Nature Reserve and Wallarah National Park (2.2.8.52) • Wyrrabalong National Park (2.2.8.53) • Bouddi National Park, Brisbane Water National Park & Ku-ring-gai Chase National Park (2.2.8.54) • Sydney Harbour National Park (2.2.8.55) • Malabar Headland National Park (2.2.8.56) • Towra Point Nature Reserve (2.2.8.57) • Kamay Botany Bay National Park (2.2.8.58) • Royal National Park (2.2.8.59) • Five Islands Nature (2.2.8.60) • Seven Mile Beach National Park (2.2.8.61) • Jervis Bay Marine Park National Park (2.2.8.62) • Booderee National Park (2.2.8.63) • Conjola National Park (2.2.8.64) • Narrawallee Creek Nature Reserve (2.2.8.65) • South Pacific Heathland Reserve (2.2.8.66) • Meroo National Park (2.2.8.67) • Murramurrang National Park (2.2.8.68) • Batemans Marine Park (2.2.8.69) • Eurobodalla National Park (2.2.8.70) • Montague Island Nature Reserve (2.2.8.69) • Mimosa Rocks National Park (2.2.8.71) • Bournda National Park (2.2.8.72) • Ben Boyd National Park (2.2.8.73)
Cultural - Indigenous Heritage (2.5.1)	Inigenous Protected Place	Babel Island Mount Chappell Island

		Big Dog Island Badger Island lungatalanana
	Native Title	Determination Area for Gunai-Kurnai People
Commonwealth Heritage Listed Natural place (2.5.2)	Wetland	Point Wilson
	National Park	The Beecroft Peninsula
	Headland	Malabar Headland
	Key Ecological Feature	Tasman Sea Mount Area
Commonwealth Heritage Listed Historic place	-	
Historic Maritime (2.5.3.1)	Historic Shipwrecks	Victoria 417 Tasmania 415 New South Wales 290
	Protected Shipwrecks	VIC • SS Alert (1893) • Clonmel (1841) • SS Glenelg (1900) NSW • Bega • Lady Darling (1880) • M24 (Japanese Midget Submarine) (1942)

2.2.1 World Heritage

There are three relevant World Heritage listings which occur in or near the DA. Darlington Probation Station and Port Arthur Historic Site are also on the Australian Convict Sites World Heritage list.

2.2.1.1 Darlington Probation Station

Darlington Probation Station, located on Maria Island National Park (Section 2.2.8.35) off the east coast of Tasmania is the only declared World Heritage place in the DA. It offers a glimpse into our convict past and the probation system that was unique to Tasmania. The precinct has 13 intact structures that remain and are set amongst a relatively unchanged landscape along the cove, uniquely demonstrating the philosophy behind the probation system (DoEE, 2019d).

2.2.1.2 Port Arthur Historic Site

Located approximately 15 kms outside the limits of the DA is the Port Arthur Historic Site, Port Arthur was inscribed on the Australian Convict Sites World Heritage serial listing on 31 July 2010. Located in the south-west on the Tasman Peninsula, Port Arthur was established in the 1830s as a penal settlement. It remains a physical chronicle of a dramatic part of Australia's history and together with its 60 or so buildings and picturesque landscape has become Tasmania's most popular tourist destination (DoEE, 2019c).

2.2.1.3 Lord Howe Island Group

Located 700 kilometres north-east of Sydney and covering an area of 1,463 km^2, the Lord Howe Island Group comprises Lord Howe Island, Admiralty Islands, Mutton Bird Islands, Ball's Pyramid, and associated coral reefs and marine environments. The justification criteria for its World Heritage listing are its exceptional diversity of spectacular and scenic landscapes within a small area, including sheer mountain slopes, a broad arc of hills enclosing the lagoon and Balls Pyramid rising abruptly from the ocean. It is considered to be an outstanding example of an island system developed from submarine volcanic activity and demonstrates the nearly complete stage in the destruction of a large shield volcano. Having the most southerly coral reef in the world, it demonstrates a rare example of a zone of transition between algal and coral reefs. Many species are at their ecological limits, endemism is high, and unique assemblages of temperate and tropical forms cohabit. The second criteria is it's an outstanding example of the development of a characteristic insular biota that has adapted to the island environment through speciation. A significant number of endemic species or subspecies of plants and animals have evolved in a very limited area. The diversity of landscapes and biota and the high number of threatened and endemic species make these islands an outstanding example of independent evolutionary processes (DoEE, 2019s). Endemic species occur in the flora and invertebrate fauna; 60% of invertebrate fauna are endemic with discovery of new species still occurring. Of the endemic flora, more is known about the vascular plants of which 113 of the 239 species are endemic. Whilst less is known about the non-vascular plants, they are also thought to be highly diverse and include endemic species (DECCW, 2007). Lord Howe Island Group is within the Lord Howe Marine Park, refer Section 2.2.6.10 for information on this park.

2.2.2 National Heritage

The National Heritage List is Australia's list of natural, historic and Indigenous places which are classified to have outstanding heritage value to the nation. There are three classes for National Heritage listings; natural, historic and indigenous. The three declared World Heritage properties noted above (Darlington Probation Station, Port Arthur Site and Lord Howe Island Group) are also listed on Australia's National Heritage list under the historic classification. Other relevant National Heritage places occurring in the DA are described below.

2.2.2.1 The Great Ocean Road and Scenic Environs – Historic Heritage

The Great Ocean Road and Scenic Environs is a 242 km road located on the west coast of Victoria, commencing at Torquay and ending in Allansford, just east of Warrnambool which as well as following the spectacular coast, passes inland through the forests of the Great Otway National Park and the rural landscape west of the Otway Ranges. The site includes all the coastline between the two towns where coastline abuts the dynamic ocean swells of Bass Strait, and the hinterland displays a diverse natural environment including temperate rainforest, heathlands, wetlands, sheer cliffs, ancient rock stacks and stunning beaches, which combined, provide a magnificent aesthetic landscape and seascape which support a diverse range of flora and fauna, including threatened coastal and migratory birds.

The project to build the road was created to provide work and continuing welfare for First World War returned servicemen over the 13 years it took to build, and also to provide a utilitarian memorial to all Australian First World War servicemen. This accounts for its listing under the historic classification on the database. It also provided the residents and tourists a means of accessing the spectacular coastal landscape, for which it is most well-known now. The limestone at Port Campbell is significant for the diversity of geomorphical features found in a single lithological unit giving rise to the distinctive rock formations of the twelve Apostles, Bay of Island and Bay of Martyrs. The Otway Ranges Coastal Cretaceous site is one of only two places in Australia where polar dinosaur fossils are found and illustrates the environment prior to the separation of Australia from Antarctica. These features contribute to the scientific and educational values of the place. The place includes a large part of the Great Otway National Park (refer Section 2.2.8.21) where a diverse range of ecosystems including wet and dry schlerophyll forests, cool temperate rainforest and near the coast, shrublands and coastal heaths (DoEE, 2019p).

2.2.2.2 Ku-ring-gai Chase National Park, Lion, Long and Spectacle Island Nature Reserves – Natural Heritage

Located at the entry to Broken Bay and the mouth of the Hawksbury River, Ku-ring-gai Chase National Park, Lion, Long and Spectacle Island Nature Reserves span 15,000 ha, approximately 20 km north of Sydney. The park and reserves contain an outstanding representation of the species that contribute to the high endemism value of the Sydney region with high species richness across many groups and a representative range of ecosystems. The complex pattern of 24 plant communities contribute species richness with over 1000 native plant species present and an outstanding array of birds and other plant species. Rock art can be seen cross the entire sandstone landscape and a small number of engravings found on vertical boulders in close proximity to major waterways. Section 2.2.8.42 provides additional information on the National Park (DoEE, 2019).

2.2.2.3 North Head – Historic Heritage

The northern, seaward entrance to Port Jackson, more commonly known as Sydney Harbour, is important as it played a major role in the cultural and military life of the colony of New South Wales, following the arrival of the First Fleet in 1788. The 'Heads', have signified arrival and departure at Port Jackson since 1788 and are recognised as important, iconic, national landmarks. The North Head Quarantine Station is important for its association with the establishment of the colony of NSW and with Australia's development as an island-nation, susceptible to ship-borne disease. The quarantine station has the longest history (1828-1977) of quarantine use in Australia. Existing structures at the North Head Quarantine Station include hospital and isolation ward, cemeteries and memorials, wharf area, separation facilities for first, second and third class passengers and an administration area. The area comprises the entire headland of approximately 277 ha at Manly DoEE, 2019i).

2.2.2.4 Bondi Beach – Historic Heritage

Bondi Beach is significant in the course of Australia's cultural history as the site of the foundation of Australia's first recognised surf lifesaving club in 1907. It is also has significant social value for being having a central place in the development of Australia's beach culture and it's way of life and leisure (DoEE, 2019j).

2.2.2.5 Kurnell Peninsula Headland – Historic Heritage

The site of first recorded contact between Indigenous people and Britain in eastern Australia (The Meeting Place) representing the birthplace of a nation and the dispossession of Indigenous people is on Kurnell Peninsula. The first landfall on continental Australia made by Captain James Cook, Commander of the Endeavour at Kurnell Peninsula was a precursor of the colonisation of Australia by Britain. On this voyage in 1770, Cook mapped Australia's eastern coastline. The listed place occupies approximately 325 hectares on the southern headland at the entrance to Botany Bay. It includes the Meeting Place Precinct, including Captain Cook's Landing Place, the coastal, landmark, sandstone, areas of Kurnell Headland between Sutherland Point in the north and Doughboy Head in the south, Endeavour Heights and sand dunes, including Botany Cone, in the south-west. The boundaries are defined by Botany Bay National Park (Kurnell Section) and a small Sydney Water inholding at Point (DoEE, 2019f).

2.2.2.6 Kamay Botany Bay: botanical collection sites – Historic Heritage

Accompanying Captain James Cook on the 1770 voyage to Australia (refer Section x above) were botanist Sir Joseph Banks and naturalist Dr Daniel Solander. Upon the first landing plants collected by Banks and Solander included a large number of iconic Australian plant species, including some that later became type-specimens which have important scientific and research value. The plant collection sites at Kamay Botany Bay, together with the collected plant material, represent the symbolic and actual integration of Australian flora into western science. Banks and Solander used ideas from Swedish scientist Carl Linnaeus newly developed and revolutionary biological classification system (known as the Linnaean System) to collect the plants for scientific study. This plant collection made a significant contribution in revolutionising the international systematic biology discipline, shaped European perceptions of Australia and provided a benchmark for the Australian environment as well as catalysing and informing subsequent botanical studies of Australia (DoEE, 2019h). The place is broadly comprised of three areas: the Kurnell Peninsula and La Perouse Headland which are located within Kamay Botany Bay National Park (refer Section 2.2.8.58) and the Towra Point Nature Reserve (refer Section 2.2.8.57).

Figure 2-4 shows the location of the National Heritage places and Ramsar Wetland in Botany Bay.

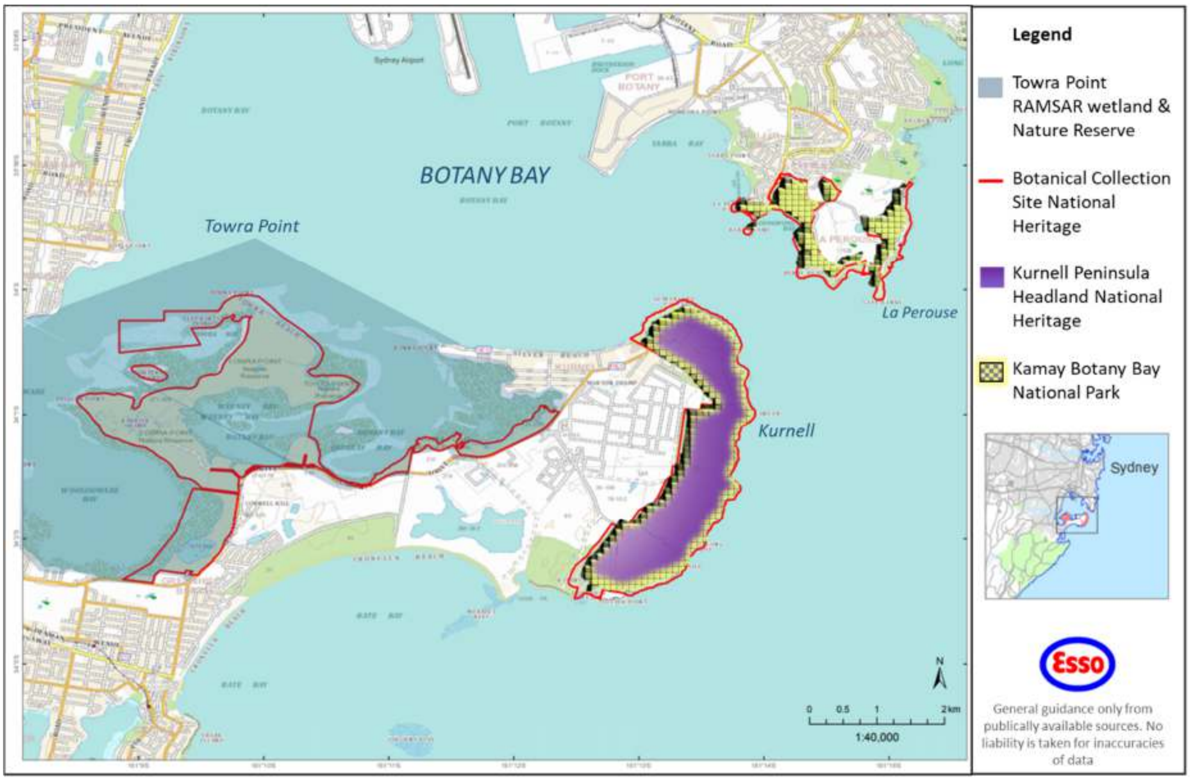


Figure 2-4 National Heritage Places, RAMSAR wetland, National Parks and Reserves in Botany Bay

2.2.2.7 Royal National Park and Garawarra State Conservation Area – Natural Heritage

Bounded by the Pacific Ocean to the east, Port Hacking to the north, the 15,968 ha area of the Royal National Park (15068 ha) and Garawarra State Conservation Area (900 ha) in NSW was the second National Park to be established in the world after Yellowstone. Its declaration in 1879 marked the beginning of the development of Australia's National Park system of protected areas. With greater access to and use of natural areas for recreation, the public's concern for the natural environment and its conservation grew. The establishment of Royal NP is considered to be the beginning of the Australian conservation movement (DoEE, 2019e).

Royal National Park (Royal NP) and Garawarra State Conservation Area (Garawarra SCA) constitute a major centre of temperate plant species richness in Australia, with more than 1000 species recorded. The place is also extremely rich in perching birds, reptiles and butterflies and can be regarded as exemplifying the biodiverse Hawkesbury Sandstone environment.

The park's historical significance and species richness account for the official values of its National Heritage listing. However this area has many other values which are described in the National Parks and Reserves, Section 2.2.8.59.

2.2.3 Wetlands of International Importance

Under the Ramsar Convention, wetland types have been defined to identify the main wetland habitats represented at each site. The classification system uses three categories (with a number of wetland types within each): (i) Marine/Coastal Wetlands; (ii) Inland Wetlands; and (iii) Human-made Wetlands. The wetlands are selected on account of their international significance in terms of the biodiversity and uniqueness of their ecology, botany, zoology or other natural process. A set of nine criteria have been developed to identify and classify wetlands, these are shown in

Table 2-4 below. Two Ramsar wetlands are located inshore of Esso's permit areas and several others occur in the DA (Figure 2-5).

Table 2-4 Criteria for identifying Wetlands of International Importance (DoEE, 2019u)

Group	Ramsar Criteria
A Sites containing representative, rare or unique wetland types	**Criterion 1:** A wetland should be considered internationally important if it contains a representative, rare, or unique example of a natural or near-natural wetland type found within the appropriate biogeographic region.
B Sites of international importance for conserving biological diversity	Criteria based on species and ecological communities **Criterion 2:** A wetland should be considered internationally important if it supports vulnerable, endangered, or critically endangered species or threatened ecological communities. **Criterion 3:** A wetland should be considered internationally important if it supports populations of plant and/or animal species important for maintaining the biological diversity of a particular biogeographic region. **Criterion 4**: A wetland should be considered internationally important if it supports plant and/or animal species at a critical stage in their life cycles, or provides refuge during adverse conditions.
	Specific criteria based on waterbirds **Criterion 5:** A wetland should be considered internationally important if it regularly supports 20,000 or more waterbirds. **Criterion 6:** A wetland should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of waterbird.
	Specific criteria based on fish **Criterion 7:** A wetland should be considered internationally important if it supports a significant proportion of indigenous fish subspecies, species or families, life-history stages, species interactions and/or populations that are representative of wetland benefits and/or values and thereby contributes to global biological diversity. **Criterion 8:** A wetland should be considered internationally important if it is an important source of food for fishes, spawning ground, nursery and/or migration path on which fish stocks, either within the wetland or elsewhere, depend.
	Specific criteria based on other taxa **Criterion 9:** A wetland should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of wetland-dependent non-avian animal species.

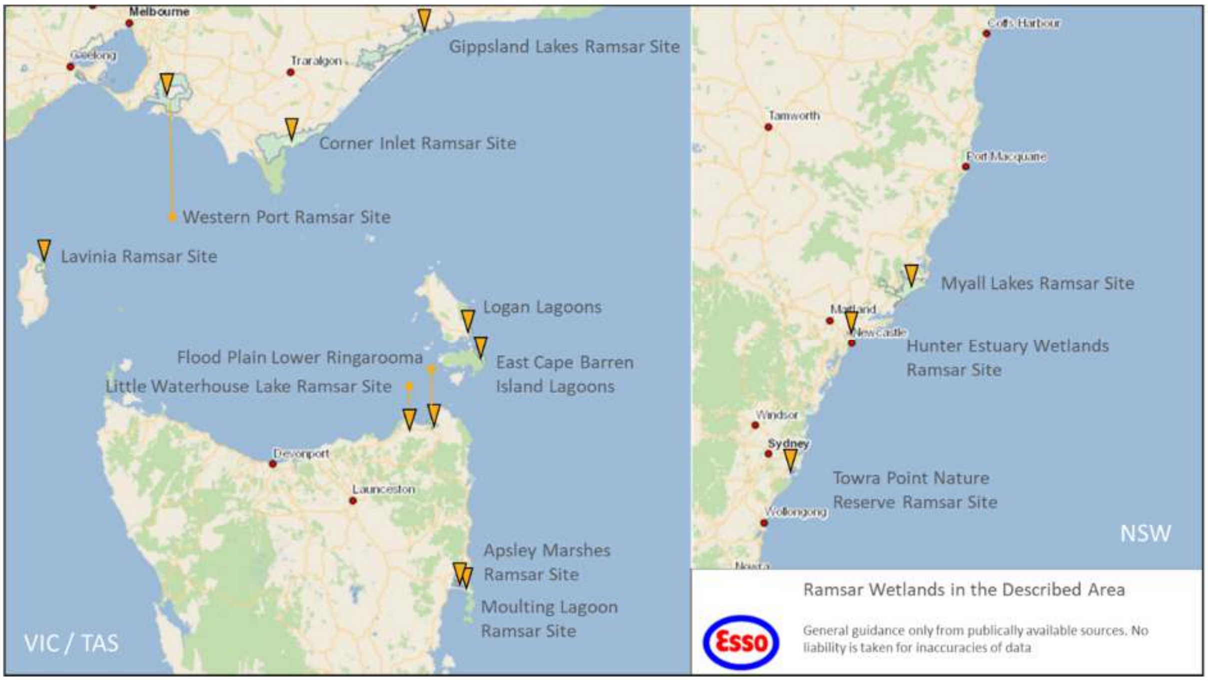


Figure 2-5 Wetlands of International Importance within the DA

2.2.3.1 Gippsland Lakes Ramsar Site

The Gippsland Lakes Ramsar Site is located in Victoria, south of the Eastern Highlands and to the east of the La Trobe Valley. Covering a vast area, the lakes are a series of large, shallow, coastal lagoons approximately 70 km in length and 10 km wide, separated from the sea by sand dunes. The surface area of the lakes is approximately 364 km2 and the three main water bodies are Lakes Wellington, Victoria and King.

The Gippsland Lakes Ramsar Site meets six of the Ramsar criteria:1, 2, 4, 6 & 8 (DoEE 2017s).

The Gippsland Lakes is a particularly good representative example of a natural or near-natural wetland, characteristic of the biogeographical region. It forms one of the largest coastal lagoon systems in the Drainage Division and contains a distinctive landscape of wetlands and flat coastal plains. The site supports a broad range of wetland types in close proximity to each other, including periodically inundated palustrine marshes, permanently inundated palustrine marshes, shallow lacustrine (lake) features, deep lacustrine features, lagoons with narrow inlets, and broad embayments.

The site supports several nationally threatened wetland fauna species at various stages of their life-cycle including two nationally threatened frog species (green and golden bell frogs and growling grass frogs), the vulnerable Australian painted snipe, a vulnerable fish species (the Australian grayling) and three nationally vulnerable and endangered wetland-associated flora species (dwarf kerrawang, swamp everlasting and metallic sun-orchid).

The site supports habitat and conditions that are important for critical life cycle stages of a variety of wetland-dependent fauna species. The permanence of the main lakes and the relatively regular flooding of the adjacent wetlands mean that this wetland is an important drought refuge for many water birds and other aquatic species, including as permanent refuges and breeding sites for two threatened frog species.

The Gippsland Lakes have been identified as being of outstanding importance for waterbirds, regularly supporting more than 20,000 waterfowl. Waterbird species which are considered to have met the one per cent population threshold are: Red-necked stint, Black swan, Sharp-tailed sandpiper, Chestnut teal, Musk duck, Fairy tern and Little tern.

Gippsland Lakes provides important habitats, feeding areas, dispersal and migratory pathways, and spawning sites for numerous fish species of direct and indirect fisheries significance. These fish have important fisheries resource values both within and external to the site.

Currently, parts of the Lakes system are heavily used for commercial and recreational fisheries and boating activities, while the immediate hinterland has been developed for agricultural use, and limited residential and tourism purposes (DoEE, 2017q).

The Lakes are protected as a Ramsar site by the Lakes National Park and the Gippsland Lakes Coastal Park (Refer Section 2.2.8.9). The locality of the Ramsar site is shown in Figure 2-6.

The ecological character description (ECD) of the Gippsland Lakes Ramsar Site as developed under the requirements of the National Framework and Guidance for Describing the Ecological Character of Australia’s Ramsar Wetlands (DEWHA, 2008), is summarised in

Table 2-5. The information on the limits of acceptable change, also required by the National Framework for describing the wetlands, are summarised in Table 2-6 (DSEWPAC 2010).

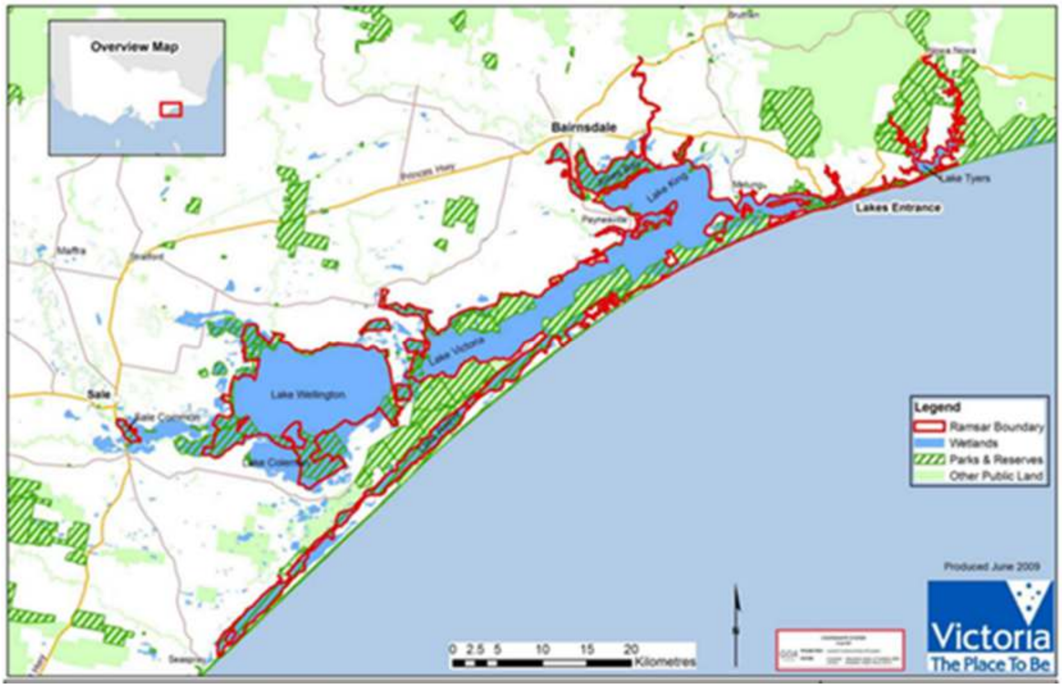


Figure 2-6 Locality of Gippsland lakes Ramsar Site (DSEWPAC, 2010)

Table 2-5 Summary of critical components, processes and services/benefits for the Gippsland Lakes Ramsar site (DSEWPAC 2010)

Critical components	Critical processes	Critical services/benefits
Wetland habitats: grouped as follows • (C1) marine subtidal aquatic beds (seagrass/aquatic plants). • (C2) coastal brackish or saline lagoons (open water phytoplankton-dominated habitats). • fringing wetlands that can occur within the site as– • (C3) predominantly freshwater wetlands • (C4) brackish wetlands • (C5) saltmarsh/ hypersaline wetlands. **Wetland flora and fauna:** • (C6) abundance and diversity of waterbirds. • (C7) presence of threatened frog species (green and golden bell frog; growling grass frog). • (C8) presence of threatened wetland flora species.	Hydrological regime: (P1) patterns of inundation and freshwater flows into the wetland system, groundwater influences and marine inflows that affect habitat structure and condition. Waterbird breeding functions: (P2) critical breeding habitats for a variety of waterbird species.	Threatened species: (S1) the site supports an assemblage of vulnerable or endangered wetland flora and fauna that contribute to biodiversity. Fisheries resource values: (S2) the site supports key fisheries habitats and stocks of commercial and recreational significance.
Supporting Components	**Supporting Processes**	**Supporting services/benefits**
Other wetland habitats: supported by the site (sand/pebble shores, estuarine waters, etc.). Other wetland fauna: supported by the site (for example, fish, aquatic invertebrates).	Climate: patterns of temperature, rainfall and evaporation. Geomorphology: key geomorphologic/ topographic features of the site. Coastal and shoreline processes: hydrodynamic controls on coasts and shorelines through tides, currents, wind, erosion and accretion. Water quality: water quality influences aquatic ecosystem values, noting the key water quality variables for Gippsland Lakes are salinity, dissolved oxygen, nutrients and sediments. Nutrient cycling, sediment processes and algal blooms: primary productivity and the natural functioning of nutrient cycling/flux processes in waterbodies. Biological processes: important biological processes such as primary productivity.	Tourism and recreation: the site provides and supports a range of tourism and recreational activities that are significant to the regional economy. Scientific research: the site supports and contains features important for scientific research.

Table 2-6 Limits of acceptable change (LAC) – Gippsland Lakes Ramsar site (DSEWPAC 2010)

Number	Indicator for Critical Component / Process/Service for the LAC	Relevant timescale[1]	Limit(s) of Acceptable Change	Spatial scale/temporal scale of measurements	Underpinning baseline data	Secondary critical C,P,S addressed through LAC
Critical components						
C1	Marine sub-tidal aquatic beds (for example, within Lake King, Lake Victoria, Lake Tyers, Bunga Arm and Lake Bunga)	Long Term	Total seagrass extent will not decline by greater than 50 per cent of the baseline value of Roob and Ball 1997 (that is, 50 per cent of 4330 hectares = 2165 hectares) in two successive decades at a whole of site scale. Total mapped extent of dense and moderate *Zostera* will not decline by greater than 80 per cent of the baseline values determined by Roob and Ball (1997) in two successive decades at any of the following locations: Fraser Island Point Fullerton, Lake King Point King, Raymond Island, Lake King Gorcrow Point – Steel Bay, Lake Victoria Waddy Island, Lake Victoria	Sampling to occur at least twice within the decade under consideration. Baseline mapping against which this LAC can be tested is within Roob and Ball 1997. Note that the seagrass assessment by Hindell (2008) did not produce mapping but did use similar sampling sites to Roob and Ball.	Level B – Recent quantitative data describes seagrass condition at various sites but over a limited timeframe. There is no available seagrass condition data prior to listing.	P1
C2	Coastal brackish or saline lagoons (for example, Lake King, Lake Victoria, Lake Wellington, Lake Tyers)	Long Term	No change in wetland typology from the 1980 classification of Corrick and Norman (1980), as presented in Figure 2-3.	To be determined based on expert review.	Level B – VMCS mapping data describes wetland extent. This is coarse scale mapping and should be considered as indicative only.	P1, S2
		Long Term	A long-term change in ecosystem state at Lake King, Lake Victoria or Lake Tyers from relatively clear, seagrass- dominated estuarine lagoons to turbid, algae dominated system (characteristic of Lake Wellington) will represent a change in ecological character.	To be determined based on expert review.		

		Short Term	No single cyanobacteria algal bloom event will cover greater than 10 per cent of the combined area of coastal brackish/saline lagoons (that is, Lake King, Victoria, Wellington and Tyers) in two successive years.	Algal bloom extent (per cent lakes area and location) and number should be reported annually, but assessed on an ongoing basis.	Level A – The occurrence of cyanobacteria algal blooms are well documented. The extent of algal blooms historically has not been assessed, including at the time of site declaration.	
C3	Fringing wetlands – predominantly freshwater marsh at Macleod Morass and Sale Common	Long Term	No change in wetland typology from the 1980 classification (Corrick and Norman 1980; See Figure 2-3). In this regard, the conversion of vegetation communities at Sale Common and Macleod Morass from a predominantly freshwater character (for example, giant rush, common reed, cumbungi) to those of a brackish water character (brackish or swamp scrub/saltmarsh species) will represent a change in ecological character.	To be determined based on expert review.	Level B – VMCS mapping data describes wetland extent during 1980. This is coarse scale mapping and should be considered as indicative only. There is no available community data prior to listing.	P1, P2, C6, C7, C8
			The total mapped area of freshwater marshes (shrubs and reed wetland types) at Sale Common and Macleod Morass will not decline by greater than 50 per cent of the baseline value outlined in VMCS for 1980 (that is, 50 per cent of 402 hectares = 201 hectares) in two successive decades.	Sampling to occur at least twice within the decade under consideration.		
		Short Term	In existing freshwater wetland areas, the annual median salinity should not be greater than one grams per litre in two successive years. Note that where ambient water quality characteristics fall outside the range of these baseline levels, and ecosystem health indicators shows no signs of impairment, the LAC may need to be adjusted accordingly.	Annual median based on at least eight sampling periods per year, encompassing wet and dry periods.	Level C – No available baseline data. Value based on species salinity tolerances.	
C4	Fringing wetlands – brackish marsh (for example, Dowd	Long Term	For all fringing brackish wetlands: No change in wetland typology from the 1980 classification (Corrick and Norman 1980).	To be determined based on expert review.	As for C3.	P1, P2, C6, C7, C8

	Morass; The Heart Morass; Clydebank Morass, Lake Coleman {Tucker Swamp})	Medium Term	For Dowd Morass and the Heart Morass: The annual median salinity will be less than four grams per litre in five successive years. Note that where ambient water quality characteristics fall outside the range of these baseline levels, and ecosystem health indicators shows no signs of impairment, LAC may need to be adjusted accordingly.	Annual median based on at least eight sampling periods per year, encompassing wet and dry periods.	Level C – No available baseline data. This value is based on species tolerances and requirement for salinity to be less than four grams per litre to allow reproduction (refer Tilleard and Ladson 2010).	
		Long Term	The total area of common reed at Dowd Morass will not decline by greater than 50 per cent of the 1982 baseline value (that is, 50 per cent of 480 hectares = 245 hectares) outlined in Boon et al. (2007) in two successive decades.	Sampling to occur at least twice within the decade under consideration.	Level A – Boon et al. (2007) provides good quality mapping data relevant to time of listing.	
C5	Fringing wetlands – saltmarsh/hypersaline marsh (for example, Lake Reeve)	Medium Term	No change in wetland typology from the 1980 classification (Corrick and Norman 1980). The total mapped area of salt flat, saltpan and salt meadow habitat at Lake Reeve Reserve will not decline by greater than 50 per cent of the baseline value outlined in VMCS for 1980 (that is, 50 per cent of 5035 hectares = 2517 hectares) in two successive decades.	To be determined based on expert review. Sampling to occur at least twice within the decade under consideration.	As for C3.	P1, C6

C6	Abundance and diversity of waterbirds	Medium Term	The number of standard 20 minute searches (within any ten year period) where waterbird abundance is less than 50 individuals will not fall below 50 per cent of the 'baseline' value (based on Birds Australia count data – 1987-2010), for the following species: black swan = 15 per cent of surveys chestnut teal = 10 per cent of surveys Eurasian coot = 11 per cent of surveys. The absence of records in any of the following species in five successive years will represent a change in character: red- necked stint, sharp-tailed sandpiper, black swan, chestnut teal, fairy tern, little tern, musk duck, Australasian grebe, grey teal, Eurasian coot, great cormorant, red knot, curlew sandpiper. Median abundance (derived from at least three annual surveys {summer counts} over a 10-year period) falls below the 20th percentile baseline value. *Note: An adequate baseline will need to be established to assess this LAC (for example, at least three annual surveys (summer counts) over a 10-year period).*	Sampling to be undertaken at least twice a year over any 10 year period at stations containing favourable habitat for these species (see Table E8 for locations). Surveys should consist of standardised 20 minute counts. Sampling to be undertaken at least twice a year (during summer) at stations containing favourable habitat for these species (see section 3.4.1 for important locations). Recommended baseline monitoring program should include: A combination of aerial and ground surveys. Representative coverage of primary habitats within the site.	Level A – Birds Australia data, while standardised in terms of sampling effort per site, is not standardised in terms of frequency of sampling events at any given sampling location. Data should be considered indicative only. Level A – Records for these species are reliable. Birds Australia and DSE data can be used to assess this qualitative LAC. There are no baseline data available for this LAC.	P1, P2

C7	Presence of threatened frogs	Medium Term	The site will continue to support suitable habitat for growling grass frog and green and golden bell frog. In this regard, the LAC for Component 3 applies. There is insufficient data to develop a LAC relating directly to site usage by these species, which represents a critical information gap. Should baseline data become available in the future, the following LAC will apply: a significant reduction (greater than 25 per cent over a period of 5 years) in the local adult population within the site, especially for important local populations (for example, within Macleod Morass, Sale Common, Ewings Marsh, Roseneath wetlands (Morley Swamp and Victoria Lagoon), the Heart Morass and freshwater pools on Rotamah Island).	Refer to C3. Recommended baseline monitoring program should comprise a minimum two annual sampling periods separated by at least one year (and within a 5 year period).	Level C – Surveys for these species have been opportunistic. The most recent record for growling grass frog is 2007, whereas the green and golden bell frog was recorded at the site in 1998. There are no empirical data describing abundances at the site.	P1
C8	Presence of threatened wetland flora species	Long Term	The three threatened flora species (*Rulingia prostrata*, *Thelymitra epipactoides* and *Xerochrysum palustre*) continue to be supported within the boundaries of the Gippsland Lakes Ramsar site.	Based on opportunistic searches.	Level C – Setting of empirical limits of acceptable change is not possible at present, given the absence of quantitative estimates of population size of threatened species within the site, and more importantly the viability of populations (and their key controls) within the site.	P1
Critical processes						

<table>
<tr>
<td>P1</td>
<td>Hydrological regime</td>
<td>Short Term – Medium Term</td>
<td>Wetland wetting frequency, flushing frequency and flushing volume are maintained as follows:
<table>
<tr><td>Wetland</td><td>Wetting Frequency</td><td>Flushing Frequency</td><td>Required Flushing Volume</td></tr>
<tr><td>Sale Common</td><td>Annual with 100 per cent reliability</td><td>2-3 times/decade</td><td>4 GL</td></tr>
<tr><td>Dowd Morass</td><td>5-7 times/decade</td><td>2-3 times/decade</td><td>15GL</td></tr>
<tr><td>The Heart Morass</td><td>5-7 times/decade</td><td>2-3 times/decade</td><td>15GL</td></tr>
</table>
From Tilleard and Ladson (2010); note that larger flushing volumes (~20GL) are identified as being needed for Dowd and the Heart Morasses following saline flood events in the Lake Wellington system (for example, when the wetlands are filled with saline water from Lake Wellington and this corresponds with low flows in the Latrobe River).</td>
<td>Refer to LAC for details. Values measured at existing gauging stations in the lower reaches of the Rivers or otherwise in the wetlands themselves.</td>
<td>LAC have been identified for these wetlands on the basis that they are the best indicators of freshwater flows into the broader Gippsland Lakes system.

Level C – LAC based on Tilleard and Ladson (2010) ‘Hydrological Analyses to Support Determination of Environmental Water Requirements in the Gippsland Lakes’. This is a threshold-based LAC that is based on modelling and ecological assessments.

Note that these values should be considered as indicative only at this stage, and should be constantly reviewed.

Tilleard and Ladson (2010) indicate no work has been done for wetlands on the Mitchell (Macleod Morass); McLennan Straits (Morley Swamp, Lake Betsy); or Jones Bay.</td>
<td>C1 – C8
S1, S2</td>
</tr>
</table>

P2	Waterbird breeding	Short Term	Abandonment or significant decline (greater than 50 per cent) in the productivity of two or more representative breeding sites (based on two sampling episodes over a five year period) within any of the following site groupings: Lake Coleman, Tucker Swamp and Albifrons Island – Australian pelican. Bunga Arm and Lake Tyers – little tern and fairy tern. Macleod Morass, Sale Common and Dowd Morass – black swan, Australian white ibis, straw-necked ibis, and little black cormorant.	Recommended baseline monitoring program should comprise a minimum two annual sampling periods separated by at least one year (and within a 5 year period).	Level C – The use of the site by these species is well documented. However, there are no empirical data describing breeding rates. Baseline data will need to be collected to assess this LAC.	C6
Critical services/benefits						
S1	Threatened species	N/A	No LAC are proposed for painted snipe and Australasian bittern at the current time until greater information is available about patterns of usage and populations in the Ramsar site. Other threatened species are dealt with in the critical components above.	N/A	Level C – Site records are not recent, uncommon and the location within the Ramsar boundary not known.	P1, C3
		Long Term	Australian grayling continues to be supported in one or more of the catchments draining into the Gippsland Lakes.	Setting of more empirical limits of acceptable change not possible at present, given the absence of quantitative population data for this species for any of the rivers and creeks that drain into the site.	Level C – This species has been recorded in the major drainages that drain into the site. Juveniles have an apparent obligate estuarine phase, and therefore must use the site in order for this species to persist in these drainages. There are no data describing the population status of this species in these drainages.	P1, C1, C2
S2	Fisheries resource values	Medium Term	Total annual black bream commercial fishing catch per unit effort will not fall below the 10th percentile historical baseline value of 6.1 (see Section 3.8.2) in a five successive year period.	Median measured over five years.	Level B – While some commercial fish data has been accessed and	C1, C2, C3, C4, C5

			Sub-optimal black bream spawning conditions should not occur in any successive five year period within key spawning grounds (that is, mid-lower estuaries and adjacent waters of main lakes) during the peak spawning period (October to December). Based on Tilleard (2009), optimal conditions are as follows:	Annual median value for the period October to December.	reviewed as part of the current study, the abundance and usage of the Gippsland Lakes by key fish species of commercial and recreational significance is not well quantified. The baseline data used in this LAC has limited duration (five years), and is unlikely to be representative of patterns in abundance over longer timeframes. This LAC will need to reviewed and refined.	
			Water column salinity is maintained in brackish condition (for example, between 17-21 grams per litre median value) in the middle of the water column in the mid-lower estuaries and adjacent waters of the main lakes	As above.		
			The salt wedge is located within the mid-lower section of the estuarine river reaches or just out into the main lakes as opposed to far upstream or well-out into the Lakes.		Level C – based on conditions outlined in Tilleard (2009).	

C – component, P – process , S/B – service/benefit

2.2.3.2 Corner Inlet Ramsar Site

The Corner Inlet Ramsar Site is located on the south-east coast of Victoria. It is bounded to the west and north by the South Gippsland coastline, in the south-east by a series of barrier islands and sandy spits lying end to end and separated by narrow entrances, and to the south by the hills of Wilsons Promontory.

The Corner Inlet Ramsar Site also meets six of the Ramsar criteria (DoEE 2017o): 1, 2, 4, 5, 6 and 8 (as described above).

Corner Inlet is a very good example of a wetland enclosed by barrier islands in Victoria and contains the most extensive intertidal mudflats in Victoria. The area contains the only extensive bed of the Broad-leafed seagrass in Victoria. The islands of Corner Inlet, although not rich in plant diversity, are of high biogeographical significance as a result of their geological history and connectivity to the mainland during ice ages. The islands also contain significant areas of saltmarsh and mangroves, both of which are communities of very limited distribution. These communities filter pollutants, stabilize sediments and protect the shoreline from erosion.

Corner Inlet provides breeding habitat for a variety of waterbirds, including several species listed as threatened at the State level and/or occurring in significant numbers and habitat for significant aggregations of waterbirds during post-breeding, and as a refuge during adverse environmental conditions. Corner Inlet regularly supports well over 20,000 waterbirds including species such as the Eastern curlew, Curlew sandpiper, Bar-tailed godwit, and Double-banded plover.

The Corner Inlet Ramsar Site has regularly supported more than one per cent of the population of the Pied oystercatcher, Sooty oystercatcher, Pacific gull, Fairy tern, Red knot, Red necked stint and Chestnut teal.

Corner Inlet supports the nationally critically endangered Orange bellied parrot as well as several other vulnerable and endangered species, including the growling grass frog and Australian grayling. The Southern right whale, Leathery turtle, Swift parrot and Shy albatross have all also been recorded at the site.

Corner Inlet provides important habitats, feeding areas, dispersal and migratory pathways, and spawning sites for numerous fish species. Some of these include King George whiting, Australian salmon, greenback flounder, southern garfish, leatherjackets (several species), short-finned eel and gummy shark.

Corner Inlet was used traditionally by Indigenous people and many archaeological sites including scarred trees, burial sites, artefact scatters, shell middens and camps have been found. Currently, the Ramsar site is used for biological conservation, ports with servicing facilities for off-shore oil and natural gas exploration, commercial fishing, recreational fishing, and other recreational activities. Diving is popular around the numerous shipwreck sites in Corner Inlet and around the barrier islands (DoEE, 2017o).

The site is protected as a Ramsar site by the Nooramunga and Corner Inlet Marine and Coastal Parks, and by part of it lying within the Corner Inlet Marine National Park (Section 2.2.8.11). The locality of the Ramsar site is shown in Figure 2-7.

The ecological character description (ECD) of the Corner Inlet Ramsar Site is summarised in

Table 2-7 with limits of acceptable change summarised in Table 2-8 (DSEWPAC, 2011b).

In the context of the Bass Strait Operations and predicted extent of the DA, critical components that may be affected by a major spill event include Seagrass, mangroves, saltmarshes and intertidal and subtidal waters (C1), Waterbird breeding (P1), Threatened species (S1) and Fish abundance (S2).

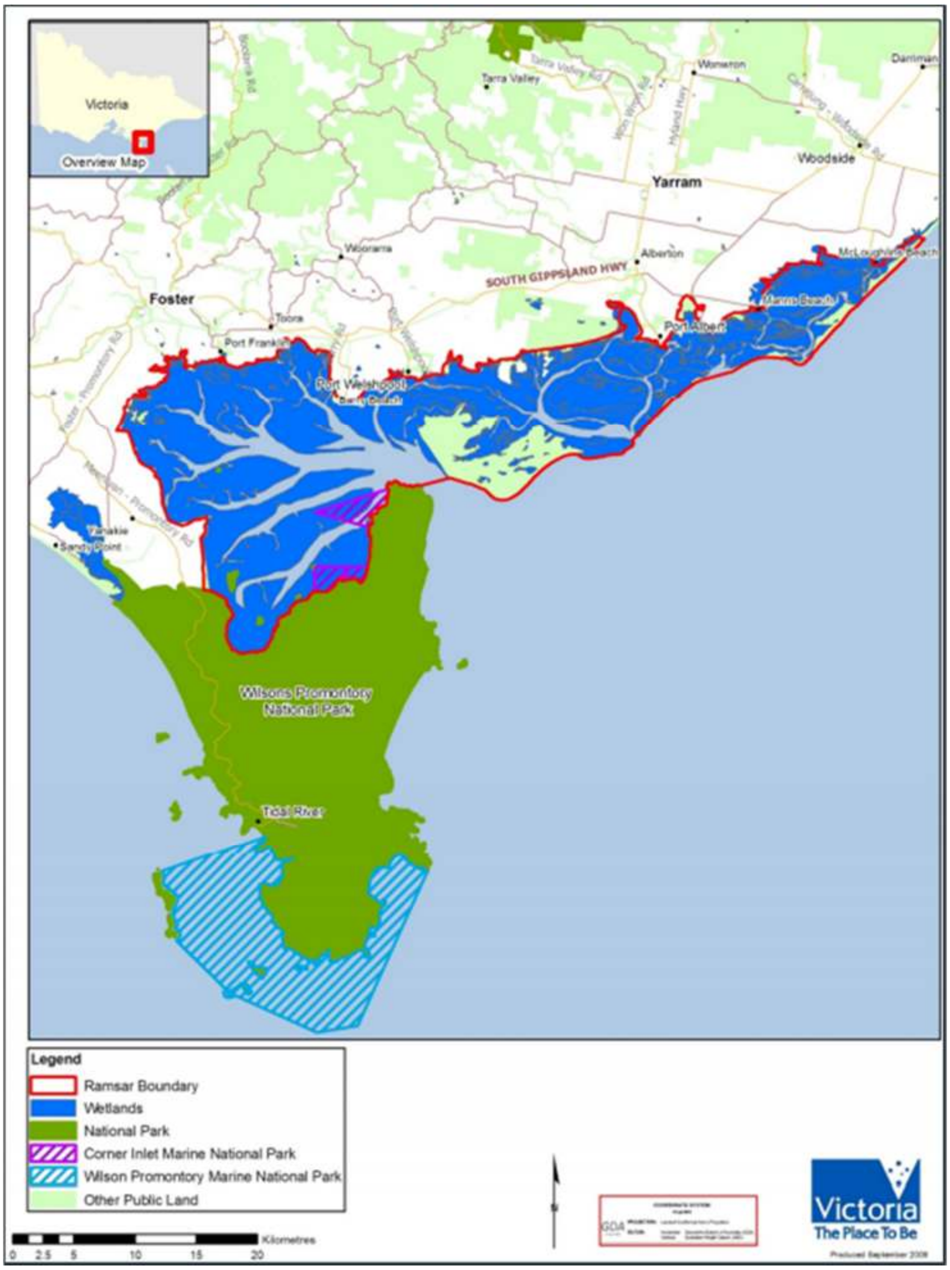


Figure 2-7 Locality of Corner Inlet Ramsar Site (DSEWPAC, 2011b)

Table 2-7 Summary of critical components, processes and services/benefits for the Corner Inlet Ramsar site (DSEWPAC, 2011b)

Critical Components	Critical Processes	Critical Services/Benefits
C1. Several key wetland mega-habitat types are present: • seagrass • intertidal sand or mud flats • mangroves • saltmarshes • permanent shallow marine water **C2.** Abundance and diversity of **waterbirds**	**P1. Waterbird breeding** is a key life history function in the context of maintaining the ecological character of the site, with important sites present on the sand barrier islands	S1. The site supports nationally threatened fauna species including: • orange-bellied parrot • growling grass frog • fairy tern • Australian grayling **S2.** The site supports **outstanding fish habitat values** that contribute to the health and sustainability of the bioregion
Supporting Components	**Supporting Processes**	**Supporting Services/Benefits**
Important **geomorphological features** that control habitat extent and types include: • sand barrier island and associated tidal delta system • the extensive tidal channel network • mudflats and sandflats. **Invertebrate megafauna** in seagrass beds and subtidal channels are important elements of biodiversity and control a range of ecosystem functions. The **diverse fish communities** underpin the biodiversity values of the site	**Climate**, particularly patterns in temperature and rainfall, control a range of physical processes and ecosystem functions Important **hydraulic and hydrological processes** that support the ecological character of the site includes**:** • Fluvial hydrology. Patterns of inundation and freshwater flows to wetland systems • Physical coastal processes. • Hydrodynamic controls and marine inflows that affect habitats through tides, currents, wind, erosion and accretion. • Groundwater. For those wetlands influenced by groundwater interaction, the level of the groundwater table and groundwater quality. **Water quality** underpins aquatic ecosystem values within wetland habitats. The key water quality parameters for the site are salinity, turbidity, dissolved oxygen and nutrients. Important **biological processes** include nutrient cycling and food webs.	The site supports **recreation and tourism values** (scenic values, boating, recreational fishing, camping, etc.) that have important flow-on economic effects for the region. The site provides a range of values important for **scientific research**, including a valuable reference site for future monitoring.

Table 2-8 Limits of acceptable change (LAC) – Corner Inlet Ramsar site (DSEWPAC, 2011b)

Number	Indicator for Critical Component / Process/Service for the LAC	Relevant timescale[1]	Limit(s) of Acceptable Change	Spatial scale/temporal scale of measurements	Underpinning baseline data	Secondary critical C,P,S addressed through LAC
Critical Components						
C1	Seagrass extent	Long Term	• Total mapped extent of dense *Posidonia* will not decline by greater than 10 percent of the baseline value outlined by Roob *et al.* (1998) at a whole of site scale (baseline = 3050 hectares; LAC = mapped area less than 2745 hectares) on any occasion. (Note: the small degree of allowable change recognises that this seagrass species is a critical habitat resource and generally shows low natural variability.) • Total mapped extent of the dense and medium density Zosteraceae will not decline by greater than 25 percent of the baseline values outlined by Roob *et al.* (1998) at a whole of site scale on two sampling occasions within any decade. • Dense *Zostera* - Baseline = 5743 hectares (LAC = mapped area less than 4307 hectares) • Medium *Zostera* - Baseline = 1077 hectares (LAC = mapped area less than 807 hectares) (Note: the moderate degree of allowable change recognises that these seagrass species generally show moderate degrees of natural variability)	Sampling to occur at least twice within the decade under consideration. Note that the seagrass assessment by Hindell (2008) did not produce mapping but did use similar sampling sites to Roob *et al*.	Recent quantitative data describes seagrass condition at various sites but over a limited timeframe. It is thought that the Roob *et al*. (1998) study under-estimated the total available seagrass habitat (J. Stevenson, Parks Victoria, pers. comm. February 2011), hence a 10 per cent change from this baseline value would represent a larger actual change from the true baseline. ***Note***: Prior to declaration, *Posidonia* covered approximately 44 per cent (11,900 hectares) of the site (Poore 1978). Morgan (1986) estimated that *Posidonia* meadows covered 11,900 hectares in 1965 and 9,000 to 9,500 square kilometres in 1983–84. There is uncertainty regarding these mapping data and therefore empirical LACs	S2

[1] *Short Term – measured in years; Medium Term – five to 10 year intervals; Long term – 10+ year intervals.*

Number	Indicator for Critical Component / Process/Service for the LAC	Relevant timescale[1]	Limit(s) of Acceptable Change	Spatial scale/temporal scale of measurements	Underpinning baseline data	Secondary critical C,P,S addressed through LAC
					have not been developed from these data.	
	Mangrove forest extent	Long term	• Based on EVC mapping, it is estimated that mangroves presently cover an area of 2137 hectares within the site (see Section 3.3.1). A 10 percent reduction in the total mapped mangrove area, observed on two sampling occasions within any decade, is an unacceptable change. (LAC – mapped area less than 1924 hectares). (Note: the small degree of allowable change recognises that mangroves are a critical habitat resource and generally shows low natural variability)	Sampling to occur at least twice within the decade under consideration.	No available data to determine changes in extent over time. It is unlikely that this has changed markedly since Ramsar listing. Note that there are uncertainties regarding the quality of existing mapping, and therefore the baseline value should be considered as indicative only.	S2
	Saltmarsh extent	Long term	• Based on EVC mapping, it is estimated that intertidal saltmarsh presently covers an area of 6500 hectares within the site (see Section 3.3.1). A 10 percent reduction in the total mapped saltmarsh area, observed on two sampling occasions within any decade, is an unacceptable change (LAC – mapped area less than 5850 hectares). (Note: the small degree of allowable change recognises that saltmarsh is a critical habitat resource and generally show low natural variability)	Sampling to occur at least twice within the decade under consideration.	No available data to determine changes in extent over time. It is unlikely that this has changed markedly since Ramsar listing. The note regarding data quality for mangroves applies also to saltmarsh.	S2
	Shallow subtidal waters	Long term	• A greater than 20 percent reduction in the extent of subtidal channel (areas mapped by NLWRA = 16 349 hectares), observed on two sampling occasions within any decade, will represent a change in ecological character (LAC – mapped area less than 13 079 hectares). (Note: the moderate degree of allowable change recognises that shallow subtidal waters represent a critical	Sampling to occur at least twice within the decade under consideration.	NLWRA mapping data describes wetland extent. This is coarse scale mapping and should be considered as indicative only. ***Note***: there is a need to develop a condition-based LAC for this critical component. While some water quality data	S2

Number	Indicator for Critical Component / Process/Service for the LAC	Relevant timescale[1]	Limit(s) of Acceptable Change	Spatial scale/temporal scale of measurements	Underpinning baseline data	Secondary critical C,P,S addressed through LAC
			habitat resource, generally show low natural variability, but data reliability is low)		exists, this is presently insufficient to derive a LAC (i.e. whether a change in water quality represents a true change in ecological character of the wetland)	
	Inlet waters (intertidal flats)	Long term	• A greater than 20 percent reduction in the extent of permanent saline wetland – intertidal flats (areas mapped by DSE = 40 479 hectares, see Figure 3-1), observed on two sampling occasions within any decade, will represent a change in ecological character (LAC – mapped area less than 36 431 hectares). (Note: the moderate degree of allowable change recognises that intertidal flats represent a critical habitat resource and generally show low natural variability. A loss of intertidal flat would also result in changes in seagrass)	Sampling to occur at least twice within the decade under consideration.	VMCS mapping data describes wetland extent. This is coarse scale mapping and should be considered as indicative only. ***Note***: there is a need to develop a condition-based LAC for this critical component. While some water quality data exists, this is presently insufficient to derive a LAC (i.e. whether a change in water quality represents a true change in ecological character of the wetland)	S2
C2	Abundance and of waterbirds	Short term (All species)	• Mean annual abundance of migratory bird species - Birds Australia (2009c) notes that there is a maximum annual abundance of migratory species of 42 811 birds, with a mean annual abundance of migratory species being 31 487 birds (deriving from 28 years of data collection to September 2008). The annual abundance of migratory shorebirds will not decline by 50 per cent of the long-term annual mean value (that is, must not fall below 15 743 individuals) in three consecutive years. (Note: the large degree of allowable change recognises that these species can show high	At least four annual surveys (summer counts) within the decade under consideration.	Bird count data are available from a variety of programs, most notably Birds Australia monitoring programs	P2

Number	Indicator for Critical Component / Process/Service for the LAC	Relevant timescale[1]	Limit(s) of Acceptable Change	Spatial scale/temporal scale of measurements	Underpinning baseline data	Secondary critical C,P,S addressed through LAC
			levels of natural variability, and that limitations of existing baseline data)change recognises that these species can show high levels of natural variability, and that limitations of existing baseline data)			
		Short term (individual species)	• Mean annual abundance of migratory species that meet the one per cent criterion will not be less than 50 per cent of the long-term annual mean value in five years of any ten year period. These values are follows: • curlew sandpiper – baseline = 2588 birds, LAC = 1294 birds • bar tailed godwit – baseline = 9727 birds, LAC = 4863 birds • eastern curlew – baseline = 1971 birds, LAC = 985 birds • pied oystercatcher – baseline = 893 birds, LAC = 446 birds • sooty oystercatcher – baseline = 285 birds, LAC = 142 birds • double-banded plover– baseline = 523 birds, LAC = 261 birds There are insufficient baseline data to determine long-term average abundance of fairy tern and Pacific gull. (Note: the large degree of allowable change recognises that these species can show high levels of natural variability, and that limitations of existing baseline data)	At least five annual surveys (summer counts) within the decade under consideration.	Bird count data are available from a variety of programs, most notably Birds Australia monitoring programs	P2
Critical Processes						
P1	Waterbird breeding	Short Term	A greater than 50 per cent decrease in nest production at two or more monitoring stations (based on two sampling	Recommended baseline monitoring	The use of the site by these species is well documented.	C2

Number	Indicator for Critical Component / Process/Service for the LAC	Relevant timescale[1]	Limit(s) of Acceptable Change	Spatial scale/temporal scale of measurements	Underpinning baseline data	Secondary critical C,P,S addressed through LAC
			episodes over a five year period) within any of the following locations and species: • Clomel Island - fairy tern, hooded plover, Caspian tern, crested tern • Dream Island - fairy tern, hooded plover, crested tern • Snake Island and Little Snake Island - pied oystercatcher	program should comprise a minimum two annual sampling periods separated by at least one year (and within a five year period).	However, there are no empirical data describing nest or egg production rates. Baseline data will need to be collected to assess this LAC.	
Critical Services/Benefits						
S1	Threatened Species	N/A	For orange-bellied parrot and growling grass frog, an unacceptable change will have occurred should the site no longer support these species.	Based on multiple targeted surveys at appropriate levels of spatial and temporal replication (at least four annual surveys in preferred habitats) over a 10 year period.	Most site records are based on opportunistic surveys	P1, C3
		Short Term	For Australian grayling, an unacceptable change will have occurred should all of the drainages that drain into Corner Inlet no longer support this species.	Based on four annual surveys in a 10 year period at multiple sites located in all major catchments.	This species has been recorded in the major drainages that drain into the site. There are no data describing the population status of this species in the site. Abundance data are available for drainages that discharge into the site (Ecowise 2007; O'Connor *et al.* 2009). O'Connor *et al.* (2009) notes that collection of this species is difficult and requires targeted survey techniques. Few targeted empirical surveys have	P1, C1, C2

Number	Indicator for Critical Component / Process/Service for the LAC	Relevant timescale[1]	Limit(s) of Acceptable Change	Spatial scale/temporal scale of measurements	Underpinning baseline data	Secondary critical C,P,S addressed through LAC
					been undertaken in the site's drainages to date	
S2	Fish abundance (using fish catch of key species as a surrogate)	Medium term	An unacceptable change will have occurred if the long term (greater than five years) median catch falls below the 20th percentile historical baseline values in standardised abundance or catch-per unit effort of five or more commercially significant species (relative to baseline) due to altered habitat conditions within the site. The 25th percentile pre-listing baseline commercial catch per unit effort values for the site are as follows (units are tonnes per annum per number of boats): Australian salmon 379 rock flathead 316 southern sand flathead 373 greenback flounder 514 southern garfish 1452 yelloweye mullet 740 gummy shark 167 King George whiting 1347	Annual fish catch measured over a greater than five year period.	Commercial fish catch data. Note that there are presently no fisheries-independent baseline data (collected using empirical, systematic methods) describing patterns in the distribution and abundance of key species. Therefore, the limits of acceptable change should be treated with caution, noting socio-economic factors should be taken into account when assessing catch data underpinning this LAC.	S2

2.2.3.3 Logan Lagoon Ramsar Site

The site is an excellent, regionally representative example of a coastal estuarine wetland system and includes Logan, Syndicate and Wilsons Lagoons, Pot Boil Point and part of Planters Beach.

The Logan Lagoon Ramsar site is enclosed within the Logan Lagoon Conservation Area and is located on the south-east corner of Flinders Island in Bass Strait, Tasmania.

Logan Lagoon meets five of the Ramsar Criteria: 1, 2, 3, 4 and 6.

The Logan Lagoon Ramsar site is in the Tasmanian Australian Drainage Division. It contains two sites listed on the Tasmanian Geoconservation Database; Logan Lagoon Holocene Shorelines and Planter Beach Coastal Barrier System. Logan Lagoon, with other lagoons and dunes in the area, provides a representative and outstanding example of the development of Holocene shorelines for the local region. Planter Beach Coastal Barrier System, partly within the site, is a representative and outstanding example of how offshore bars formed with Holocene sea level rise and barrier growth has enclosed the coast, forming large lagoons. Logan Lagoon is recognised as a wetland in near pristine condition.

The nationally threatened Northern leek orchid occurs within the Logan Lagoon Ramsar site (DoEE, 2017v). The nationally threatened subspecies of the Common wombat (Bass Strait) also occurs on the site and is restricted to Flinders Island.

Logan Lagoon supports species and communities threatened in the Tasmania Drainage Division, particularly Callitris rhomboidea forest and the rayless starwort. The site provides breeding habitat for two beach nesting shorebirds that are threatened in the region, the Fairy tern and Little tern.

The Logan Lagoon Ramsar site is an important area for birds migrating between south-eastern Australia and Tasmania. The lagoon supports five migratory bird species, the Red-necked stint, Curlew sandpiper, Sharp-tailed sandpiper, Common greenshank, and Little tern. The site also regularly supports one percent of the global or regional populations of: Hooded plover, Fairy tern, Musk duck, and Chestnut teal (DoEE 2017v).

In the context of the Bass Strait Operations and predicted geographical extent of the DA, critical components that may be affected by a major spill event include water quality (should tidal exchange occur), threatened wetland-dependent plant species, threatened saline plant communities and shorebird and waterbird species.

The locality of the Ramsar site is shown in Figure 2-8. The critical components and processes of the Logan Lagoon Ramsar site and its limits of acceptable change are shown in Table 2-9.

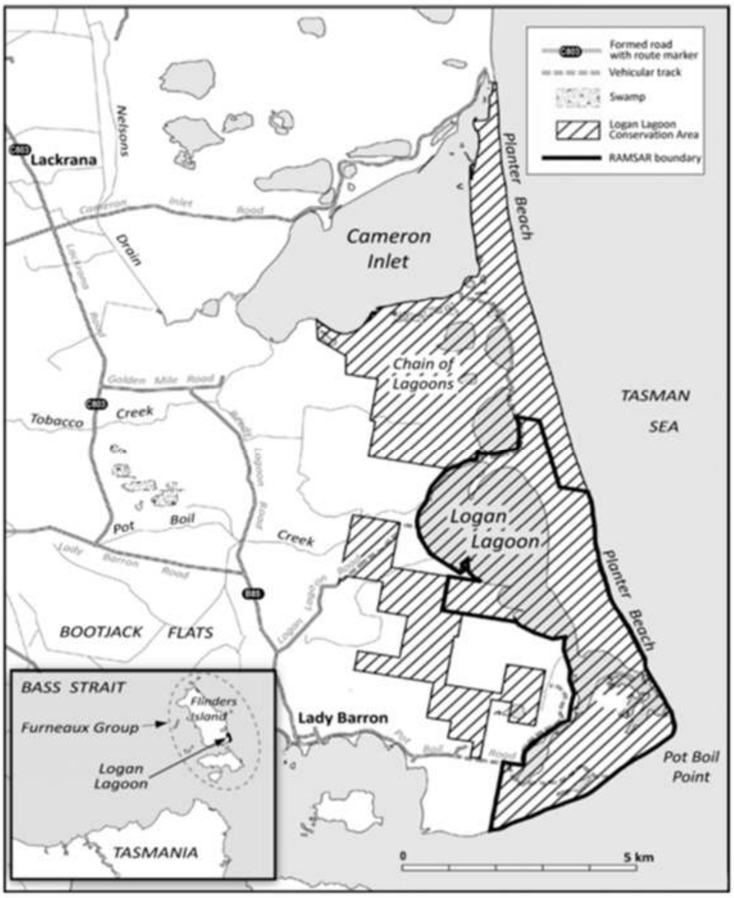


Figure 2-8 Locality Logan Lagoon Ramsar Site (Finley and Roberts, 2010)

Table 2-9 Limits of acceptable change for critical components and processes of the Logan Lagoon Ramsar site (Finley and Roberts, 2010).

Critical Component/Process / Service	Baseline / supporting evidence	Limit of acceptable change
Climate: Understanding the interactions between the physical conditions at the site and its subsequent use by flora and fauna is important. For example, waterbirds may use the site for breeding only in years when water levels are moderate and there is adequate area for nesting on the shores.		
Climate	The particular attributes of climate that are important in maintaining the ecological character of the site are rainfall, temperature, wind and evaporation. Climate predictions for north-eastern Tasmania suggest a generally warmer climate which is wetter in all seasons. Mean daily temperatures are projected to be warmer (both minimum and maximum temperatures) with increased solar radiation, relative humidity in summer, and increased evaporation (ACE CRC 2010).	The links between climatic conditions, the hydrological responses to such conditions, and their impact on the biological components are poorly understood and should be further investigated. No LAC can be determined due to a lack of understanding of the impact of climatic processes on other critical components, processes and services, such as, hydrology, geomorphology, flora and fauna.
Geomorphology: Protecting the geological features, including the integrity and structure of the dunes, is important for the purposes of geoconservation and maintaining the ecological character which contributes to the site's listing under Criterion 1.		
Holocene Shorelines and dune systems	There are approximately 54 hectares of shorelines, spits and dune systems that are important for maintaining the geoconservation value of the site under Criterion 1. The area of shorelines, spits and dunes defined in the TASVEG mapping layers require ground-truthing.	Currently there are 54 hectares of high quality shorelines, dune systems and spits mapped within the site. In the absence of studies detailing impacts from human disturbance, a common-sense approach has been adopted, setting a limit of acceptable change at not more than 3 hectares (2 percent) of the area of the Holocene shoreline and dune systems showing evidence of human disturbance through vehicle use or foot traffic. Because the wetland map was made without proper ground-truthing, verification of areas will be required.
Hydrology: The hydrological regime is a major driver in the vegetation communities at the site, particularly for wetland-dependent communities. The availability of water plays a key role in the attractiveness of the site for resting and breeding of resident and migratory fauna, especially birds.		
Surface water flow	Flow regimes are poorly understood: Historically, the lagoon mouth has been artificially breached by local landowners. Alterations to the natural hydrological regime impacts on other components such as geomorphology, water quality, vegetation and fauna. Surrounding farmland drains into the lagoon via a series of channels. High water levels in the lagoon have previously been blamed for inundated pasture on surrounding farms. The link between climate and hydrology is poorly understood. For example, the amount of rainfall required to maintain the natural hydrology.	No unnatural opening of the lagoon mouth. Site observations indicate that fluvial inflows are a significant input of surface water to the lagoon. Whilst this inflow is beneficial in maintaining water in the lagoon, poor water quality in inflow waters could offset this benefit. Site specific hydrology data and further water quality data is therefore required before LAC can be set that takes into account these factors.

Tidal exchange	Historical information on lagoon mouth opening is anecdotal. Future monitoring should include the status of the lagoon entrance (open/closed) because parameters such as salinity may be highly variable when the lagoon is open to the ocean.	No unnatural opening of the lagoon mouth. The lagoon is rarely open to the ocean. However, when the hydrological regime shifts to a marine system, advice on appropriate parameters should be sought.
Water Quality: provides suitable water quality to support the persistence of wetland dependent flora and fauna. The ecological character of the site currently depends on the quality of water entering and being retained within the lagoon. Baselines need to be set before LAC can be set.		
Water quality	Only two water samples recorded from the site. <u>pH</u>: Limited data indicates pH of 7.2-7.7 in Logan Lagoon waters. Potential for acid sulphate soils to impact on pH of lagoon waters. <u>Salinity:</u> Limited data indicates salinity (as Total Dissolved Solids) ranging between 2,600-35,700 mg/L: Salinity highly variable depending on seasonal climatic and hydrological processes. <u>Dissolved Oxygen:</u> No data available. <u>Turbidity:</u> Limited data indicates range between 0.5 and 4.9 NTU: Turbidity varies with freshwater inflows, wind and tidal influences. <u>Nutrients</u>: Limited site data indicates Total P (0.09 – 0.2 mg/L and Total N (1.4-1.5 mg/L).	Cannot determine LAC due to insufficient data.
Vegetation: the hydrology, climate, water quality and soil quality of Logan Lagoon influence the vegetation that is supported at the site. The threatened wetland-dependent vegetation communities contribute to the regional biodiversity and selection of Criterion 1 and 3.		
Holocene Shorelines and dune systems	There are currently three threatened wetland-dependent plant species mapped at the site.	In the absence of accurate mapping, a common sense approach has been adopted, setting a limit of acceptable change as the persistence of the following threatened species within the Logan Lagoon boundary: Swamp fireweed (*Senecio psilocarpus*) Large-fruit seatassel (*Ruppia megacarpa*) Northern leek orchid (*Prasophyllum secutum*) These three species are cryptic and therefore seasonally specific surveying will be required to identify them. Species should be observed during two out of every three surveys.
Threatened plant communities	Poor quality information on the current distribution and abundance of threatened plant communities because maps based on TASVEG Mapping Layers have not been ground-truthed. The areas of threatened wetland-dependent vegetation communities are: Saline aquatic herbland = 9.23 hectares	There are 14.22 hectares of threatened wetland-dependent vegetation communities at the site. Common sense would suggest no loss greater than 10 percent for each wetland type based on TASVEG mapping layers. Because the wetland map was made without proper ground-truthing, verification of areas will be required. Based on current estimates made for this

	Freshwater aquatic herbland = 1.28 hectares Lacustrine herbland = 3.71 hectares.	ECD, the maximum areas of threatened wetland vegetation that could be lost before causing unacceptable change to the site are: Saline aquatic herbland: 0.9 hectares Freshwater aquatic herbland: 0.5 hectares Lacustrine herbland: 4 hectares.
Fauna: Logan Lagoon supports and large number of birds, many with conservation significance locally, nationally, and internationally which justifies the selection of Ramsar criteria 3, 4 and 6.		
Number of waterbird species counted at the site annually	Annual counts of waterfowl carried out at Logan Lagoon during February 1985 - 2009, excluding 1987, 1989, 1994 and 2008. The area counted varied among years and data are not comparable, making it difficult to detect population trends.	No LAC can be determined due to insufficient data. To be defined once population trends for waterfowl are clear from systematic annual counts.
Number of shorebirds recorded in annual surveys	There has been no systematic, long term monitoring of shorebirds within the Ramsar site to enable a numerical baseline to be set, although Birds Tasmania conducted counts along the ocean coastline of the site in 2008 and 2010, and is planning future work.	No LAC can be determined due to insufficient data. To be defined once population trends for shorebirds are clear from systematic annual counts.
Threatened mammals, reptiles, amphibians	Very little systematic data. Poor information on the current distribution and abundance of threatened species.	No LAC can be determined due to insufficient data. To be defined once systematic surveys undertaken for a range of species.

2.2.3.4 East Coast Cape Barren Islands Lagoons Ramsar Site

The East Coast Cape Barren Island Lagoons Ramsar site is located on the east coast of Cape Barren Island, one of the Furneaux Group of islands which lie in Bass Strait to the north-east of Tasmania. The site extends from just north of Tar Point down to Jamieson's Bay and extends westwards from the coast for a distance varying from one to four kilometres. The site meets two of the Ramsar Criteria: 1 and 3.

The East Coast Cape Barren Island Lagoons site is significant as it forms a representative sample of coastal lagoons in the Flinders Biogeographic Region and is relatively undisturbed. The Cape Barren Dunes, within the site, are a geoconservation site in Tasmania. Thirsty Lagoon is a hypersaline lagoon and is a Tasmanian estuary of critical conservation significance. Three of the lagoons within the site, Flyover Lagoon 1, Flyover Lagoon 2 and Little Thirsty Lagoon, have been assessed as near pristine wetlands for Tasmania.

The critical components and processes for the site at the time of listing in 1982 have been determined to be geomorphology, hydrology and vegetation types. While there is some anecdotal evidence that this site is important for shorebirds, there is insufficient data to evaluate whether they are a critical component (DSEWPAC, 2008).

The Ramsar site is an important habitat for a number of plant species and vegetation communities. Thirteen threatened species listed in Tasmania occur on the site, including the Furze hakea and horny cone bush. The site represents the only known reserve in Tasmania for the threatened pink bladderwort. The White-bellied sea eagle, listed as vulnerable in Tasmania, and the Ruddy turnstone, listed under international migratory conservation agreements, also occur within the site.

This area is of cultural importance to the local Indigenous community, who manage the freehold title to part of Cape Barren Island, including the Ramsar site. Access is currently restricted, keeping the site largely undisturbed (DSEWPAC, 2008).

In the context of the Bass Strait Operations and predicted geographical extent of the DA, critical components that may be affected by a major spill event include estuarine waters, coastal brackish or saline lagoons, intertidal marshes, intertidal mud sand or salt flat and, threatened flora species.

The locality of the Ramsar site is shown in Figure 2-9. The critical components and processes of the East Coast Cape Barren Island Lagoons Ramsar and its limits of acceptable change are shown in Table 2-10.

Figure 2-9 Locality of East Coast Cape Barren Island Lagoons Ramsar site (DSEWPAC, 2008)

Table 2-10 Summary of limits of acceptable change for the East Coast Cape Barren Island Lagoons Ramsar site (DSEWPAC, 2008)

Critical ecological components, processes and services	Baseline condition and range of natural variation where known	Limit(s) of Acceptable Change* (based on baseline and natural variability)	Basis of LAC	Level of confidence
Critical component and process: Geomorphology and Hydrology *Critical service:* Natural or near-natural wetland ecosystem	There is a diversity and range of Ramsar wetland types which are defined by their geomorphology and hydrology. There is an absence of information relating to the variability in extent and types of wetland around the time of listing	The areal extent of Ramsar wetland types does not change by ±20%, i.e. • estuarine waters ± 20% from 200 hectares • intertidal marshes ± 20% from 44 hectares • coastal brackish/saline lagoons ± 20% from 375 hectares • intertidal mud sand or salt flats ± 20% from 55 hectares.	Based on aerial photograph interpretation and geomorphological mapping by Mowling (2007).	Low: Limited confidence in estimates of aerial extent. Limited data on changes to geomorphology, hydrology and vegetation types since time of listing (refer to Chapter 7 of ECD).
Critical component and process: Hydrology *Critical service:* Natural or near-natural wetland ecosystem	Hydrology as a critical component and service is linked to the geomorphology of the wetland.	As above, this LAC is linked to the geomorphology of the wetland.	As above	As above
Critical component Vegetation types *Critical service*: Natural or near-natural wetland ecosystem	Thirteen different Tasmanian wetland vegetation communities were identified within site which corresponds to six TASVEG communities. Sixteen flora species have been recorded on site that are threatened in Tasmania. Vegetation succession is an integral component of the ECCBIL wetlands such that some changes in vegetation communities are normal.	Maintenance of the extant TASVEG vegetation communities on site at time of listing i.e. • lacustrine herbland (AHL) • freshwater aquatic sedgeland and rushland (ASF) • freshwater aquatic herbland (AHF) • saline aquatic herbland (AHS) • saline sedgeland/rushland (ARS)	Based on the limited available vegetation data i.e. TASVEG mapping, the Kirkpatrick and Harwood (1981) survey and expert opinion.	Low: Not confident in the data and not confident that this will represent a change in ecological character. Limited information about the variability in extent and condition of the vegetation types since the time of listing is available. Difficult to describe baseline condition and variability (refer to Chapter 7 of ECD).

Critical ecological components, processes and services	Baseline condition and range of natural variation where known	Limit(s) of Acceptable Change* (based on baseline and natural variability)	Basis of LAC	Level of confidence
		• succulent saline herbland (ASS).		

*Exceeding or not meeting a LAC does not automatically indicate that there has been a change in ecological character

2.2.3.5 Flood Plain Lower Ringarooma

The Flood Plain Lower Ringarooma River Ramsar site is located on the far north-east coast of Tasmania, between Cape Portland and Waterhouse Point and covers an area of 3519 hectares.

The Flood Plain Lower Ringarooma River Ramsar site is rare within the Drainage Division, as it is rare for large rivers in Tasmania to be flowing through flood plains and forming the mosaic of wetlands that the Ringarooma River does. The site contains good condition, regionally representative examples of wetland systems within a flood plain, with a mosaic of permanent and seasonal marshlands and a large river estuary (Boobyalla Inlet). Boobyalla Inlet is recognised as a Tasmanian estuary with high conservation significance.

The site meets Ramsar Criteria 1, 2, 3 and 4. It supports six fauna species listed as nationally threatened including four wetland dependant species. : green and gold frog (Litoria raniformis-Vulnerable) , dwarf galaxias (Galaxiella pusilla - Vulnerable), fairy tern (Sterna nereis- Vulnerable), Australian grayling (Prototroctes maraena - Vulnerable), Australasian bittern (Botaurus poiciloptilus - Endangered) and shiny grasstree (Xanthorrhoea bracteata - Endangered) (Newall and Lloyd, 2012a). The series of shallow freshwater lagoons at the site are an important feeding and nesting place for many species of waterbirds. A number of migratory birds have been recorded from the site, including eleven listed species.

The locality of the Ramsar site is shown in Figure 2-10. The critical components and processes of the Flood Plain Lower Ringarooma River site and its limits of acceptable change are shown in Table 2-11.

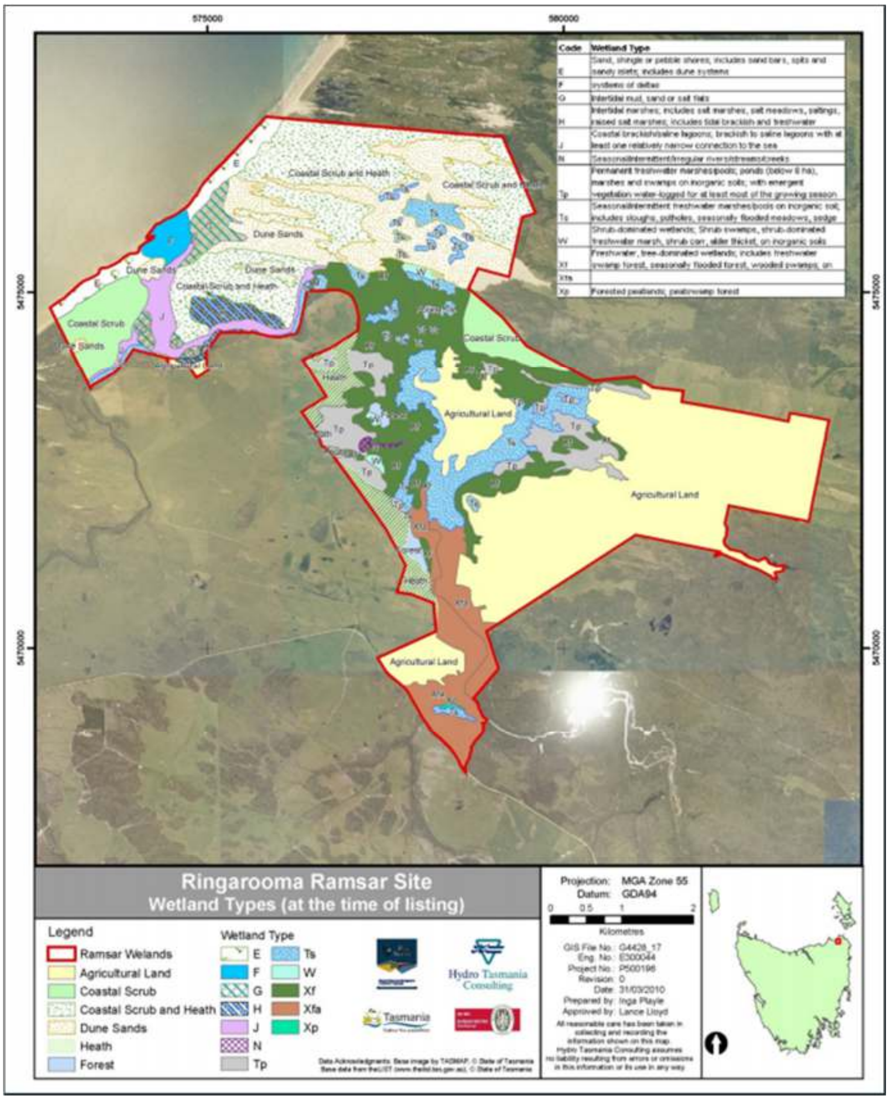


Figure 2-10 Locality and wetland type of Ringarooma Ramsar Site

Table 2-11 Critical Components and Limits of Acceptable Change for the Flood Plain Lower Ringarooma River Ramsar Site.

Critical Component, Process or Service	Baseline Information	Limits of acceptable change*	Confidence level	Justification and Comments
All Ramsar wetland types identified as being present at time of listing except Freshwater aquatic sedgeland and rushland (Ts) (service = supports Ramsar wetland types).	Using a vegetation survey (DPIW 2006), aerial photographs, and a site inspection, the following areas were identified for each wetland type (hectares): E = 74, F = 33 G = 58, H = 44 J = 74, N = 5 Tp= 169, W = 13 Xf = 614, Xp = 1	Not more than a 20 percent loss in area of any wetland type in nine out of 10 years. So that is, no more than: • 15 hectares for E • 6.5 hectares for F o 12 hectares for G • 9 hectares for H • 15 hectares for J • 1 hectare for N • 34 hectares for xp • 2.5 hectares for W • 123 hectares for Xf • 0.2 hectares for Xp	Medium – site specific measures of area are used: however, the 20 percent change is not quantitatively derived.	There are no data on the variability of the wetland habitat types and, until this ECD, there was no mapping of the wetland types. These limits have been set as a common sense approach to defining a significant change in the area of each wetland type. Monitoring into the future should incorporate changes to wetland type over time to refine this LAC.
Freshwater aquatic sedgeland and rushland (Ts) (service = supports Ramsar wetland types).	Using a vegetation survey (DPIW 2006), aerial photographs and a site inspection, an area of 257 hectares was identified as freshwater aquatic sedgeland and rushland at the time of listing.	No less than 298 hectares of freshwater aquatic sedgeland and rushland should be present at the site in nine out of 10 years. This represents 80 percent (for example a 20 percent loss) of the current area of this wetland type (373 hectares).	Medium – site specific measures of area are used: however, the 20 percent change is not quantitatively derived.	At listing, the site contained a large area of agricultural land (rough grazing) in Fosters Swamp. Grazing has subsequently ceased and the area allowed to regenerate into sedgeland and rushland, increasing the total area of this vegetation type to 373 hectares. There are no data on the variability of the wetland habitat type at the site and, until this ECD, there was no mapping of the wetland types. A limit of 20 percent has been set as a common sense approach to defining a significant change in the area of each wetland type. Monitoring into the future will refine this LAC.
Rare plant species (service = supporting populations important for regional biodiversity).	The only baseline information available is that four rare wetland dependent species were recorded as being at the site at the time of designation.	Presence in nine out of 10 years of: • native gypsywort • erect marshflower • purple loosestrife • ribbon weed	Low	There is no quantitative information on these species within the site. Therefore quantitative limits of acceptable change cannot be set and a qualitative LAC based on presence / absence of these four species is provided. Based on lack of data for the site, confidence in the LAC representing

				good indicator of change in ecological character is low.
Australian grayling and dwarf galaxias (service = support for rare or threatened species).	The only baseline information available is that these species were recorded as being at the site at the time of designation.	Presence in nine out of 10 years of: • Australian grayling • dwarf galaxias	Low	There is no quantitative information on any fish species at the site. Therefore quantitative limits of acceptable change cannot be set and a qualitative LAC based on presence / absence of the species is provided. Based on lack of data for the site, confidence in the LAC representing good indicator of change in ecological character is low.
Green and gold frog (service = support for rare or threatened species).	This species has been seen and heard at the site on different occasions. There are no quantitative data for this species.	Presence in nine out of 10 years of the green and gold frog	Low	There is no quantitative information on *Litoria raniformis* at the site. Therefore quantitative limits of acceptable change cannot be set and a qualitative LAC based on presence / absence of the species is provided. Based on lack of data for the site, confidence in the LAC representing good indicator of change in ecological character is low.
Migratory bird species (service = support for a population at a critical stage of its life cycle), and regionally rare bird species (service = supporting populations important for regional biodiversity).	The only baseline information available is that these eleven species were recorded as using the site at the time of designation.	Presence in 2 out of 3 years of: • Latham's snipe • curlew sandpiper • red-necked stint • ruddy turnstone • bar-tailed godwit • caspian tern • little tern • greenshank • cattle egret • great egret • white-bellied sea eagle	Low	There is no quantitative information on these species at the site. Therefore quantitative limits of acceptable change cannot be set and a qualitative LAC based on presence / absence of the species is provided. Based on lack of data for the site, confidence in the LAC representing good indicator of change in ecological character is low.
Nesting shorebird species (service = support for a population at a critical stage of its life cycle), and rare bird species (service = support for rare or threatened species).	The only baseline information available is that five species of shorebirds nest at the site, one of which (fairy tern) is listed on the IUCN redlist.	The presence of nesting populations in 2 out of 3 years for: • little tern • hooded plover • fairy tern • pied oystercatcher	Low	There is no quantitative information on these species at the site. Therefore quantitative limits of acceptable change cannot be set and a qualitative LAC based on presence / absence of the species is provided. Based on lack of data for the site, confidence in the LAC representing good indicator of change in ecological character is low.

		• red-capped plover		
Migratory fish species (service = support for a population at a critical stage of its life cycle).	The only baseline information available is that three migratory fish species occur at the site, one of which is the rare Australian grayling.	Presence in 2 out of 3 years of: • Tasmanian mudfish • Tasmanian whitebait • Australian grayling	Low	Again, no quantitative information on these species at the site. Therefore quantitative limits of acceptable change cannot be set and a qualitative LAC based on presence / absence of the species is provided. Based on lack of data for the site, confidence in the LAC representing good indicator of change in ecological character is low.

2.2.3.6 Moulting Lagoon Ramsar Site

Moulting Lagoon Ramsar site comprises of an estuarine and marine waters system and is influenced by freshwater inflows from two permanent fresh water rivers which are not within the site boundary. Moulting Lagoon is located on the east coast of Tasmania, between the townships of Bicheno and Swansea and 6 kilometres north-west of Coles Bay and the Freycinet Peninsular. The site covers approximately 4507 hectares and lies within the municipality of Glamorgan-Spring Bay. The entire area of the site is Crown Land and is contiguous with the Apsley Marshes Ramsar site. The site, plus several sections of coastal reserve surrounding it and an additional area of land to the north, is located within the Moulting Lagoon Game Reserve, under the management of the Tasmanian Parks and Wildlife Service. Moulting Lagoon discharges into Great Oyster Bay via a narrow entrance at the end of a long sand spit (DoEE, 2019a).

Moulting Lagoon meets Ramsar Criteria 1, 2, 3, 4 & 8. It supports large numbers and a high diversity of waterbirds including shorebirds and waders. Twenty-two species of resident and migratory waders have been recorded onsite, with nine species regularly using the area. The site supports a number of threatened species listed under the Tasmanian Threatened Species Protection Act 1995 (TSPA) including the white-bellied sea eagle (Haliaeetus leucogaster; vulnerable); eastern curlew (Numenius madagascariensis, endangered); and great-crested grebe (Podiceps cristatus vulnerable); 13 plant species and a number of saltmarsh communities. The estuary also supports substantial populations of fish and diverse floristic communities. Wetland vegetation is dominated by two key types: saltmarsh and seagrass. These vegetation associations are critical components of the site’s ecological character playing central roles in the provision of physical habitat for aquatic species as well providing key food resources, particularly for the waterbirds including migratory species. Moulting Lagoon and the Apsley Marshes provide a linkage between the inland waters of the Apsley River and the Southern Ocean. Regular migrations of short-finned eels (Anguilla australis), both on their seaward migration to breed as well as returning juveniles, are reported (Hale and Butcher 2011). In addition, black bream (Acanthopagrus butcheri) are known to travel up the drains, via Moulting Lagoon into the Apsley Marshes Ramsar site in order to spawn. Australian grayling (vulnerable, EPBC Act and TSPA) have also been recorded in the river upstream and presumably would use the site as a migratory route during breeding (DoSEWPaC, 2011).

Moulting Lagoon has indigenous cultural significance as part of the lands were occupied by the Oyster Bay Tribe, which included most of the east coast from the Derwent estuary to the Fingal Valley and west inland to the Midlands. Currently only eight sites have been registered on the Tasmanian Aboriginal Site Index.

The locality of the Ramsar site is shown in Figure 2-11. The critical components and processes of the Moulting Lagoon site and its limits of acceptable change are shown in Table 2-12.

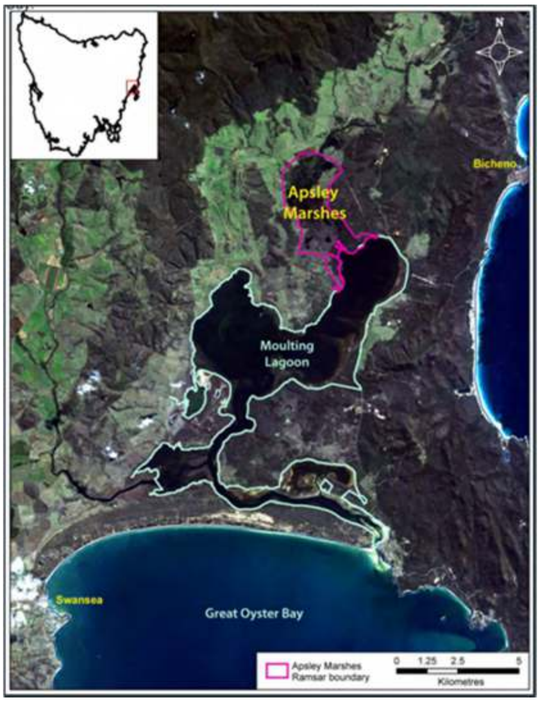


Figure 2-11 Locality of Moulting Lagoon and Apsley Marches Ramsar Sites (Hale &Butcher, 2011).

Table 2-12 Limits of Acceptable Change for the Moulting Lagoon Ramsar site

Critical Component/ Process / Service	Baseline Information and Justification	Limit of acceptable change*	Confidence level
Hydrology	Moulting Lagoon receives freshwater inflows from the Swan and Apsley Rivers. The Department of Primary Industries, Parks, Water and Environment, Tasmania monitor flow events into Moulting Lagoon at stream gauges located at Swansea Grange and Apsley upstream at Coles Bay Road. This information is stored and accessible via WIST (The Water Information System of Tasmania). There is a relatively high degree of inter annual variability in inflows. For example, from 1968 to 1992 average daily flow during winter ranged from less than 10 megalitres a day to over 5000 megalitres a day (data from State of Tasmania 2010). The tidal influence and estuarine conditions that prevail in the site are critical to the character of the site. However, there is limited information other than tide heights for this source of water. The site supports a range of estuarine wetland types including intertidal mud and sand flats, and sea grass beds. However mapping and other information is insufficient to determine extent and variability at the time of listing. In the absence of sufficient data LAC are based on no change in hydrological wetland types.	No change in wetland hydrological types present within the site. That is, the following hydrological wetland types are maintained: • • Dominance of estuarine waters; • • Presence of marine subtidal aquatic beds - seagrass beds; • • Presence of sand bars, spits, dune systems; • • Presence of intertidal mud, sand and salt flats; • • Presence of intertidal saltmarsh and salt meadows; and • • Presence of brackish to saline lagoons.	M
Wetland vegetation-saltmarsh	Some mapping of plant communities has been undertaken as part of the TASVEG program; however extent of saltmarsh vegetation within the Ramsar site is considered a knowledge gap. As such a quantitative LAC for this component cannot be set and will require revision should such information become available.	No less than 90 percent of the extent of saltmarsh communities within the Ramsar site.	L
Wetland vegetation – seagrass	Detailed mapping of seagrass was completed by Mount et al. (2005) (for the Great Swanport estuary part of the site) and Lucieer et al. (2009) for Moulting Lagoon. The combined figures from these studies indicate 2200 hectares of Ruppia; 940 hectares of seagrass (mixed Heterozostera tasmanica and Zostera muelleri) and 50 hectares of macroalgae. The mapping is a single snap shot in time and does not provide an indication in variability. The LAC has therefore been based on an arbitrary figure of 25 percent reduction from baseline mapping.	No less than 1650 hectares of Ruppia and 700 hectares of seagrass (*Heterozostera tasmanica* and *Zostera muelleri*).	H
Wetland vegetation – threatened species	The Management Plan for the Moulting Lagoon Game Reserve (PWS 2007), which covers a larger area than the Ramsar site, indicates that 13 plant species listed under the Tasmanian Threatened Species Protection Act 1995 occur "in and around" the game reserve (Appendix 2). Moulting Lagoon is recognised as being important for the conservation of some of these species such as: large fruit sea tassel Ruppia megacarpa (rare) and the spreading watermat Lepilaena patentifolia (rare) both of which are marine angiosperms; southern swampgrass Amphibromus neesii (rare), which is found at Charlie Diglers Hole; and native broom Viminaria juncea, for which Moulting Lagoon is the only known Tasmanian population.	Continued presence of the following species within the Ramsar site: *Ruppia megacarpa;* *Lepilaena patentifolia Amphibromus neesii and* *Viminaria juncea*	M

	However, how many of the 13 species occur within the Ramsar site and are important to the ecological character of the site remains unknown. The LAC is based on continued presence of those species currently known to occur in the site and for which the site has been recognised as important for their conservation.		
Fish	Last (1993) recorded 36 fish species from Great Swanport estuary. Last also described habitat preferences for these species.	No less than 28 of recorded fish species (Last 1983) are present at least once every 10 years.	H
Waterbirds – abundance	Three waterbird species have greater than one percent of their population occurring at the site on a regular basis. These species are a major reason for the site's Ramsar listing. Further reductions in population numbers may be beyond site management control, but it is vital to the site's ecological character that it still retains the quality and quantity of habitat required by waterbirds for foraging and breeding. Long-term regional trends for these species can be used to underpin the LAC. If trends in species counts move opposite to regional trends, this may indicate issues at the site, and might be used as a management trigger for these LAC. The LAC for individual species are provided for the intrinsic value of the species but also in part as a surrogate for the waterbird community as a whole. For black swan the 20th percentile+ as a minima of the current data (1992 to 2009, S. Blackhall data) has been used to derive the LAC as the species move into and out of the site on a seasonal basis. For pied oystercatcher and Pacific gull the 80th percentile+ of the current data (1992 to 2009, S. Blackhall data) has been used to derive the LAC.	No less than 7000 black swan (*Cygnus atratus*) in eight out of 10 years.	H
		No less than 200 pied oystercatcher (*Haematopus longirostris*) in five out of 10 years.	H
		No less than 80 Pacific gull (*Larus pacificus*) in five out of 10 years	H
Waterbirds - breeding	Of the waterbirds which breed at the site, the most significant in terms of occurrence and abundance is the black swan, which breeds annually within the site.	Presence of black swan (Cygnus atratus) breeding within the site on an annual basis.	H
Supports near natural wetland types	Wetland types are maintained by hydrology and vegetation.	See LAC for hydrology and vegetation communities.	N/A
Physical habitat for waterbird (breeding, roosting and feeding).	Physical habitat for waterbirds is maintained through wetland types and can be indicated by the numbers of waterbirds supported by the site.	See LAC for hydrology, vegetation and waterbirds.	N/A
Provides drought refuge	Drought refuge is maintained by hydrology.	See LAC for hydrology.	N/A
Supports biodiversity including threatened species	Biodiversity values of the site lie predominantly with the high diversity of wetland flora, waterbirds and fish and can be indicated by the species richness of these groups.	See LAC for vegetation, fish and waterbirds.	N/A

Ecological connectivity	Connectivity for fish migration is maintained through hydrological connections from Moulting Lagoon to inland freshwater wetlands via the Aspley River. While the LAC for hydrology partially addresses this service, it is important that physical connectivity is also retained and that obstructions to water flow are not introduced to the site	No barriers to hydrological connectivity between Moulting Lagoon and the Aspley River.	H

2.2.3.7 Apsley Marshes Ramsar Site

The Apsley Marshes Ramsar site is located on the east coast of Tasmania, within the Tasmanian Drainage Division (bioregion), 14 kilometres south west of the town of Bicheno (population in 2007; 640). The site covers approximately 880 hectares and lies within the municipality of Glamorgan-Spring Bay. The site is situated almost entirely within private (freehold) land and is contiguous with and inland of Moulting Lagoon Ramsar site (Refer Section 2.2.3.6, **Figure 2-11** above). It meets Ramsar Criteria 1, 2, 3, 4 & 8. The wetland has 82 native species of wetland plant; including six species that are considered rare or threatened within the bioregion and the nationally vulnerable swamp everlasting (Xerochrysum palustre) and ten wetland vegetation associations. There are 26 species of waterbird recorded including the internationally endangered Australasian bittern (Botaurus poiciloptilus). It is also a significant breeding site for black swans (Cygnus atratus); confirmed breeding of three additional species including the white-bellied sea-eagle and potential breeding of three more waterbird species (Hale &Butcher, 2011).

2.2.3.8 Western Port Ramsar Site

The Western Port Ramsar site situated in south-eastern Australia, approximately 60 km south-east of Melbourne, Victoria, occupies approximately 59,950 ha and consists of large shallow intertidal areas dissected by deeper channels, and a narrow strip of adjacent coastal land in some areas. The Ramsar site has long been recognised for its diversity of native flora and fauna, particularly for its ability to support diverse assemblages of waterbirds and wetland vegetation, including seagrass, saltmarsh and mangroves. As such, the site as listed in 1982 satisfies criteria 1a, 1b, 2, 3a, 3b, 3c, 4 and 8.

2.2.3.9 Little Waterhouse Lake Ramsar Site

Little Waterhouse Lake, part of the Waterhouse Point wetlands complex, is located seven kilometres south-west of Waterhouse Point, and lies between the towns of Bridport and Tomahawk on the north-east coast of Tasmania.

Little Waterhouse Lake is a good example of a coastal freshwater body in good condition in the Flinders Biogeographic Region. The site forms part of the Waterhouse Dunefield Geoconservation site, a system of current, active dunes moving over the top of much older longitudinal dunes, which developed at the height of the last glacial stage when Bass Strait was dry and arid.

2.2.3.10 Lavinia Ramsar Site

Lavinia Ramsar Site (7,034 ha) is situated on the northeast coast of King Island in Bass Strait. King Island lies between the north-west tip of Tasmania and Cape Otway in Victoria. The site is listed under Ramsar criteria 1, 2, 3 and 4 (Newall and Lloyd, 2012b). The site has 4 ecosystem units and the coastal components include estuarine waters, intertidal mud and marshes, saline/brackish lagoons and rocky/sand/shingle shores. The site is important for supporting regionally rare flora and fauna and providing habitat for ten migratory bird species listed under international agreements. It provides nesting habitat for waterbirds and seabirds including the threatened fairy tern and orange-bellied parrot. The vulnerable green and gold frog are also found at the site (Newall and Lloyd, 2012b).

2.2.3.11 Myall Lakes Ramsar site

The large area of 44,612 ha making up the Myall Lakes Ramsar site is entirely within the Port Stephens Great Lakes Marine Park (NSW) just to the north of Newcastle city on the NSW central coast. It supports a rich biodiversity, containing a range of undisturbed terrestrial and wetland vegetation communities with a large number of plant and animal species. The site's vegetation is particularly diverse, with 968 species of terrestrial and aquatic plants recorded, and vegetation communities ranging from littoral rainforest to forest, heath, grassland, swamp, mangrove, seagrass, submerged aquatic vegetation and emergent freshwater vegetation. It is listed under Ramsar criterion 1a, 1c, 2a and 3b. There are 22 species of shorebirds listed under migratory bird agreements (JAMBA, CAMBA and ROKAMBA) which use the site as roosting, feeding, nesting and breeding habitat. The lakes support 5 wetland dependent threatened species including the endangered, Australasian bittern, 3 vulnerable frog species and 1 endangered frog species (NSW OEH, 2012a).

2.2.3.12 Hunter Estuary Wetlands Ramsar site

The Hunter Estuary Wetlands Ramsar site is comprised of two components, Kooragang is located in the estuary of the Hunter River, 7km north of Newcastle comprising of 3,388 ha and Hunter Wetlands Centre is a small, 42 ha complex approximately 2.5 km south west of the Kooragang (NSW OEH, 2012b). The site meets Ramsar criteria 2, 4 and 6. The site is extremely important as both a feeding and roosting site for a large seasonal population of shorebirds and as a waylay site for transient migrants. Over 250 species of birds have been recorded within the Ramsar site, including 45 species listed under international migratory conservation agreements. In addition, the Ramsar site provides habitat for the nationally threatened Green and Golden Bell Frog, Red Goshawk and Australasian Bittern (Brereton et al., 2010).

2.2.3.13 Towra Point Nature Reserve Ramsar Site

Towra Point Nature Reserve Ramsar site consists of 386.5 hectares of wetlands that lie on the southern shore of Botany Bay, approximately 16 kilometres from Sydney city centre. The entire Ramsar site lies within Towra Point Nature Reserve (Refer Section 2.2.8.57). The site meets Ramsar criteria 2, 3, 4 & 8. Towra Point is a critical roosting and feeding habitat for large numbers of migratory shorebird species and a significant nesting site for the endangered little tern (Sterna albifrons). The mangroves and seagrass provide protection and food for juvenile fish species. Studies have shown that a higher abundance and diversity of fish species are found in areas of mangrove and saltmarsh which are adjacent to seagrass than are found in isolated communities. The release of crab larvae from saltmarsh areas during spring ebb tides provides a reliable source of food for a variety of fish species and a critical link in the estuary's food web. Towra Point is important in providing ecological connectivity for itinerant species, and is important for maintaining biodiversity in the greater Sydney region. Threats to the site include its proximity to one of the largest ports in eastern Australia; alterations to the shoreline, hydrology and bathymetry of Botany Bay causing increased wave energy on the southern side of the bay; residential and industrial development within the catchment; invasive species; and the impacts of climate change including sea level rise (DECCW, 2010).

2.2.4 Threatened Ecological Communities

Ecological communities are a group of native flora, fauna and other organisms that naturally occur together and interact in a unique habitat. Their structure, composition and distribution are determined by environmental factors such as soil type, location (e.g. altitude/depth), climate, and water availability, chemistry and movement (e.g. oceanic currents) and thereby changes to any one or a combination of these factors threatens the viability of the community. Species within each ecological community interact with and depend on each other for survival. Ecological communities are important because of their unique combination of native biodiversity, distinctive landscape/seascape values, vital habitat qualities and for the ecosystem services they provide. There are three types of listed threatened ecological communities (TEC) within the DA.

2.2.4.1 Giant Kelp Marine Forests of South East Australia

The 'Giant Kelp Marine Forests of South East Australia' is listed as an endangered TEC under the EPBC Act. Kelps are very large brown algae that grow on hard sub tidal substrates in cold temperate regions. Kelps have a holdfast that attaches to the substrate, a stem-like or trunk-like stipe, and large, flattened, leaf-like blades called fronds. Because kelps require constant water motion to provide nutrients, they are located in relatively high-energy settings. Kelp forests support a diverse animal community of fish, invertebrates, and marine mammals as well as important algal communities (NOAA 2010). The ecological community is characterised by a closed to semi-closed surface or subsurface canopy of Macrocystis pyrifera, and extends between the ocean floor and ocean surface, exhibiting a 'forest-like' structure with a diverse range of organisms occupying its benthic, pelagic and upper-canopy layers (TSSC 2012). M. pyrifera is the only species of kelp to provide this three-dimensional structure from the sea floor to the sea surface (TSSC 2012). This ecological community occurs on rocky substrate along the east and south coastlines of Tasmania; some patches may also occur in the coastal waters of western and northern Tasmania, south eastern South Australia, and Victoria (TSSC 2012).

The high primary and secondary productivity of the giant kelp forests create and provide a number of ecosystem services to the local environment including settlement habitat for juvenile life stages of commercially important fisheries, improvements in local water quality conditions and coastal protection via buffering strong wave conditions from reaching the shore (TSSC 2012).

The key threats affecting the ecological community include increasing sea surface temperatures, changes in nutrient availability in warmer waters, changes in weather patterns and large scale oceanographic conditions, and associated range expansion of invasive species (TSSC 2012). Other threats include impacts on water quality from land-based activities and aquaculture and potential loss from catastrophic storm events (TSSC 2012). Figure 2-12 shows the distribution of the Giant Kelp Marine Forests of south east Australia.

Figure 2-12 Distribution of Threatened Ecological Communities - Giant Kelp Marine Forests of South East Australia

2.2.4.2 Littoral Rainforest and Coastal Vine Thicket

The 'Littoral Rainforest and Coastal Vine Thickets of Eastern Australia' is listed as a critically endangered TEC under the EPBC Act. The ecological community is a complex of rainforest and coastal vine thickets on the east coast of Australia influenced by its proximity to the sea; and provides habitat for over 70 threatened plants and animals and provides important stepping stones along the eastern Australian coast for various migratory and marine birds (DoE&PI, 2014). It also provides an important buffer to coastal erosion and wind damage (TSSC, 2015a; DoEE, 2017s).

The ecological community occurs as a series of naturally disjunct and localised stands within two kilometres of the eastern coastline of Australia or adjacent to a large saltwater body, such as an estuary on a range of landforms including dunes and flats, headlands and sea-cliffs, including offshore islands, from Princess Charlotte Bay, Cape York Peninsula to the Gippsland Lakes in Victoria (TSSC, 2015a). Figure 2-13 shows the detailed distribution of Littoral Rainforest within East Gippsland. Figure 2-14 shows the distribution of Littoral Rainforest in New South Wales.

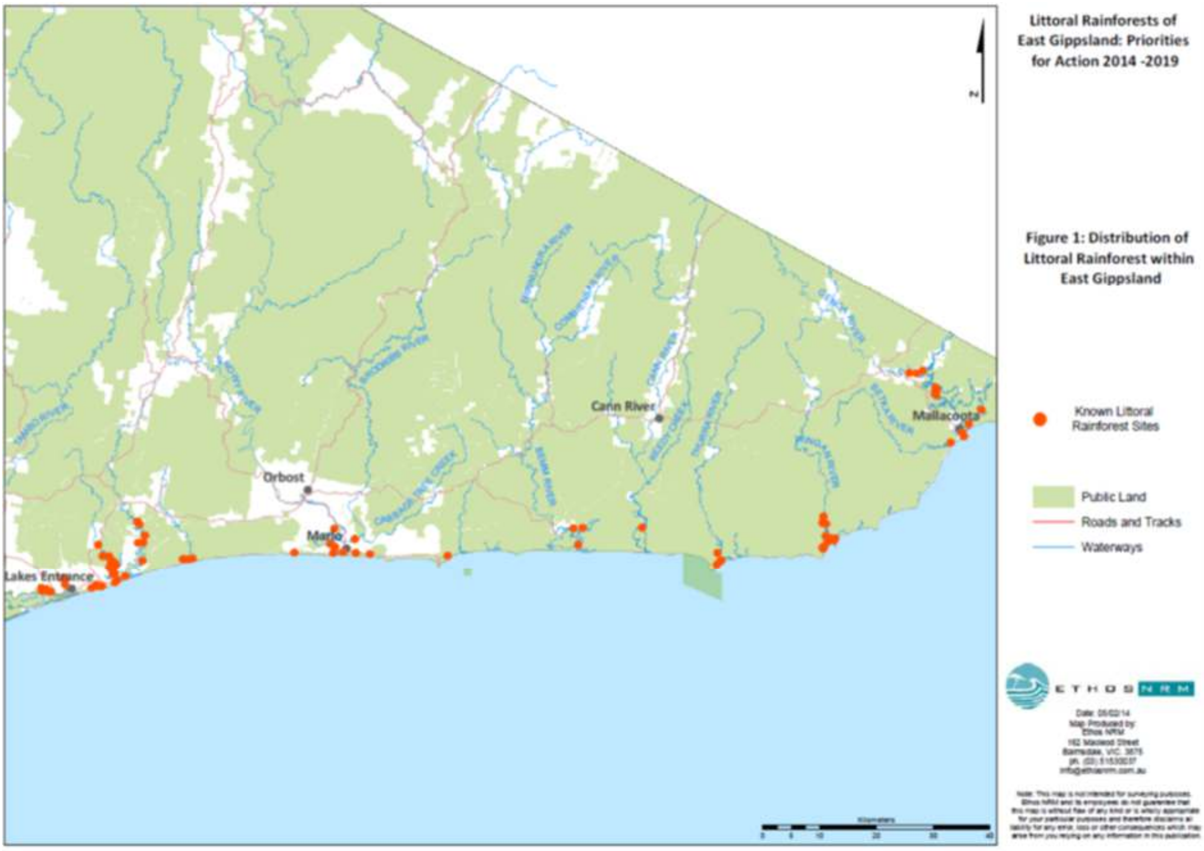


Figure 2-13 Distribution of Threatened Ecological Communities - Littoral Rainforest within East Gippsland (Vic DoE&PI, 2014 Littoral Rainforests of East Gippsland: Priorities for Action 2014-2019)

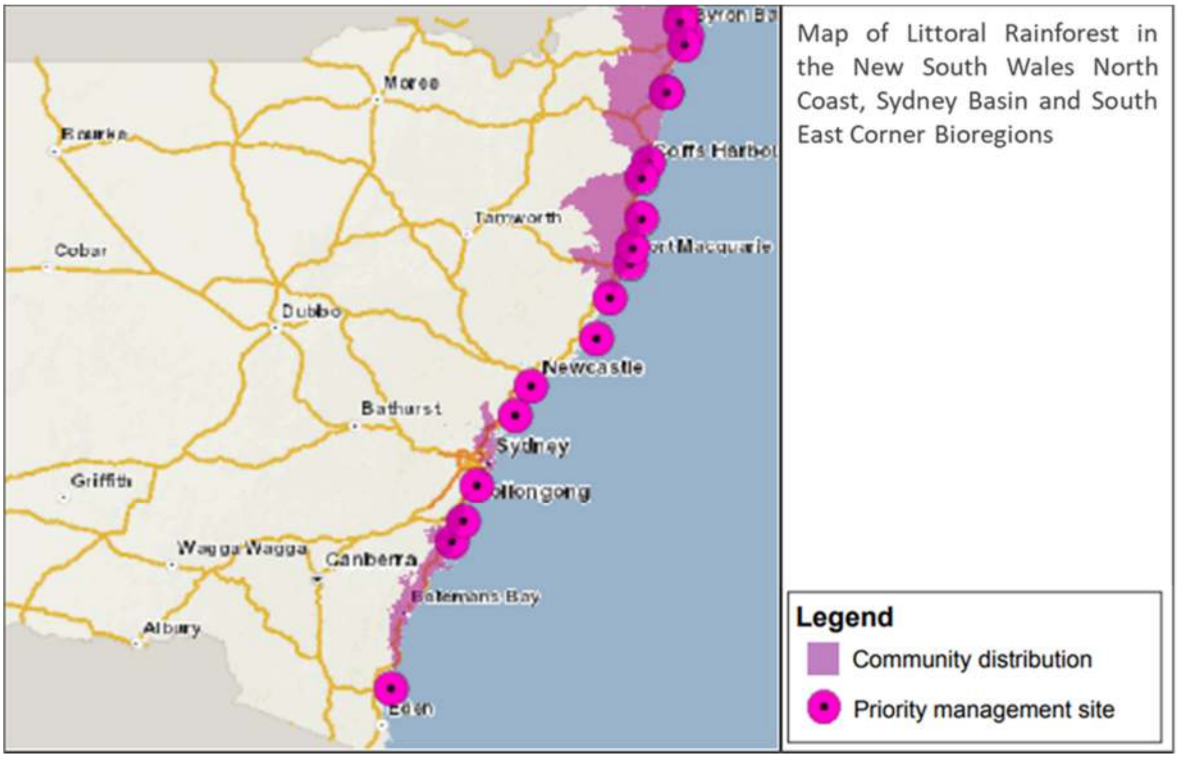


Figure 2-14 Distribution of Threatened Ecological Communities - Littoral Rainforest in NSW (NSW OEH, 2017)

2.2.4.3 Subtropical and Temperate Coastal Saltmarsh

The 'Subtropical and Temperate Coastal Saltmarsh' is listed as a vulnerable Threatened Ecological Community (TEC) under the EPBC Act, and its known distribution includes the southern and eastern coasts of Australia (Figure 2-15). The Subtropical and Temperate Coastal Saltmarsh ecological community occurs within a relatively narrow margin along the Australian coast, within the subtropical and temperate climatic zones; and includes coastal saltmarsh occurring on islands within these climatic zones (TSSC, 2013a). The physical environment for the ecological community is coastal areas under regular or intermittent tidal influence (TSSC, 2013a).

The ecological community consists mainly of salt-tolerant vegetation (halophytes) including: grasses, herbs, sedges, rushes and shrubs (TSSC, 2013a). Many species of non-vascular plants are also found in saltmarsh, including epiphytic algae, diatoms and cyanobacterial mats (TSSC, 2013a). The ecological community is inhabited by a wide range of infaunal and epifaunal invertebrates, and temporary inhabitants such as prawns, fish and birds (and can often constitute important nursery habitat for fish and prawn species) (TSSC, 2013a). Insects are also abundant and an important food source for other fauna, with some species being important pollinators (TSSC, 2013a). The dominant marine residents are benthic invertebrates, including molluscs and crabs that rely on the sediments, vascular plants, and algae, as providers of food and habitat across the intertidal landscape (TSSC, 2013a).

The key threats affecting the ecological community include: clearing and fragmentation, infilling, altered hydrology/tidal restriction, invasive species, climate change, mangrove encroachment, damage from recreational activities, pollution (including oil spills), eutrophication, acid sulphate soils, grazing, insect control, salt and other mining activities, and inappropriate fire regimes (TSSC, 2013a).

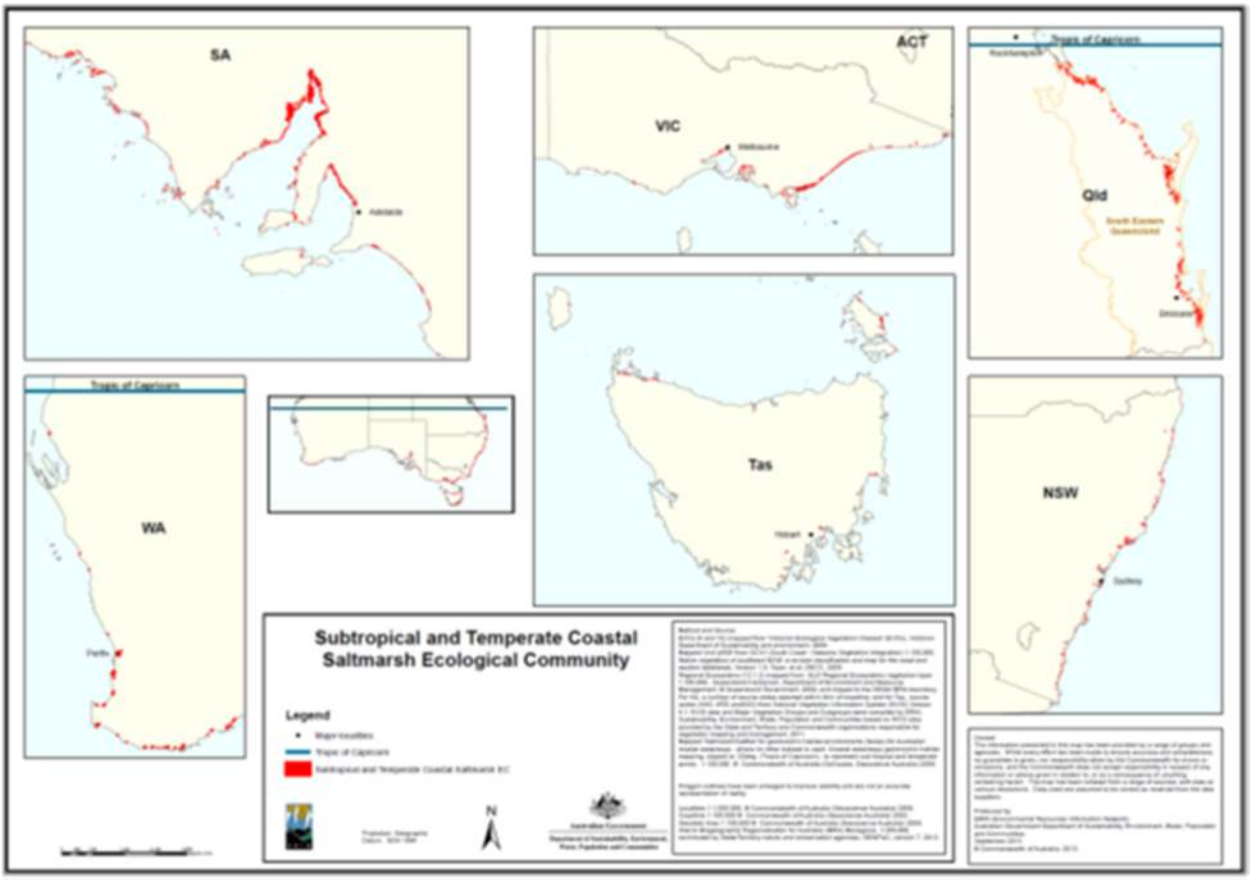


Figure 2-15 Distribution of the TEC Subtropical and Temperate Coastal Saltmarsh

2.2.5 Commonwealth Marine Areas

Six marine regions have been identified in Commonwealth waters around Australia. Marine bioregional planning is designed to better protect marine environments, conserve biodiversity and deliver greater certainty to resource users and decision-makers about the marine conservation priorities of the Australian Government. The majority of the DA lies within the South-east Marine Region. A portion of the north-eastern section of the DA overlaps with the Temperate East Marine Region (Refer **Figure 2-16** in Section 2.2.6 below).

The key conservation values of the South-east Marine Region are:

- Features with high biodiversity and productivity, such as the east Tasmania subtropical convergence zone, Bass Cascade, Upwelling east of Eden, Seamounts south and east of Tasmania and Bonney coast upwelling.
- Breeding and resting areas for Southern right whale.
- Migration areas for Blue, Fin, Sei, Southern right and Humpback whales.
- Foraging areas for Australian sea-lion, White shark, Harrison's dogfish, Killer and Sei whales, Australasian gannet, Fairy prion, Black-faced cormorant, Little penguin, Crested tern, and several species of seal, penguin, albatross, petrel, shearwater and gulls.
- Wrecks of MV City of Rayville, SS Cambridge and ketch Eliza Davies.
- 10 provincial bioregions and 17 seafloor types are represented in the network (DoEE, 2015a)

The Temperate East Marine Region spans an area of approximately 1.4 million square kilometres from the southern boundary of the Great Barrier Reef in Queensland to Bermagui in Southern New South Wales. The key conservation values of the Temperate East Marine Region relevant to the DA are:

- Features with high biodiversity and productivity such as the Canyons of the Eastern Continental Slope and Shelf rocky reefs

- Nesting sites for listed seabirds on islands along the NSW coast, including Montague Island (Short-tailed shearwater, Sooty shearwater)
- Breeding sites for Little penguin, shearwater, Wilson's storm petrel, Crested tern
- Migration areas for Humpback whale
- Breeding sites for Indo-Pacific Bottlenose Dolphin
- Foraging sites for several species of petrel, albatross, shearwater
- 3 provincial bioregions

2.2.6 Australian Marine Parks

Australian Marine Parks have been established in Commonwealth waters for to contribute to the long term conservation of marine ecosystems and protect marine biodiversity found in them, while also allowing for sustainable use of natural resources. The Australian Marine Parks are protected areas.

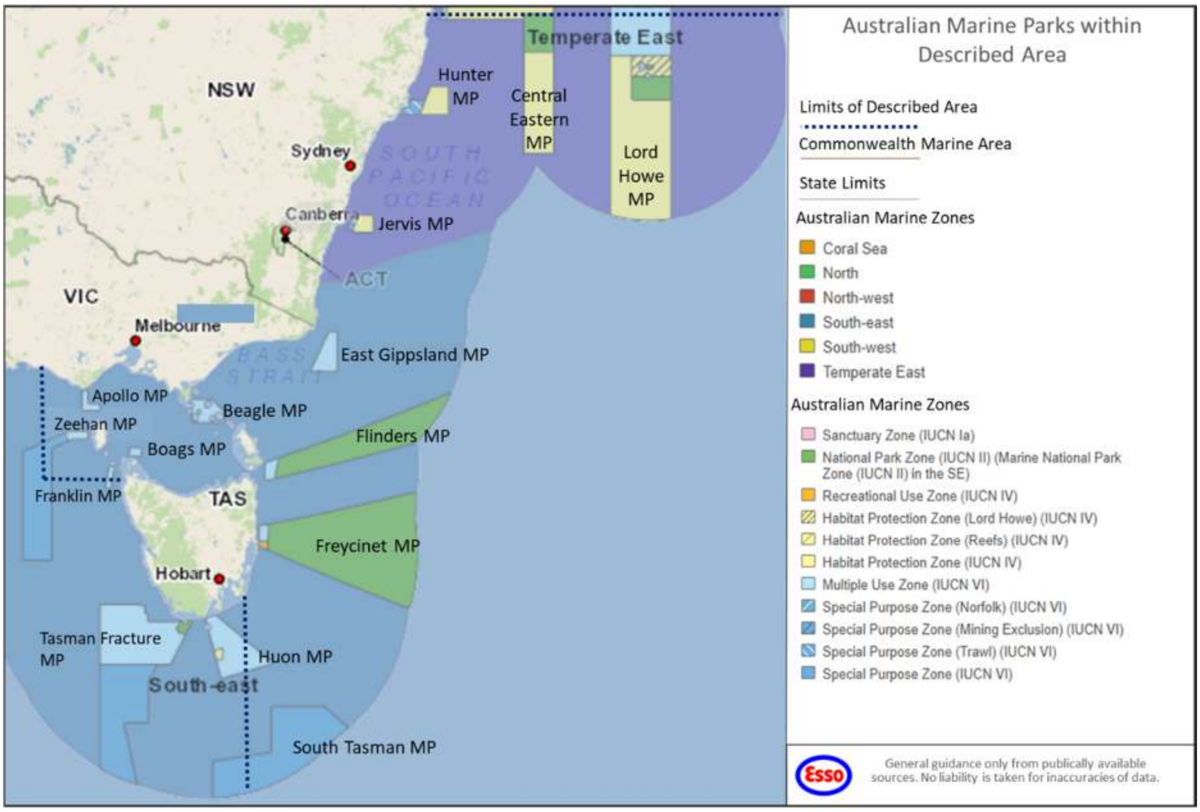


Figure 2-16 Australian Marine Parks within the DA

2.2.6.1 East Gippsland Marine Park

The East Gippsland Marine Park (4,137 km2) is off the north-east corner of Victoria, on the continental slope and escarpment and the closest of the Marine Parks to the EGBPA. The full area of the Marine Park is designated as a multiple use zone (IUCN VI).

The East Australian Current funnels warm waters through the marine park over the complex seafloor features causing eddies to form off Cape Howe. This results in conditions in which phytoplankton flourish, thereby attracting and supporting an abundance of marine life. The main features of the seafloor are the continental shelf, the steep escarpments and deep canyons.

Details of the East Gippsland Marine Park are listed in Table 2-13 (DNP, 2013). The full extent of the East Gippsland Marine Park occurs within the DA (Figure 2-16 Australian Marine Parks within the DAFigure 2-16); as such all conservation values identified above are considered applicable to this region.

Table 2-13 East Gippsland CMR: SE Commonwealth Marine Reserves Network Management Plan 2013-2023 (DNP, 2013)

<table>
<tr><td>Proclaimed</td><td colspan="4">28 June 2007</td></tr>
<tr><td>IUCN category assigned by this Management Plan and reserve management zone name</td><td colspan="4">IUCN VI—Multiple Use Zone</td></tr>
<tr><td rowspan="2">Assigned zones in reserve:</td><td>IUCN Ia</td><td>IUCN II</td><td>IUCN IV</td><td>IUCN VI</td></tr>
<tr><td></td><td></td><td></td><td>Multiple Use Zone</td></tr>
<tr><td>Depth of reserve below seabed</td><td colspan="4">100 m</td></tr>
<tr><td>Total area</td><td colspan="4">4,137 km^2 (413 700 ha).</td></tr>
<tr><td>Major conservation values</td><td colspan="4">Examples of ecosystems, habitats and communities associated with:
• the Southeast Transition
and associated with sea-floor features:
• abyssal plain/deep ocean floor
• canyon
• escarpment
• knoll/abyssal hill
• slope
Features with high biodiversity and productivity:
• Bass Cascade
• upwelling east of Eden
Important foraging area for:
• Wandering, Black-browed, Yellow-nosed and Shy albatrosses; Great-winged petrel; Wedge-tailed shearwater; and Cape petrel
Important migration area for:
• Humpback whale</td></tr>
<tr><td>Location</td><td colspan="4">The East Gippsland Commonwealth Marine Reserve is off the north-east corner of Victoria, on the continental slope and escarpment.</td></tr>
<tr><td>General description of the reserve</td><td colspan="4">The East Gippsland Commonwealth Marine Reserve contains representative samples of an extensive network of canyons, continental slope and escarpment at depths from 600 m to more than 4000 m.

The geomorphic features of this reserve include rocky-substrate habitat, submarine canyons, escarpments and a knoll, which juts out from the base of the continental slope.

The reserve includes both warm and temperate waters, which create habitat for free-floating aquatic plants or microscopic plants (i.e. phytoplankton) communities. Complex seasonality in oceanographic patterns influences the biodiversity and local productivity.

The East Australian Current brings subtropical water from the north, and around Cape Howe the current forms large eddies, with a central core of warm water. Around the outside of the eddies, cooler, nutrient-rich waters mix with the warm water creating conditions for highly productive phytoplankton growth, which supports a rich abundance of marine life. During winter, upwellings of cold water may occur and bring nutrient-rich waters to the surface, boosting productivity.

Many oceanic seabirds forage in these waters, including albatrosses (e.g. Wandering, Black-browed, Yellow-nosed and Shy albatrosses), the Great- winged petrel, Wedge-tailed shearwater and Cape petrel.

Humpback whales pass by during their migrations north and south along the eastern seaboard.</td></tr>
</table>

2.2.6.2 Beagle Marine Park

The Beagle Marine Park (2,928 km2) lies entirely within Bass Strait, encompassing Tasmania's Kent Group Marine Reserve and the Hogan and Curtis Island groups; and is nearby to the north-east is Victoria's Wilsons Promontory Marine National Park. The full area of the Marine Park is designated as a multiple use zone (IUCN VI).

The Beagle Marine Park was once dry land which connected mainland Australia to Tasmania. After the the ending of the last ice-age, the melting glaciers caused sea levels to rise and the connection to Tasmania was lost leaving the Bass Strait islands and an area of shallow waters 50-70m depth. Further information on the Hogan Group of islands, the Kent Group and other protected areas is described in Section 2.2.8, National Parks and Reserves. Detailed information on the Beagle Marine Park is presented in Table 2-14 (DNP, 2013).

The full extent of the Beagle Marine Park occurs within the DA (Figure 2-16); as such all conservation values identified in the park are considered applicable to this region.

Table 2-14 Beagle CMR: SE Commonwealth Marine Reserves Network Management Plan 2013-2023 (DNP, 2013)

<table>
<tr><td>Proclaimed</td><td colspan="4">28 June 2007</td></tr>
<tr><td>IUCN category assigned by this Management Plan and reserve management zone name</td><td colspan="4">IUCN VI—Multiple Use Zone</td></tr>
<tr><td rowspan="2">Assigned zones in reserve:</td><td>IUCN Ia</td><td>IUCN II</td><td>IUCN IV</td><td>IUCN VI</td></tr>
<tr><td></td><td></td><td></td><td>Multiple Use Zone</td></tr>
<tr><td>Depth of reserve below seabed</td><td colspan="4">100 m</td></tr>
<tr><td>Total area</td><td colspan="4">2,928 km^2 (292 800 ha)</td></tr>
<tr><td>Major conservation values</td><td colspan="4">Ecosystems, habitats and communities associated with:
• the Southeast Shelf Transition.
and associated with sea-floor features:
• basin
• plateau
• shelf
• sill
Important migration and resting on migration area for:
• southern right whale
Important foraging area for:
• Australian fur seal
• Killer whale
• Shy albatross, Australasian gannet, Short-tailed shearwater, Pacific and Silver gulls,
• Crested tern, Common diving petrel, Fairy prion, Black-faced cormorant and Little penguin
• White shark
Cultural and heritage sites:
• the wreck of the steamship SS Cambridge
• the wreck of the ketch Eliza Davies</td></tr>
<tr><td>Location</td><td colspan="4">The Beagle Commonwealth Marine Reserve lies entirely within Bass Strait, with its north-western edge abutting Victorian waters south-east of Wilson’s Promontory. It is a shallow-water reserve surrounding a collection of Bass Strait islands.</td></tr>
</table>

General description of the reserve	The Beagle Commonwealth Marine Reserve represents an area of shallow continental shelf ecosystems in depths of about 50–70 m that extends around south-eastern Australia to the east of Tasmania. The sea floor that it covers formed a land bridge between Tasmania and Victoria during the last ice age 10 000 years ago. Its boundary encloses Tasmania's Kent Group Marine Reserve and the Hogan and Curtis Island groups. Nearby to the north-east is Victoria's Wilsons Promontory Marine National Park. The reserve encompasses the fauna of central Bass Strait, which is expected to be especially rich based on studies of several sea floor–dwelling animal groups. Its ecosystems are similar to those documented for the deeper sections of the Kent Group Marine Reserve, especially those based around habitats of 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. Islands encompassed by the reserve and nearby islands support important breeding colonies for many seabirds and for the Australian fur seal. The waters of the reserve provide an important foraging area for those species breeding nearby. The rich marine life also attracts top predators, such as the great white shark and killer whales. The SS Cambridge, a British freighter, which lies in the reserve to the east of Wilson's Promontory, was sunk in 1940 by a WWII mine. The trading ketch Eliza Davies, which lies in the reserve to the east of Wilson's Promontory, sunk under tow in 1924.

2.2.6.3 Flinders Marine Park

The Flinders Marine Park (27,043 km2) is east of the north-east tip of Tasmania and Flinders Island, and extends over 400 km eastward. The Marine Park has two management zones: Marine National Park (IUCN II), and a multiple use zone (IUCN VI).

Seafloor habitats found in this marine park are the continental shelf, and a long section of steep continental slope cut through by a series of deep canyons, a large seamount and areas of sandy and muddy sediments. As per the East Gippsland Marine Park, Flinders Marine Park is influenced by the East Australian Current forming large-scale eddies which ultimately result in an abundance of marine fauna. Detailed information on the Beagle Marine Park is presented in Table 2-15 ((DNP, 2013)).

The full extent of the Flinders Marine Park occurs within the DA (Figure 2-16); as such all conservation values identified above are considered applicable to this region.

Table 2-15 Flinders CMR: SE Commonwealth Marine Reserves Network Management Plan 2013-2023 (DNP, 2013)

Proclaimed	28 June 2007			
IUCN category assigned by this Management Plan and reserve management zone name	IUCN II—Marine National Park zone			
Assigned zones in reserve:	IUCN Ia	IUCN II	IUCN IV	IUCN VI
2		Marine National Park Zone		Multiple Use Zone
Depth of reserve below seabed	100 m			

Total area	27 043 km^2 (2 704 300 ha)
Major conservation values	Examples of ecosystems, habitats and communities associated with: • the Tasmania Province • the Tasmanian Shelf Province • the Southeast Transition • the Southeast Shelf Transition And associated with sea-floor features: • abyssal plain/deep ocean floor • canyon • plateau • seamount/guyot • shelf slope Features with high biodiversity and productivity: • east Tasmania subtropical convergence zone Important foraging area for: • wandering, black-browed, yellow-nosed and shy albatrosses, northern giant petrel, Gould's petrel and cape petrel • killer whale • white shark • Harrison's dogfish Important migration area for: • humpback whale
Location	The Flinders Commonwealth Marine Reserve is east of the north-east tip of Tasmania and Flinders Island, and extends over 400 km eastward.
General description of the reserve	The Flinders Commonwealth Marine Reserve covers a depth range from about 40 m on the shallow continental shelf to abyssal depths of 3000 m or more near the edge of Australia's exclusive economic zone. Key features of this area are the continental shelf, and a long section of steep continental slope, incised by a series of deep submarine canyons. Sea bottom habitats include sheer rocky walls and large rocky outcrops that support a rich diversity of small seabed animals, such as lace corals and sponges. These and the large expanses of sandy and muddy sediments are habitats to a wide variety of fishes and to populations of the giant crab. Areas between 400 m and 600 m of the continental slope sea floor are habitat for dogfish and gulper sharks, and Harrison's dogfish has been recently recorded in the reserve. The biodiversity of the reserve is influenced by summer incursions of the warm East Australian Current and associated large-scale eddies. Another prominent feature is a large offshore seamount believed to be too deep to have been fished. Seamounts are generally considered to be important centres of deep ocean biodiversity, offering a wide range of habitats at different depths and orientations to currents. The large seamounts to the east of Tasmania are believed to be individually important, providing habitat to species that may be unique to each seamount and to a range of more widely occurring species that make their homes only on their rocky slopes. Presently, little is known about the fauna of these seamounts, but based on information from other better known offshore seamounts, seabed animals are expected to include endemic species.

2.2.6.4 Freycinet Marine Park

The Freycinet Commonwealth Marine Park (57,942 km2) is east of Tasmania, offshore from the Freycinet Peninsula. The Marine Park has three management zones: Marine National Park (IUCN II), recreational use zone (IUCN IV) and a multiple use zone (IUCN VI).

The Freycinet Marine Park begins offshore from Bicheno and Freycinet National Park on the east coast of Tasmania and extends out to over 3,000 m depth convering seafloor features such as seamounts, deep sea (abyssal) plains, canyons and deep granite reefs. Detailed information on the Freycinet Marine Park is presented in Table 2-16 (DNP, 2013).

The offshore region of the Freycinet Marine Park occurs within the DA (Figure 2-16); as such all conservation values relevant to the deeper offshore waters are considered applicable to this region.

Table 2-16 Freycinet CMR: SE Commonwealth Marine Reserves Network Management Plan 2013-2023 (DNP, 2013)

Proclaimed	28 June 2007			
IUCN category assigned by this Management Plan and reserve management zone name	IUCN II—Marine National Park zone			
Assigned zones in reserve: **3**	IUCN Ia	IUCN II	IUCN IV	IUCN VI
		Marine National Park Zone	Recreational Use Zone	Multiple Use Zone
Depth of reserve below seabed	100 m			
Total area	57 942 km^2 (5 794 200 ha)			
Major conservation values	Examples of ecosystems, habitats and communities associated with: • the Tasmania Province • the Tasmanian Shelf Province • the Southeast Transition And associated with sea-floor features: • abyssal plain/deep ocean floor • canyon • escarpment • knoll/abyssal hill • saddle • seamount/guyot • shelf • terrace Features with high biodiversity and productivity: • east Tasmania subtropical convergence zone Important foraging area for: • wandering, black-browed and shy albatrosses, cape petrel and fairy prion • sei whales and killer whales			

	Important migration and resting on migration area for: • southern right whale Important migration area for: • humpback whale
Location	The Freycinet Commonwealth Marine Reserve is east of Tasmania, offshore from the Freycinet Peninsula.
General description of the reserve	The Freycinet Commonwealth Marine Reserve covers a depth range from about 40 m on the shallow continental shelf, to abyssal depths of 3000 m or more at the edge of Australia's exclusive economic zone. The reserve spans the continental shelf and deeper water ecosystems that extend around south-eastern Australia to the east of Tasmania. The shelf is adjoined to a large offshore saddle. The reserve also includes large offshore seamounts, which are believed to be too deep to have been fished. Seamounts are generally considered to be important centres of biodiversity. They offer a wide range of habitats at different depths and orientations to currents. The seamounts east of Tasmania are also believed to be individually important, providing habitat to species that may be unique to each seamount. The shallower part of the reserve includes habitat important to seabirds. White shark also forage in the reserve.

2.2.6.5 Boags Marine Park

The Boags Marine Park is north of Three Hummock Island off Tasmania's north-west coast. It covers 537 square kilometres, with depths mostly between 40 metres and 80 metres.

The shallow waters of central Bass Strait are home to rich arrays of animals that live on the seafloor and in the sediment, including crustaceans, molluscs and polychaete worms. Seabirds from colonies on nearby islands forage also in the area (DNP, 2013).

The marine park is a Multiple Use Zone.

Table 2-17 Boags CMR: SE Commonwealth Marine Reserves Network Management Plan 2013-2023 (DNP, 2013)

Proclaimed	28 June 2007			
IUCN category assigned by this Management Plan and reserve management zone name	IUCN VI—Multiple Use Zone			
Assigned zones in reserve:	IUCN Ia	IUCN II	IUCN IV	IUCN VI
				Multiple Use Zone
Depth of reserve below seabed	100 m			
Total area	537 km2 (53 700 ha).			
Major conservation values	Ecosystems, habitats and communities associated with:: • the Bass Strait Shelf Province And associated with sea-floor features: • plateau			

	• tidal sandwave/sandbank Important foraging area for: • shy albatross, Australasian gannet, short-tailed shearwater, fairy prion, black-faced cormorant, common diving petrel and little penguin
Location	The Boags Commonwealth Marine Reserve is off the north-west tip of Tasmania, north of Three Hummock Island. The reserve is wholly contained within western Bass Strait.
General description of the reserve	The Boags Commonwealth Marine Reserve represents an area of shallow ecosystems that has a depth range mostly between 40m and 80 m. It encompasses the fauna of central Bass Strait, which is expected to be especially rich based on studies of several sea floor–dwelling animal groups. The Boags Marine Reserve contains a rich array of life, particularly bottom-dwelling animals and animals living in the sea-floor sediments and muds, such as crustaceans, polychaete worms and molluscs, as is common for the Bass Strait seabed. The reserve is adjacent to the important seabird breeding colonies of Tasmania's north-west, particularly the Hunter group of islands (Three Hummock Island, Hunter Island, Steep Island, Bird Island, Stack Island and Penguin Islet), and so is an important foraging area for a variety of seabirds. White shark also forage in the reserve.

2.2.6.6 Apollo Marine Park

The Apollo Commonwealth Marine Reserve (118,400 ha) is representative of the continental shelf that extends from South Australia to the west of Tasmania. The park is located off the southern tip of Cape Otway just beyond the Victorian state boundary down to the north of King Island in Tasmania. The waters of the reserve are exposed to large swell waves generated from the south-west and strong tidal flows. Detailed information on the Apollo Marine Park is presented in Table 2-18 (PA, 2019c).

Table 2-18 Apollo CMR: SE Commonwealth Marine Reserves Network Management Plan 2013-2023 (PA, 2019c)

Proclaimed	28 June 2007			
IUCN category assigned by this Management Plan and reserve management zone name	IUCN VI—Multiple Use Zone			
Assigned zones in reserve:	IUCN Ia	IUCN II	IUCN IV	IUCN VI
				Multiple Use Zone
Depth of reserve below seabed	100 m			
Total area	1184 km2 (118 400 ha).			
Major conservation values	Ecosystems, habitats and communities associated with:: • the Western Bass Strait Shelf Transition • Bass Strait Shelf Province And associated with sea-floor features: • deep hole valley • 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			
Location	The Apollo Commonwealth Marine Reserve is in Bass Strait south of Cape Otway and Apollo Bay in western Victoria, and north-west of King Island.			

General description of the reserve	The Apollo Commonwealth Marine Reserve represents the continental shelf that extends from South Australia to the west of Tasmania. The cool waters of the reserve are less than 50 m deep near Cape Otway. The reserve includes the Otway Depression, a 100 m deep undersea valley joining the Bass Basin to the open ocean. This valley was an outlet channel for the ancient Bass Lake and mainland river systems, which existed during the last ice age. The waters of the reserve are exposed to large swell waves generated from the southwest and strong tidal flows. The sea floor has many rocky reef patches interspersed with areas of sediment and, in places, has rich, benthic fauna dominated by sponges. Seabirds, dolphins, seals and white shark forage in the reserve, and blue whales migrate through Bass Strait. The MV City of Rayville, a United States of America freighter, which lies in the reserve south of Cape Otway, was sunk in 1940 by a mine.

2.2.6.7 Zeehan Marine Park

The Zeehan marine park is south-west of King Island. It covers 19,897 km^2 with depths from about 50 metres to over 3000 metres. The park has four undersea canyons cutting into the continental shelf. The Zeehan current, an extension of the Leeuwin current from the west runs along the west coast of Tasmania and reaches the southern tip at its strongest point in winter. Zeehan Marine Park is a nursery ground for blue warehou and ocean perch. Concentrations of larval fish of these species are found in the marine park as well as the commercially fished species of Tasmanian giant (PA, 2019e).

Table 2-19 Zeehan CMR: SE Commonwealth Marine Reserves Network Management Plan 2013-2023 (PA, 2019e)

Proclaimed	28 June 2007			
IUCN category assigned by this Management Plan and reserve management zone name	IUCN VI—Multiple Use Zone			
Assigned zones in reserve: 2	IUCN Ia	IUCN II	IUCN IV	IUCN VI
				Multiple Use Zone (933 km2) Special Purpose Zone (18 967 km^2)
Depth of reserve below seabed	100 m			
Total area	19,897 km2 (1,989,700 ha).			
Major conservation values	Ecosystems, habitats and communities associated with:: • the Tasmania Province • the West Tasmania Transition • the Western Bass Strait Shelf Transition • Bass Strait Shelf Province And associated with sea-floor features: • abyssal plain/dep ocean floor • canyon • deep hole valley • knoll/abyssal hill • shelf • slope Important migration area for:			

	• blue and humpback whales Important foraging area for: • black-browed, wandering and shy albatross and great-winged and cape petrels
Location	The Zeehan Commonwealth Marine Reserve is north-west of Tasmania.
General description of the reserve	The Zeehan Commonwealth Marine Reserve covers a broad depth range, from the shallow continental shelf at a depth of about 50 m to the abyssal plain, which is over 3000 m deep. A significant feature of this reserve is a series of four submarine canyons that incise the continental slope, extending from the shelf edge to the abyssal plain. Biodiversity and productivity on the outer shelf and upper slope in this reserve are influenced by the Zeehan Current and its interactions with the canyons. The reserve includes a variety of seabed habitats, including exposed limestone, that support rich animal communities of large sponges and other, permanently fixed, invertebrates on the continental shelf. There are also extensive ‘thickets’ of low invertebrate animals, such as lace corals and sponges, on the continental slope. These communities are exceptionally diverse and include species new to science. The rocky limestone provides important habitats for a variety of commercial fish species, including Australia’s giant crab. Concentrations of larval blue warehou and ocean perch indicate the area is a nursery ground. It is also a foraging area for a variety of seabirds and white shark.

2.2.6.8 Franklin Marine Park

The Franklin Marine Park is located off the north-western point of Tasmania, south of King Island. It mostly comprises of water depths of approximately 40 m except for a deep valley in the southern end of the reserve which drops to 150m depth. Seabirds from the numerous breeding colonies on nearby islands including Albatross Island, Black Pyramid Rock and other Hunter Group islands forage in the park (PA, 2019d). Detailed information on the Franklin Marine Park is presented in Table 2-20 (PA, 2019d).

Table 2-20 Franklin CMR: SE Commonwealth Marine Reserves Network Management Plan 2013-2023 (PA, 2019d))

Proclaimed	28 June 2007			
IUCN category assigned by this Management Plan and reserve management zone name	IUCN VI—Multiple Use Zone			
Assigned zones in reserve:	IUCN Ia	IUCN II	IUCN IV	IUCN VI
				Multiple Use Zone
Depth of reserve below seabed	100 m			
Total area	671 km2 (67 100 ha).			
Major conservation values	Ecosystems, habitats and communities associated with:: • The Tasmanian Shelf province • the Western Bass Strait Shelf Transition And associated with sea-floor features: • shelf • deep hole valley • escarpment • 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			

Location	The Franklin Commonwealth Marine Reserve is west of the north-western corner of Tasmania and south-east of King Island.
General description of the reserve	The Franklin Commonwealth Marine Reserve represents an area of shallow continental shelf ecosystems and incorporates areas of two major bioregions: western Bass Strait and the Tasmanian shelf. Its cool temperate waters are exposed to large swells driven by westerly gales. 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 reserve provides a feeding ground for a variety of seabirds, such as the fairy prion, shy albatross, silver gull, short-tailed shearwater, black-faced cormorant and common diving petrel that have breeding colonies on the nearby Hunter group of islands. Black Pyramid Rock, 6 km north of the reserve supports the largest breeding colony of the Australasian gannet in Tasmania, and one of only eight breeding sites for this species in Australia. White shark also forage in the reserve

2.2.6.9 Huon Marine Park

The Huon Commonwealth Marine Park off Southern Tasmania covers approximately 991 square kilometres of outer continental shelf, continental slope and deeper seabed, ranging from 70 metres to over 3000 metres. It has more than 120 seamounts within the marine park, the largest cluster in Australia. The seamounts are cone-shaped remnants of extinct volcanoes rising from the seafloor, up to 25km across at the base and rising 200 to 500 m from the seabed. Some 'summits' are over 1000 metres below the surface. In an otherwise bare substrate, seamounts provide hard, elevated and current swept attachment sites for communities of filter feeding fauna such as corals, sponges, sea stars and anemones (CSIRO, 2007). Their structural form made of massive accumulations of the reef building stony coral also provides habitat for a smaller mobile fauna such as crustaceans, brittle stars, urchins and molluscs. The marine park protects spawning grounds for basketwork eels and commercial fish species, including ocean perch. Details of the Huon Marine Park are listed in Table 2-21 (PA, 2019a).

The marine park has Habitat Protection and Multiple Use zones. The Tasmanian seamounts are also on the Commonwealth Heritage List and are also lised as a key ecological feature (refer Section 2.2.7.5).

Table 2-21 Huon CMR: SE Commonwealth Marine Reserves Network Management Plan 2013-2023 (PA, 2019a)

Proclaimed	28 June 2007			
IUCN category assigned by this Management Plan and reserve management zone name	IUCN VI—Multiple Use Zone			
Assigned zones in reserve:			IUCN IV	IUCN VI
2			Habitat Protection Zone (389 km2)	Multiple Use Zone (9602 km2)
Depth of reserve below seabed	100 m			
Total area	9991 km2 (999 100 ha)			
Major conservation values	Examples of ecosystems, habitats and communities associated with: • the Tasmanian Shelf Province • the Tasmania Province And associated with sea-floor features:			

	• canyon • knoll/abyssal hill (seamount) • pinnacle • saddle • shelf • 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-tail shearwater and fairy prion • Australian fur seal and killer whale • Important migration area for: • humpback whale
Location	The Huon Commonwealth Marine Reserve is south-east of Tasmania.
General description	The Huon Commonwealth Marine Reserve covers a broad depth range from the inner continental shelf at about 70 m, to abyssal depths of more than 3000 m. The majority of the area is in deep water. The Tasman Seamounts Marine Reserve that was proclaimed in 1999 has been wholly incorporated into the Huon Commonwealth marine reserve. The reserve contains a cluster of seamounts that appear as cone-shaped submerged mountains, which provide a range of depths for a diversity of plants and animals. The peaks of many of the reserve's seamounts are between 750 m and 1000m below the sea surface and support endemic species, including large erect corals and sponges. Some of the flora and fauna are hundreds and possibly thousands of years old, making them some of the longest-lived animals on Earth. The reserve also provides an important connection between seamounts of the Indian Ocean and the Tasman Sea. Seamounts are regarded as areas of increased productivity in the otherwise nutrient-poor open ocean. Their topography accelerates water currents to provide a consistent and relatively rich food source for filter feeders, and which sweeps the seamounts clear of fine sediments, exposing rocks for animals, such as corals, to attach to. Seamounts are generally considered to be important stepping stones in the transoceanic dispersal of larvae of bottom-dwelling species. The habitat protection zone was established to protect the unique and vulnerable benthic communities of the reserve's seamounts. The zone includes seamounts rising 650–1000 m above the sea floor, which have been subject to commercial fishing. Deeper seamounts, peaking at 1150–1700 m above the sea floor, have not been fished, and are in pristine condition. Benthic communities include coral dominated communities found at depths less than 1400 m. The hard coral Solensomilia variabilis forms a dense matrix that provides a platform for hydroids and sponges; stone corals; and black, gold and bamboo corals. Benthic communities deeper than 1400 m are urchin dominated. The reserve is a foraging area for white shark and seabirds and a spawning or nursery area for important commercial fish, including ocean perch and blue warehou.

2.2.6.10 Lord Howe Marine Park

The Lord Howe Marine Park surrounds the NSW Lord Howe Island Marine Park (refer Section 2.2.8.37) and extends further seaward to 12 nautical miles. The waters – a unique mix of warm tropical and cool temperate ocean currents – are home to over 500 fish species, more than 90 coral species and countless other marine species, many only found in the immediate area. A wide range of habitats include a barrier coral reef and lagoon, and fringing reefs dominated either by coral or macroalgal communities. Details of the park are described in Table 2-22 (DNP, 2018).

Table 2-22 Lord Howe Marine Park CMR: Temperate East Marine Parks Network Management Plan 2018 (DNP, 2018)

<table>
<tr><td>Proclaimed</td><td colspan="4">14 December 2013</td></tr>
<tr><td>IUCN category assigned by this Management Plan and reserve management zone name</td><td colspan="4">IUCN category IV - Habitat Protection Zone</td></tr>
<tr><td rowspan="4">Assigned zones in reserve:</td><td>IUCN Ia</td><td>IUCN II</td><td>IUCN IV</td><td>IUCN VI</td></tr>
<tr><td rowspan="3"></td><td rowspan="3">National Park Zone</td><td>Habitat Protection Zone</td><td rowspan="3">Special Purpose Zone (Trawl)</td></tr>
<tr><td>Habitat Protection Zone (Lord Howe)</td></tr>
<tr><td>Recreation Zone</td></tr>
<tr><td>Depth of reserve below seabed</td><td colspan="4">between 15 m and 6000 m.</td></tr>
<tr><td>Total area</td><td colspan="4">110,126 km ²</td></tr>
<tr><td>Major conservation values</td><td colspan="4">Ecosystems, habitats and communities associated with::
• Lord Howe Province—due to the convergence of warm, tropical and cooler temperate waters in the area, the Marine Park supports a unique mix of tropical, subtropical and temperate species, many found at the northern or southern extent of their range.
• Tasman Basin Province—interactions between currents, eddies and seamounts and the movements of the deep sub-Antarctic water mass influence biological productivity in this area.
Important area for:
• Foraging and breeding of seabirds
• Migrating humpback whales
Key ecological features of the Marine Park are:
• Lord Howe Seamount Chain—a chain of submerged volcanoes running 1000 km north–south, the seamount chain includes Lord Howe Island and Elizabeth and Middleton Reefs. These isolated, oceanic reefs support a diverse range of tropical and temperate marine life, including both warm-water and cold-water corals and an abundance of fish species. This diversity is a result of the effect of the East Australian Current on the reefs as it exposes the area to its warm waters, in contrast to the surrounding cooler ocean.
• Elizabeth and Middleton Reefs—small, isolated, oceanic platforms reefs that occur on top of the volcanic seamounts of the Lord Howe seamount chain. The lagoons of both reefs are important areas for populations of black cod and the Galapagos shark.
• Tasman Front and eddy field—a region that separates the warm, nutrient-poor waters of the Coral Sea from the cold, nutrient-rich waters of the Tasman Sea, providing increased nutrients and plankton aggregations, and enhanced productivity that attracts mobile species such as turtles, cetaceans, tuna and billfish.
Culture
• The marine environment around Lord Howe Island has long held significance among Lord Howe Islanders. A unique community and culture has developed by those who have visited and settled the island over time Sea country is valued for Indigenous cultural identity, health and wellbeing.</td></tr>
</table>

	• Across Australia, Indigenous people have been sustainably managing their sea country for tens of thousands of years. At the commencement of this plan, there is limited information about the cultural significance of this Marine Park due to its remote location World Heritage • Parts of the Marine Park are within the world heritage-listed Lord Howe Island Group, which was listed as an area of outstanding universal value under the World Heritage Convention in 1982. The Lord Howe Island Group comprises Lord Howe Island, Admiralty Islands, Mutton Bird Islands, Ball's Pyramid, and associated coral reefs and marine environments. It includes spectacular landscapes, volcanic mountains, and diverse low-lying rainforests, palm forests and grasslands. There are a large number of species of native plants, of which many are endemic to Lord Howe Island, and colonies of endangered seabirds. National Heritage • The Lord Howe Island Group was included in the National Heritage List in 2007. Historic shipwrecks • The Marine Park contains over 25 known shipwrecks listed under the Historic Shipwrecks Act 1976. Social and economic values • Tourism, commercial fishing, recreation, including fishing, and scientific research, are important activities in the Marine Park. These activities contribute to the wellbeing of regional communities and the prosperity of the nation.
Location	The Lord Howe Marine Park is located approximately 550 km offshore of New South Wales, adjacent to the New South Wales Lord Howe Island Marine Park and World Heritage Area.
General description of the reserve	The Lord Howe Marine Park is significant because it includes habitats, species and ecological communities associated with the Lord Howe Province and the Tasman Basin Province. It includes three key ecological features: the Lord Howe Seamount Chain; Elizabeth and Middleton Reefs (the southernmost coral reefs in the world); and the Tasman Front and eddy field, all valued for high productivity, aggregations of marine life, biodiversity and endemism. The Elizabeth and Middleton Reefs Ramsar site is located within the Marine Park. The site was listed under the Ramsar Convention in 2002 and is a wetland of international importance under the EPBC Act, due to its unique nature as the southernmost open-ocean coral-reef platform in the world. The Marine Park includes habitats connecting to and complementing the adjacent New South Wales Lord Howe Island Marine Park.

2.2.6.11 Central Eastern Marine Park

Central Eastern Marine Park begins 30 kilometres east of Coffs Harbour. It covers 70,054 km², with depths from 120 m to 6000 m. It has National Park, Habitat Protection and Multiple Use zones. And is located between the Hunter and the Lord Howe Commonwealth Marine Parks. Details of the park are described in Table 2-23 (DNP, 2018).

Table 2-23 Central Eastern Marine Park CMR: Temperate East Marine Parks Network Management Plan 2018 (DNP, 2018)

Proclaimed	14 December 2013
IUCN category assigned by this Management Plan and reserve	IUCN category IV - Habitat Protection Zone

<table>
<tr><td>management zone name</td><td colspan="4"></td></tr>
<tr><td rowspan="2">Assigned zones in reserve:</td><td>IUCN Ia</td><td>IUCN II</td><td>IUCN IV</td><td>IUCN VI</td></tr>
<tr><td></td><td>National Park Zone</td><td>Habitat Protection Zone</td><td>Special Purpose Zone (Trawl)</td></tr>
<tr><td>Depth of reserve below seabed</td><td colspan="4">between 120 m and 6000 m.</td></tr>
<tr><td>Total area</td><td colspan="4">70,054 km ²</td></tr>
<tr><td>Major conservation values</td><td colspan="4">Ecosystems, habitats and communities associated with:
• Central Eastern Province—includes canyons along the shelf that interact with currents and ocean gyres resulting in upwellings that influence biological productivity. Plankton blooms associated with the upwellings attract aggregations of tuna, whale and albatross and support over 50 fish species endemic to the area.
• Central Eastern Shelf Transition—upwellings caused by the East Australian Current crossing the continental shelf, and river sediment influence biological productivity
• Tasman Basin Province—interactions between currents, eddies and seamounts and the movements of the deep sub-Antarctic water mass influence biological productivity in this area. The deep-reef coral communities on seamounts are dominated by filter feeders and provide stepping stones for large oceanic species moving between breeding, nesting, calving and foraging sites.
Important area for:
• Foraging and breeding of seabirds
• Migrating humpback whales

Key ecological features of the Marine Park are:
• Tasmantid Seamount Chain—a series of underwater volcanic mountains comprised of guyots, seamounts, tablemounts, banks, plateaux and terraces that runs in a north–south direction, and extends into the Tasman Basin. The feature rises from approximately 4800 m deep to 125 m from the surface at Taupo Seamount in the south, approximately 280 m from the surface at Derwent–Hunter Seamount in the centre of the Marine Park, and to approximately 350 m from the surface at Queensland Guyot in the north of the Marine Park. The seamounts support a diverse range of habitats in temperate and subtropical waters
• Canyons on the eastern continental slope—canyons enhance diversity and abundance of species, driven by the combined effects of steep and rugged topography, ocean currents, seafloor types and nutrient availability. Canyons also create localised changes in productivity in the water column above them, providing feeding opportunities for a range of species.
• Tasman Front and eddy field—a region that separates the warm, nutrient-poor waters of the Coral Sea from the cold, nutrient-rich waters of the Tasman Sea, providing increased nutrients and plankton aggregations, and enhanced productivity that attracts mobile species such as turtles, cetaceans, tuna and billfish.
Culture
Sea country is valued for Indigenous cultural identity, health and wellbeing. Across Australia, Indigenous people have been sustainably managing their sea country for tens of thousands of years. At the commencement of this plan, there is limited information about the cultural significance of this Marine Park.
Heritage
• The Marine Park contains two known shipwrecks listed under the Historic Shipwrecks Act 1976— Amelia (wrecked in 1816) and Illagong (wrecked in 1872).
Social and economic values</td></tr>
</table>

	• Tourism, commercial fishing, and recreation, including fishing, are important activities in the Marine Park. These activities contribute to the wellbeing of regional communities and the prosperity of the nation.
Location	The Central Eastern Marine Park is located approximately 30 km east of Coffs Harbour at the edge of the continental shelf. It extends to deep ocean waters approximately 200 km offshore of New South Wales.
General description of the reserve	The Central Eastern Marine Park is significant because it includes habitats, species and ecological communities associated with the Central Eastern Province, the Central Eastern Shelf Transition and the Tasman Basin Province. It includes three key ecological features: canyons on the eastern continental slope (valued as a unique seafloor feature with ecological properties of regional significance); the Tasmantid Seamount Chain; and the Tasman Front and eddy field (both valued for high productivity, aggregations of marine life, biodiversity and endemism).

2.2.6.12 Hunter Marine Park

Encompassing three key ecological features, the Hunter Marine Park is located offshore from Port Stephens in NSW and extends out approximately 100km. Details of the Hunter Marine Park are described in Table 2-24 (DNP, 2018).

Table 2-24 Hunter CMR: Temperate East Marine Parks Network Management Plan 2018 (DNP, 2018)

Proclaimed	14 December 2013			
IUCN category assigned by this Management Plan and reserve management zone name	IUCN category IV - Habitat Protection Zone			
Assigned zones in reserve:	IUCN Ia	IUCN II	IUCN IV	IUCN VI
			Habitat Protection Zone	Special Purpose Zone (Trawl)
Depth of reserve below seabed	between 15 m and 6000 m.			
Total area	6257 km²			
Major conservation values	Ecosystems, habitats and communities associated with:: • Central Eastern Province—includes canyons along the shelf that interact with currents and ocean gyres resulting in upwellings that influence biological productivity. Plankton blooms associated with the upwellings attract aggregations of tuna, whale and albatross and support over 50 fish species endemic to the area. • Central Eastern Shelf Province—upwellings caused by the East Australian Current crossing the continental shelf, and river sediment influence biological productivity in this provincial bioregion that extends south over the continental shelf from the boundary of the Great Barrier Reef Marine Park to offshore Coffs Harbour. Important area for: • Foraging seabirds and humpback whales • Migrating humpback whales • Aggregation of grey nurse sharks Key ecological features of the Marine Park are:			

	• Canyons on the eastern continental slope—canyons enhance diversity and abundance of species, driven by the combined effects of steep and rugged topography, ocean currents, seafloor types and nutrient availability. Canyons also create localised changes in productivity in the water column above them, providing feeding opportunities for a range of species. • Shelf rocky reefs—which have a complex range of benthic habitat that supports diverse benthic communities. • Tasman Front and eddy field—a region that separates the warm, nutrient-poor waters of the Coral Sea from the cold, nutrient-rich waters of the Tasman Sea, providing increased nutrients and plankton aggregations, and enhanced productivity that attracts mobile species such as turtles, cetaceans, tuna and billfish. Heritage • The Marine Park contains one known shipwreck listed under the Historic Shipwrecks Act 1976— India (wrecked in 1884). Social and economic values • Commercial fishing, tourism and recreation, including fishing, are important activities in the Marine Park. These activities contribute to the wellbeing of regional communities and the prosperity of the nation
Location	The Hunter Marine Park extends from the New South Wales state water boundary to approximately 100 km offshore, and adjacent to the New South Wales Port Stephens–Great Lakes Marine Park.
General description of the reserve	The Hunter Marine Park is significant because it contains habitats, species and ecological communities, representative of the Central Eastern Province and the Central Eastern Shelf Province. It includes three key ecological features: canyons on the eastern continental slope (valued for a unique seafloor feature with ecological properties of regional significance); shelf rocky reefs (valued for a unique seafloor feature with ecological properties of regional significance); and the Tasman Front and eddy field (valued for high productivity, aggregations of marine life, biodiversity and endemism). The Marine Park supports a range of species, including species listed as threatened, migratory, marine or cetacean under the EPBC Act. The Marine Park includes habitats connecting to and complementing the adjacent New South Wales Port Stephens–Great Lakes Marine Park.

2.2.6.13 Jervis Marine Park

Jervis Marine Park comprises an area of 2473 square kilometres and covers a depth range from 120 m to 5000 m approximately.

Seafloor features represented in the reserve include abyssal-plain/deep ocean floor, canyons, shelf and slope. The reserve include two key ecological features, it is one of three shelf incising canyons occurring within the region (unique sea-floor feature with ecological properties of regional significance) and shelf rocky reefs. Details of the Jervis Marine Park are described in Table 2-25 (DNP, 2018).

Table 2-25 Jervis CMR: Temperate East Marine Parks Network Management Plan 2018 (DNP, 2018)

Proclaimed	14 December 2013			
IUCN category assigned by this Management Plan and reserve management zone name	IUCN category IV - Habitat Protection Zone			
	IUCN Ia	IUCN II	IUCN IV	IUCN VI

Assigned zones in reserve:			Habitat Protection Zone	Special Purpose Zone (Trawl)
Depth of reserve below seabed	between 120 m and 5000 m			
Total area	2473 km²			
Major conservation values	Ecosystems, habitats and communities associated with:: • the Central Eastern Province and Southeast Shelf Transition Important foraging area for: • seabirds, grey nurse sharks and humpback whales Key ecological features of the Marine Park are: • Canyons on the eastern continental slope—canyons enhance diversity and abundance of species, driven by the combined effects of steep and rugged topography, ocean currents, seafloor types and nutrient availability. Canyons also create localised changes in productivity in the water column above them, providing feeding opportunities for a range of species. • Shelf rocky reefs—which have a complex range of benthic habitat that supports diverse benthic communities. Heritage The Marine Park contains one known shipwreck listed under the Historic Shipwrecks Act 1976—HMAS Tattoo (wrecked in 1939).			
Location	The Jervis Marine Park is located approximately 20 km offshore, adjacent to the New South Wales Jervis Bay Marine Park and Commonwealth Booderee National Park.			
General description of the reserve	The Marine Park supports a range of species, including species listed as threatened, migratory, marine or cetacean under the EPBC Act. Biologically important areas within the Marine Park include foraging habitat for seabirds, grey nurse sharks and humpback whales. Tourism, commercial fishing, and recreation are important activities in the Marine Park. These activities contribute to the wellbeing of regional communities and the prosperity of the nation. Sea country is valued for Indigenous cultural identity, health and wellbeing. Across Australia, Indigenous people have been sustainably managing their sea country for tens of thousands of years. At the commencement of this plan (Temperate East Management Plan), there was limited information about the cultural significance of this Marine Park. The Native Title Services Corporation is the Native Title Service Provider for the New South Wales region.			

2.2.6.14 South Tasman Rise Marine Park

The South Tasman Rise is an area of seafloor that lies 550 km south of Hobart, Tasmania in the Southern Ocean where water depths are about 1,500 metres. This deep ocean park covers 27,704 square kilometres. It is designated as a Special Purpose zone.

The reserve supports unique environments for marine life and is an area of significant scientific interest. The seamounts here have flat tops, evidence they were once above the ocean's surface where they were shaped by wind and wave erosion. The rise most probably originates from subsided continental crust that fragmented as Australia and Antarctica separated (AMP, 2019). Australia and New Zealand agreed that there would be no fishing in 2007-08 and indefinitely thereafter. No permits have been issued for this fishery since 2007 (AFMA, 2019). Details of the South Tasman Rise Marine Park are listed in Table 2-26 (DNP, 2013).

Table 2-26 South Tasman Rise CMR: SE Commonwealth Marine Reserves Network Management Plan 2013-2023 (DNP, 2013)

Proclaimed	28 June 2007			
IUCN category assigned by this Management Plan and reserve management zone name	IUCN VI—Special Purpose Zone			
Assigned zones in reserve:	IUCN Ia	IUCN II	IUCN IV	IUCN VI
				Special Purpose Zone
Depth of reserve below seabed	100 m			
Total area	27,704 km^2 (27 704 00 ha)			
Major conservation values	Ecosystems, habitats and communities associated with: • Tasman Province and associated with sea-floor features: • Abyssal plain/deep ocean floor • canyon • plateau • seamount/guyot • slope Important foraging area for: • wandering and black-browed albatrosses, Short-tailed shearwater • white-headed and white-chinned petrels			
Location	The South Tasman Rise Commonwealth Marine Reserve is south-east of Tasmania, with its southern edge following the boundary of the Australian exclusive economic zone, 200 nm from land.			
General description of the reserve	The South Tasman Rise Commonwealth Marine Reserve occurs in the deep ocean and includes a section of the mid-continental slope at depths of 1200–3000 m. It encloses a submerged plateau of continental rock that stands as the last remnant of the link between Australia and Antarctica. The sea floor in this reserve was deformed by the massive rifting process when the Australian continental block moved north. The reserve supports unique environments for marine life and is an area of significant scientific interest. It contains several seamounts, some of which have flat summits, which indicates that they were exposed above the surface at some time.			

2.2.7 Key Ecological Features (KEF)

Key Ecological Features (KEF) are elements of the Commonwealth marine environment that are considered to be of regional importance for either a region's biodiversity or its ecosystem function and integrity. KEFs are not matters of national environmental significance and have no legal status in their own right. However, they are components of the Commonwealth marine area. Twelve KEFs occur in the DA as identified in the Conservation Values Atlas (DoEE 2015b). The nine KEFs that have been spatially defined are shown in Figure 2-17.

The location of the three KEFs that are not spatially defined (Bass Cascade, shelf rocky reefs and hard substrates (South East Marine Region) and the East Tasmania subtropical convergence zone) are described below.

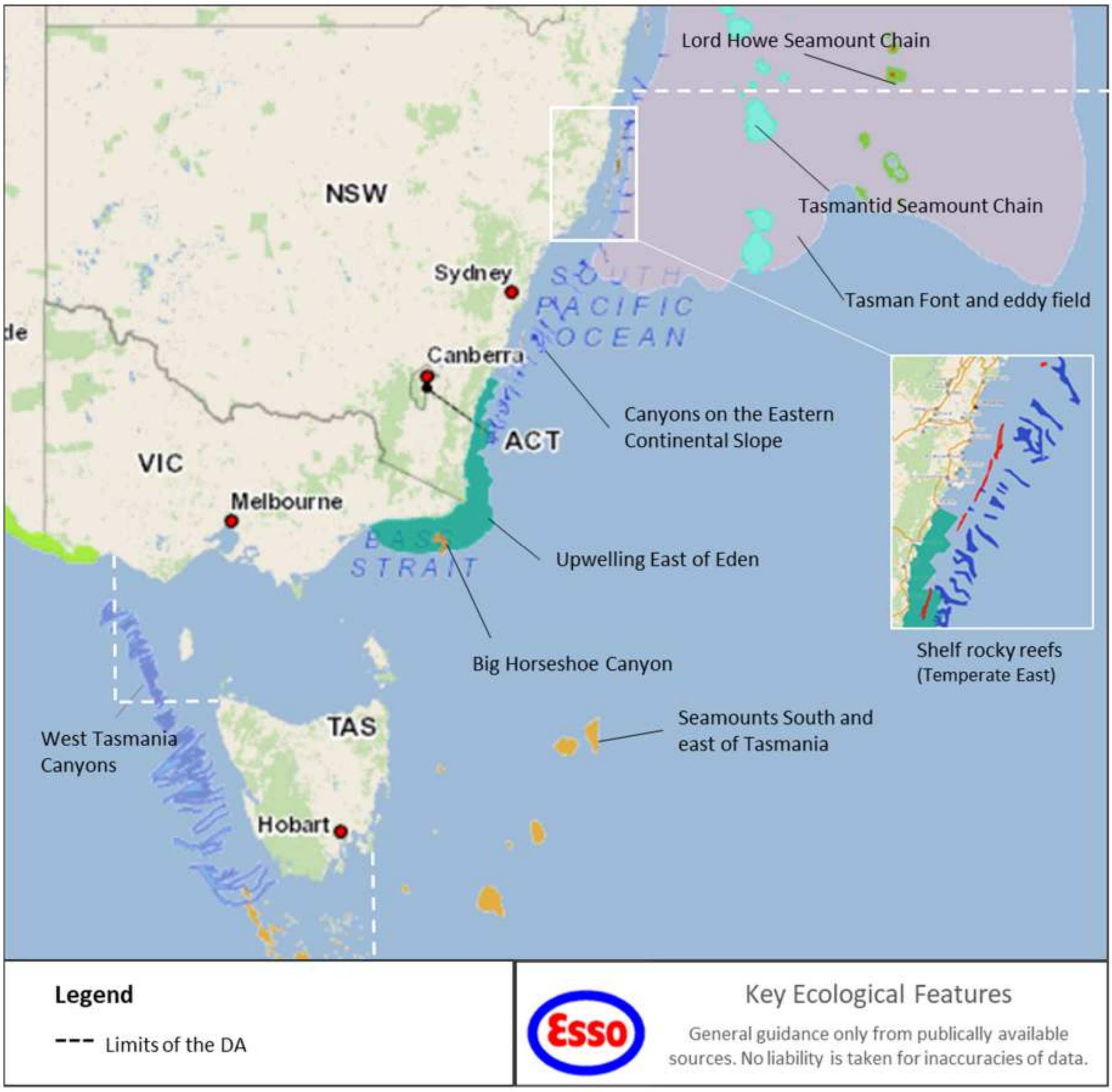


Figure 2-17 Key Ecological Features within the DA

2.2.7.1 Big Horseshoe Canyon

Big Horseshoe Canyon is defined as a key ecological feature as it is an area of high productivity and aggregations of marine life.

The steep, rocky slopes of the Big Horseshoe Canyon provide hard substrate habitat for attached large megafauna. Sponges and other habitat forming species provide structural refuges for benthic fishes, including the commercially important pink ling.

The Big Horseshoe Canyon is the largest south eastern canyon sampled for benthic biodiversity (Williams et al., 2009). It has a total area of 319 km2 in 1500-m depth that supports a rich, abundant, filter-feeding benthic megafauna, including large sponges in dense beds of large individuals at 120 m and at 300–400 m, dense stands of the stalked crinoid Metacrinus cyaneus in 200–300 m, and many species of octocoral (especially gold corals) at depths >700 m (Kloser et al., 2001). It is the only known temperate location of the stalked crinoid Metacrinus cyaneu.

Big Horseshoe Canyon lies south of the coast of eastern Victoria. This feature is the eastern most arm of the Bass Canyon system (DoEE 2015a).

2.2.7.2 Upwelling East of Eden:

The Upwelling east of Eden is defined as a key ecological feature as it is an area of high productivity and aggregations of marine life.

Dynamic eddies of the East Australian Current cause episodic productivity events when they interact with the continental shelf and headlands. The episodic mixing and nutrient enrichment events drive phytoplankton blooms that are the basis of productive food chains including zooplankton, copepods, krill and small pelagic fish.

The upwelling supports regionally high primary productivity that supports 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 seals, other cetaceans, sharks and seabirds.

This feature displays seasonal and annual variation, and is present along the eastern Victorian and southern NSW coasts.

2.2.7.3 East Tasmania subtropical convergence zone (East coast of Tasmania):

A zone of enhanced pelagic productivity where eddies of the East Australian Current interact with subantarctic waters driven by westerly winds. This is a complex feature that is characterised by autumn and spring phytoplankton blooms that form the basis of a productive food chain which supports cetaceans, seals, sharks and seabirds. The phytoplankton blooms attract migratory commercial fish stocks such as Southern bluefin tuna, barracouta, and jack mackerel, and are also important for krill, which in turn form an important component of the diet of many pelagic species. This KEF has not been spatially defined and hence is not shown in Figure 2-17 however it is expected to occur within the DA. The northern and southern extent of the feature are approximately level with the north-east tip of Tasmania and the Tasman Peninsula.

2.2.7.4 The Bass Cascade (along the Bass Canyon System)

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

This KEF has not been spatially defined and hence is not shown in Figure 2-17, however it is expected to occur within the DA.

2.2.7.5 Seamounts south and east of Tasmania (south and east of Tasmania):

The Seamounts south and east of Tasmania are defined as a key ecological feature as they are an area of high productivity and aggregations of marine life.

These seamounts are a chain or cluster of seamounts rising from the abyssal plain, continental rise or plateau situated 200 km or more from shore (east of Flinders Island to south east of southern Tasmania). Seamounts with hard substrate summits and slopes provide attachment points for sessile invertebrates, while the soft sediments can be habitat for species that burrow into the sediments.

The Seamounts south and east of Tasmania extend into the southern offshore waters of the DA (Figure 2-17).These seamounts create localised upwellings of nutrient rich waters from the seafloor. The hard substrate support sessile invertebrates.

2.2.7.6 Shelf rocky reefs and hard substrates (Southeast Marine Region)

Rocky reefs and hard grounds are located in all areas of the South-east Marine Region continental shelf including Bass Strait, in 50 m to 150–220 m water depth. They support macroalgae and sessile invertebrates and provide habitat and shelter for fish and are important for aggregations of biodiversity and enhanced productivity. This KEF has not been spatially defined and hence do not appear on Figure 2-17 however it is expected to occur along the continental shelf of Bass Strait within the DA.

2.2.7.7 West Tasmania Canyons

The West Tasmania Canyons are located in the Southeast Marine Bioregion on the edge of the continental shelf offshore of the north-west corner of Tasmania and they extend down as far south as Macquarie Harbour. The northern section of the canyons intersect the DA. These canyons can influence currents, act as sinks for rich organic sediments and debris, and can trap waters or create upwellings that result in productivity and biodiversity hotspots. For example, plumes of sediment and nutrient-rich water can be seen at or near the heads of canyons. 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 (refer Section 2.2.7.5 above) (DoEE, 2015a).

2.2.7.8 Tasmantid Seamount Chain

Just 150-600 km east of the Australian mainland is a 2000 km long chain of submerged volcanoes (from approximately Latitude 19^{o}deg south to 33^{o} deg south) are the Tasmantid Seamount Chain that rise over 4000 m above the seafloor - nearly twice the height of the highest mountain on the mainland. These undersea mountains, the Tasmantid Seamounts, are extinct volcanoes formed from around 40 to 6 million years ago above a mantle hotspot, similar to the Hawaiian Islands. The seamount chain includes Lord Howe Island and Elizabeth and Middleton Reefs. These isolated, oceanic reefs are thought to support a diverse range of tropical and temperate marine life, including both warm-water and cold-water corals and an abundance of fish species. This diversity is a result of the effect of the East Australian Current on the reefs as it exposes the area to its warm waters, in contrast to the surrounding cooler ocean. The information on the Tasmantid Seamounts has been based on observations from some seamounts in other locations, however for benthic ecosystems, the data for the Tasmantid seamount chain is poor (CSIRO, 2012). Thus the seamount chain’s conservation values are defined in terms of containing feature scale geomorphic surrogates for biodiversity (basin, plateau, seamount and abyssal plain/deep ocean floor). In general what is known is that Taupo seamount supports a diverse and dense invertebrate megafauna and abundant sharks; a high diversity of demersal fishes is recorded in commercial fishery logbooks and fishery observers; individual seamounts vary greatly in size in shelf and upper/mid slope depths where benthic biodiversity is expected to be greatest (CSIRO, 2012).

2.2.7.9 Lord Howe Seamount Chain

Lord Howe Seamount Chain is a chain of submerged volcanoes running 1000 km north–south, the seamount chain includes Lord Howe Island and Elizabeth and Middleton Reefs. This seamount chain runs east of the Tasmantid Seamount discussed above (refer Section 2.2.7.8). These isolated, oceanic reefs support a diverse range of tropical and temperate marine life, including both warm-water and cold-water corals and an abundance of fish species. This diversity is a result of the effect of the East Australian Current on the reefs as it exposes the area to its warm waters, in contrast to the surrounding cooler ocean (DSEWPAC, 2012a).

2.2.7.10 Tasman Front and eddy field

The Tasman Front and eddy field occurs in the Temperate East Marine Region and is defined as a key ecological feature formed by complex and dynamic oceanographic processes supporting transient patches of enhanced productivity that, in turn, attract aggregations of species across trophic levels, including top predators such as tuna and sharks. This feature also supports biological connectivity with seamount habitats (Tasmantid Seamount Chain – refer Section 2.2.7.8 above) further offshore. The Tasman Front is formed by a current that moves to the north in winter and to the south in summer. The Front separates the warm, nutrient-poor waters of the Coral Sea from the nutrient-rich waters of the Tasman Sea and its boundary can and associated eddies vary in shape, strength and location. The front is formed between 27^{o} S and 33^{o} S. In the southern portion of the Temperate East Marine Region, the Tasman Front creates a complex oceanographic environment with vertical mixing causing enhanced productivity. Patches of productivity are important for mid-level consumers including turtles and top fish predators. This is supported by Fisheries oceanography studies that describe a positive relationship between fish catch rates and proximity to frontal features, and a predominance of bigeye tuna and swordfish associated with the Tasman Front (DoEE, 2019t).

2.2.7.11 Shelf rocky reefs (Temperate East Marine Region)

The Shelf Rocky Reefs habitat has been identified as a key ecological feature as it is considered a unique sea-floor feature which is associated with ecological properties of regional significance.

Shelf rocky reefs feature support a range of complex benthic habitats that, in turn, support diverse benthic communities. Along the continental shelf, south of the Great Barrier Reef, benthic communities on rock outcrops and boulder substrates shift from algae-dominated communities to those dominated by attached invertebrates, including dense populations of large sponges, with a mixed assemblage of moss animals and soft corals; this shift generally occurs at a depth of 45 m. Below wave-influenced areas, massive and branched growth forms of sponges are more prevalent, and sponge species richness and density generally increases with depth along the New South Wales coast.

Collectively, these invertebrates create a complex habitat-forming community that supports microorganisms and other invertebrates, such as crustaceans, molluscs, annelids and echinoderms. These habitats also contribute to increased survival of juvenile fish by providing refuge from predation. Rocky reef habitats on Australia's east coast support a diverse assemblage of demersal fish, which show distinct patterns of association with shelf-reef habitats; e.g. jackass morwong, barracouta, orange-spotted catshark, eastern orange perch, butterfly perch and warehou are species that distinguish rocky-reef habitats at depths greater than 45 m from those of soft sediments. Unlike the shelf rocky reef and hard substrate of the South East Marine Region, this KEF has been spatially defined and is shown in Figure 2-17.

2.2.7.12 Canyons on the eastern continental slope

The Canyons on the eastern continental slope are defined as a key ecological feature as they are a unique seafloor feature with enhanced ecological functioning and integrity, and biodiversity, which apply to both its benthic and pelagic habitats.

Canyon systems 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. As such, these features are valued for their enhanced productivity and biological diversity properties. Canyons contribute to habitat diversity by providing a hard surface that offers anchoring points and vertical relief for filter feeder benthic species. Hard substrata support different species assemblages; particularly favouring large filter feeder–dominated benthic species (e.g. attached sponges and crinoids) that thrive in abundance in the enhanced current flow conditions. Large benthic animals such as sponges and feather stars are abundant, with particularly high diversity found in the upper slope regions (150–700 m). A range of higher trophic level species, including crustaceans, echinoderms, bivalves, cephalopods and fish are then attracted to these regions. Canyons are therefore significant contributors to overall biodiversity, particularly in terms of benthic organisms. Due to isolation, restricted dispersal and connectivity, it is also expected this diversity encompasses a high degree of endemism, further contributing to the social and biological values of these communities.

The Canyons on the eastern continental slope lie off the coast of NSW (Figure 2-17).

2.2.8 National Parks and Reserves

National parks and reserves which include marine protected areas and terrestrial protected areas are declared under each individual state’s legislation and are managed by state authorities. A number of state marine protected areas occur within the DA. The parks which are located within approximately 100 kms of the EGBPA are all on the Victorian coastline between Point Hicks National Park and Corner Inlet and Nooramunga Marine and Coastal Parks. Figure 2-18 shows National Parks and Reserves in the DA in Victoria. Figure 2-19 shows the Parks and Reserves in the DA in the islands of Tasmania in northern Bass Strait, Figure 2-20 shows the Parks and Reserves in the DA in Tasmania and Figure 2-21 shows the Parks and Reserves in the DA in NSW.

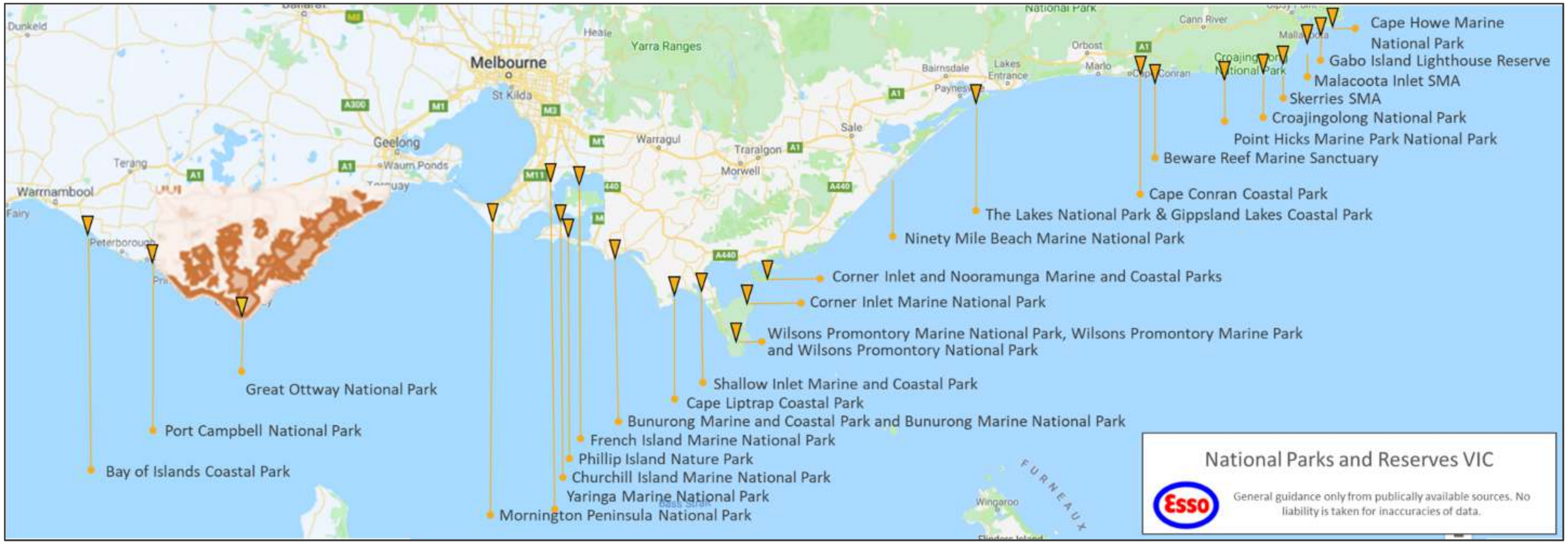


Figure 2-18 National Parks and reserves in the DA in Victoria

Figure 2-19 National Parks and reserves in the DA on the islands of Tasmania in northern Bass Strait

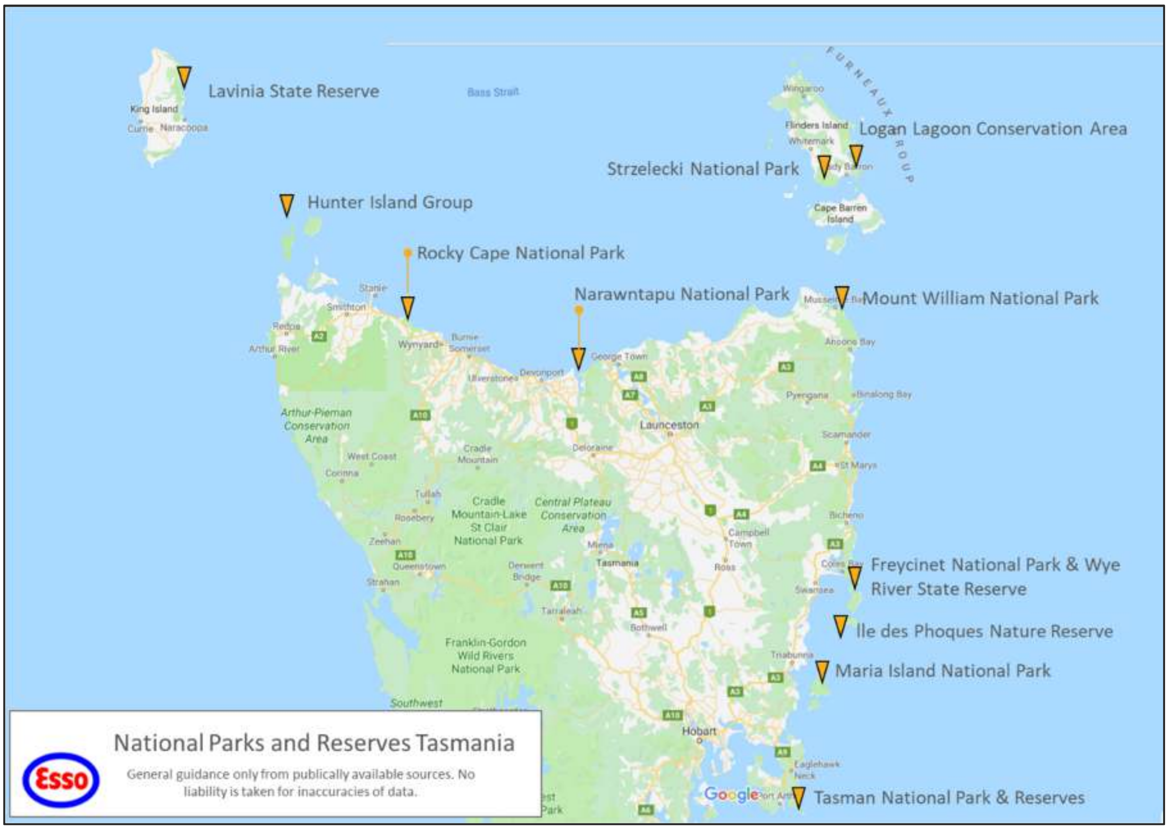


Figure 2-20 National Parks and Reserves in the DA on and around mainland Tasmania

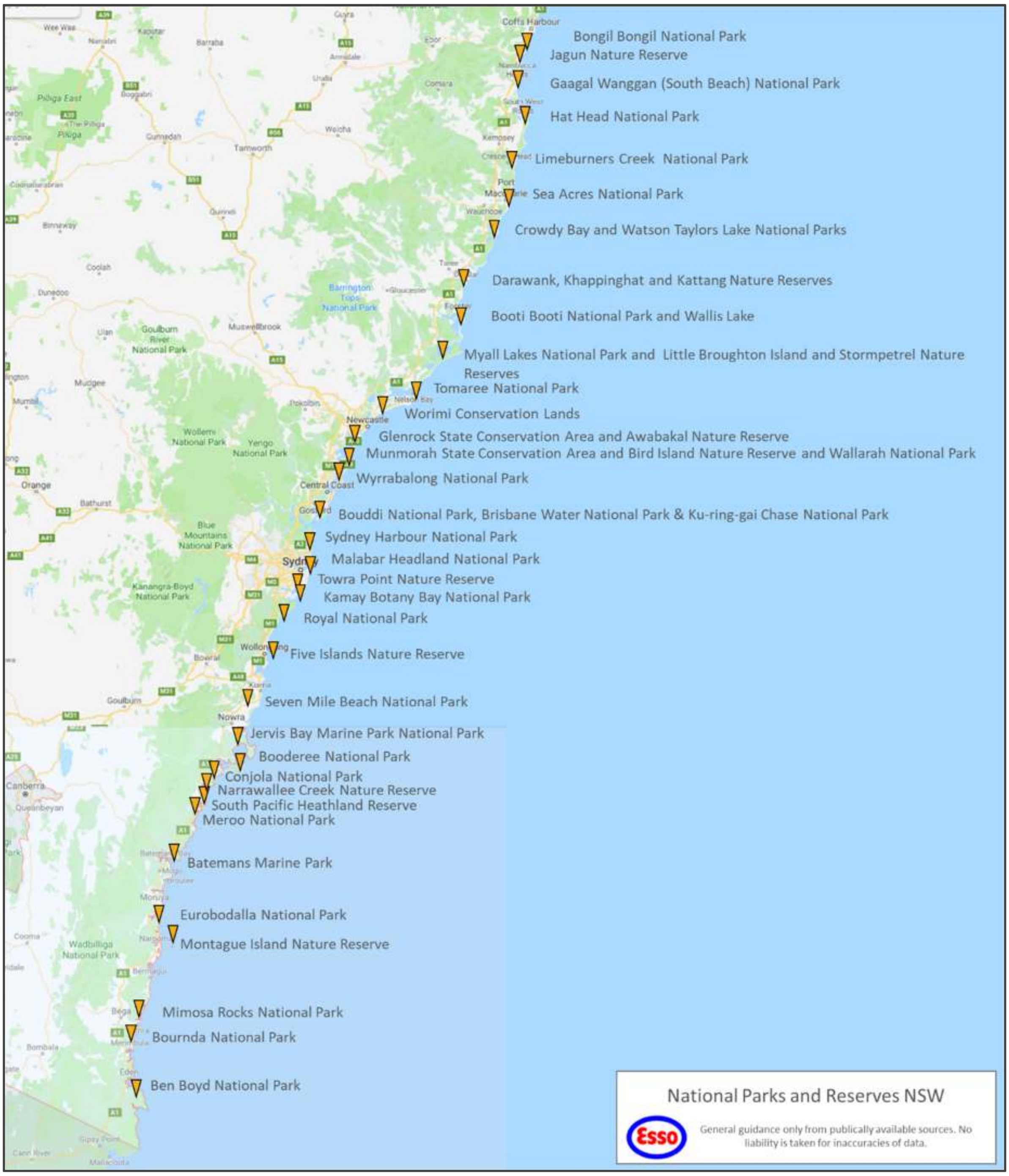


Figure 2-21 National Parks and reserves in the DA in New South Wales

2.2.8.1 Cape Howe Marine National Park - VIC

The Cape Howe Marine National Park is situated in the far east of Victoria alongside the border with New South Wales. The habitats found in the park include kelp forests, granite and sandstone reefs, sandy beaches and soft sediments. The marine life of the area is particularly diverse because species of both warm and cool areas can reside here. Whales pass by Cape Howe on their migration from Antarctica and are sometimes followed by a pod of orcas. Little penguins also forage at the rook on Gabo Island. (ParksVic 2017l).

2.2.8.2 Gabo Island Lighthouse Reserve - VIC

Gabo Island is considered to be of State zoological significance due to the presence of one of the largest breeding colonies of Little penguins in the world. Short-tailed shearwaters also breed on Gabo Island.

Common species of whale sighted from the island include Southern right whales, Humpback whales and Killer whales. Whales pass Gabo Island on their annual migration south to feed in Antarctic waters from late winter to early spring and then again during autumn on their northern migration to calve in tropical areas. Pods of dolphins are also regularly sighted from Gabo Island. Species include Common dolphins and Bottlenose dolphins. Australian and New Zealand Fur Seals are also often seen on the rocks surrounding the island.

The lighthouse was constructed from 1858 to 1862 and is the only operating lighthouse in Victoria (ParksVic, 2017f).

2.2.8.3 Mallacoota Inlet Special Management Area (Victoria)

The Mallacoota Inlet Special Management Area is a special management area. Flora, fauna and areas of geomorphological significance are protected in this area.

2.2.8.4 The Skerries Special Management Area (Victoria)

The Skerries Special Management Area is a special management area. The Skerries is home to a major seal breeding colony with an estimated population of 11,500 representing approximately 12% of the national population.

2.2.8.5 Croajingolong National Park & Nadgee Nature Reserve - VIC

The Croajingolong National Park follows the far-eastern coastline of Victoria for 100 km and together with the adjoining Nadgee Nature Reserve in New South Wales is classified as a UNESCO World Biosphere Reserve. Over 1000 species of native plants have been recorded in the park including 90 species of orchids. The park also contains areas of cool temperate and warm temperate rainforest, eucalypt forest and coastal heathland.

Of the 52 mammal species recorded in the park, arboreal mammals, such as possums, gliders and bats are common. Seals, whales and dolphins occur in coastal waters adjacent to the park. The islands and ocean beaches attract migratory seabirds and waders, the wetlands are habitat for a diversity of waterfowl and the coastal woodlands are favoured habitat for birds of prey. Significant populations of reptiles and amphibians also occur within the park.

The park's secluded coastal camping locations make it popular for beach walks, bird watching, boating and fishing (ParksVic 2017h).

The Skerries, offshore from Wingan Inlet, is home to a major seal breeding colony with an estimated population of 11,500 representing approximately 12% of the national population.

Dry open forest areas occur widely throughout Nadgee Nature Reserve with patches of rainforest occurring in creek catchments and low shrubby heaths being encountered at Mt Nadgee and along the coast. Nadgee Nature Reserve also contains examples of both fresh and salt water wetlands.

The near-coastal areas are significant breeding and foraging habitat for the Eastern bristlebird and seabirds such as the Short-tailed shearwater, Crested tern and Gannet. Most of the park's beaches support a breeding pair of Hooded plovers. Sea caves support important invertebrate 'guano' communities.

The reserve is largely undisturbed by recreational development and contains the only coastal Wilderness Area in NSW (NPWS 2017a).

2.2.8.6 Point Hicks Marine National Park - VIC

The Point Hicks Marine National Park is located alongside Croajingolong National Park, East Gippsland. Many creatures found here are not found further west because the water is too cold, for example the large black sea urchin. The National Park is approximately 4,000 ha in area, with fauna including intertidal and shallow subtidal invertebrates, diverse sessile invertebrates living on subtidal reefs, kelps and small algae, and a high diversity of reef fish. In addition to the subtidal reef, the marine environment around Point Hicks includes intertidal rock operational areas and offshore sands (ParksVic 2017a).

Point Hicks Marine National Park is also a popular location for recreational divers. Remains of two shipwrecks can be encountered in the National Park.

2.2.8.7 Beware Reef Marine Sanctuary - VIC

The Beware Reef Marine Sanctuary is a State marine protected area, IUCN Category II, located approximately 5 km southeast of Cape Conran and to the north-east of the operational area, comprises a granite outcrop covering an area of 220 ha and extending for a distance of approximately 500 m from the edge of the exposed reef. It rises from a depth of approximately 30 m and is exposed at low tide, providing a resting area for Australian fur seals. The reef is covered by outcrops of Bull kelp (Durvillaea sp.) and supports a range of marine life, including seahorses and leafy seadragons (ParksVic, 2017b). Beware Reef is a popular location for recreational divers and the remains of numerous shipwrecks can be encountered in the sanctuary.

2.2.8.8 Cape Conran Coastal Park - VIC

The Cape Conran Coastal Park extends from Sydenham Inlet in the east to Point Ricardo near Marlo. The park includes ocean beaches and is a popular park for water activities - swimming, diving, boating, fishing and rock pooling.

Many birds feed on the nectar rich plants of the heathlands and banksia woodlands including the threatened Ground parrot (Pezoporus wallicus wallicus). Lizards and large lace monitors are common around Cape Conran (Parks Victoria 2017i).

2.2.8.9 The Lakes National Park and Gippsland Lakes Coastal Park - VIC

The Gippsland Lakes are a group of large coastal lagoons in eastern Victoria, separated from the sea by sand dunes and fringed on the seaward side by Ninety Mile Beach. The main lakes - Wellington, Victoria and King cover an area of 340 km2 and have a shoreline of 320 km. The lakes are fed by a number of river systems. The largest of the rivers are the Latrobe River and the Avon River (flowing into Lake Wellington), and the Mitchell River, Nicholson River and Tambo River (flowing into Lake King). The system is linked to the sea by an artificial entrance near the eastern end, opened in 1889, where the town of Lakes Entrance is now situated (ParksVic, 2017j, ParksVic, 2017k).

The Lakes National Park covers 2390 ha bounded by Lake Victoria, Lake Reeve and the township of Loch Sport. Gippsland Lakes Coastal Park is a narrow coastal reserve covering 17,600 ha along approximately 90km of Ninety Mile Beach from Seaspray to Lakes Entrance. The Lakes National Park contains large areas of diverse and relatively undisturbed flora and fauna communities representative of the inner barrier of the Gippsland Lakes system. Gippsland Lakes Coastal Park takes in extensive coastal dune systems, woodlands and heathlands, as well as water bodies such as Lake Reeve and Bunga Arm (ParksVic 2017k).

The Gippsland Lakes system is listed under the Convention on Wetlands of International Importance (Ramsar). The Gippsland Lakes provide important feeding, resting and breeding habitat for approximately 80 waterbird species (ParksVic 2003, 2017j,k), and the lakes, and associated swamps and morasses, regularly support approximately 40,000 to 50,000 waterbirds.

Clydebank Morass, Macleod Morass and Jones Bay (within Lake King) support many species of migratory waders. Lake Wellington, Lake Victoria and Lake King support migratory seabirds, including the little tern and fairy tern, as well as a range of other waterfowl. Lake Reeve provides significant habitat for a large number of migratory waders, and is listed as one of the five most important areas for shorebirds in Victoria (Parks Victoria, 2003). Bunga Arm supports breeding populations of threatened species e.g. Little tern, Fairy tern, Hooded plover and White-bellied sea-eagle (ParksVic 2003, 2017k).

2.2.8.10 Ninety Mile Beach Marine National Park - VIC

Located 30 km south of Sale and adjacent to Gippsland Lakes Coastal Park, the Ninety Mile Beach Marine National Park covers 5 km of coastline. The huge subtidal sandy expanses characteristic of the area exhibit particularly high species diversity including tube building worms, small molluscs and many tiny crustaceans. Many pelagic fish species feed on the benthos, and young Great white sharks have also been observed feeding in the area (ParksVic 2017c).

2.2.8.11 Corner Inlet and Nooramunga Marine and Coastal Park - VIC

The Corner Inlet and Nooramunga Marine and Coastal Parks are protected from Bass Strait by sand barrier islands and Wilsons Promontory. Corner Inlet and Nooramunga consist of shallow marine waters, intertidal mudflats and a series of sand islands. Corner Inlet and Nooramunga Marine and Coastal Parks contain a diverse range of habitats including large stands of white mangrove and saltmarsh areas. Seaward of the mangroves are extensive areas of intertidal mud and sand flats which provide food for thousands of migratory wading birds each year.

Thirty two species of migratory waders have been recorded, including the largest concentrations of Bar tailed godwit and Great knot in south eastern Australia. In summer, the ocean beaches and sand spits are also used as nesting sites by shorebirds like the Pied oyster catcher, Crested tern, Caspian tern, Fairy tern, Hooded plover and the endangered Little tern. Fringing the saltmarshes and mangroves on the mainland and islands are stands of swamp paperbark and coast tea-tree, and further inland woodlands of coast banksia and manna gum. These are home for a variety of animals including the New Holland mouse, swamp antechinus, Orange-bellied parrot, Ground parrot and White-bellied sea eagle. The parks are recognised as wetlands of international importance under the Ramsar convention (Parks Victoria 2017d and 2017e).

2.2.8.12 Corner Inlet Marine National Park - VIC

Corner Inlet Marine National Park is located north and east of Wilson's Promontory adjacent to the southern shores of Corner Inlet. The National Park protects large areas of seagrass including the only extensive Posidonia australis meadow in southern Australia. Amongst the seagrass live over 300 marine invertebrates including crabs, seastars, sea snails, squid and many fish including pipefish, stingrays, flathead, whiting and flounder. The seagrass and surrounding marshes are particularly important for international migratory birds such as the Eastern curlew (Parks Victoria 2017e). The area has been listed as part of the Corner Inlet Ramsar Site.

2.2.8.13 Wilsons Promontory Marine National Park - VIC

Wilsons Promontory Marine National Park is Victoria's largest Marine Protected Area (MPA) at 15,550 ha and is located around the southern tip of Wilsons Promontory. There is a diversity of marine life including octopus, sharks and rays. It is a popular location for recreational divers particularly around the sponge gardens. The offshore islands support many colonies of fur seals and oceanic birds such as Little penguins, Fairy prions, Silver gulls and Pacific gulls (Parks Victoria 2017g).

Wilsons Promontory National Park is a popular tourist destination due to its coastal scenery and diverse natural environments. Tourist activities include walking, camping, sightseeing, viewing wildlife, fishing, boating, diving, sea kayaking and surfing.

The park is important for its range of plants and animals, including many threatened species including the New Holland mouse, Ground parrot and White-bellied sea eagle. Coastal features include expansive intertidal mudflats, sandy beaches and sheltered coves interrupted by prominent headlands and granite cliffs in the south, backed by coastal dunes and swamps.

The avifauna recorded for Wilsons Promontory includes around half of all Victorian bird species. Significant species of migratory wading birds feed on the tidal mudflats of Corner Inlet within and adjoining the park. The offshore islands have breeding and roosting sites for sea birds, including a large number of Short-tailed shearwaters (Parks Victoria 2017g).

2.2.8.14 Cape Liptrap Coastal Park - VIC

Cape Liptrap is a narrow peninsula formed by the spine of the Hoddle Range running out to sea. It consists of steep cliffs flanked by rock pinnacles and wave cut platforms. Between Venus Bay and Cape Liptrap the coast varies between cliffs of dune limestone and rock stacks and pebble beaches to broad sandy beaches backed by high dunes.

The Gunai/Kurnai and Boonwurry people have inhabited this area for over 6000 years. Middens mark the location of camps along the coast.

Along the coast Pacific Gulls, Silver gulls, Sooty oystercatchers and herons feed on the beach and rock platforms, and cormorants and Australian gannets forage for fish (ParksVic, 2018).

2.2.8.15 Bunurong Marine and Coastal Park and Bunurong Wilsons Promontory Marine National Park - VIC

The Bunurong group of parks stretches along 17 km of coastline. The Bunurong Marine National Park is 2,100 ha in size and adjoins the Bunurong Marine Park and Bunurong Coastal Reserve.

The coastal waters protect a remarkable range of habitats including intertidal reefs, subtidal rocky reefs, algal gardens and seagrass beds. The coastal waters share the cool waters of Victoria's central and western coasts but, unlike those shores, are relatively protected from the oceanic south-westerly swell by the position of distant King Island. The gently sloping rocky seafloor is also unusual in Victoria.

The marine life of the region is considered special due to the unusual set of environmental conditions. The intertidal sandstone reefs of the area boast the highest recorded diversity of intertidal and subtidal invertebrates in eastern Victoria. The range of seaweed species is also large and includes greens, blue-greens, browns and encrusting, coralline reds.

Seagrass meadows and sandy bays are also important habitats within the area. The diversity of habitats supports many marine animals including seastars, featherstars, crabs, snails, Port Jackson Sharks and up to 87 species of fish.

The coastal area is home to the Hooded plover which breeds on the beaches (ParksVic, 2018).

2.2.8.16 Phillip Island Nature Park - VIC

Phillip Island Nature Parks is part of the United Nations Scientific and Cultural Organisation (UNESCO) Western Port Biosphere Reserve, and abuts the Western Port Ramsar wetland. Phillip Island is part of Bunurong and Boonwurrung country, and the Nature Parks conserves important elements of the area’s indigenous heritage, as well as historical sites of European settlement and agriculture. It is an important ecotourism site for Victoria and protects threatened flora and fauna and is a known breeding site for threatened marine species of Little Penguin and Short-Tailed Shearwaters, Hooded Plovers and has a population of Australian Fur Seals (PoV, 2013).

2.2.8.17 French Island Marine National Park - VIC

The park is 2,978 hectares in size and approximately 10 kilometres south of the township of Tooradin on the Victorian coast. The main ecological communities protected by the park include subtidal and intertidal soft sediments (including seagrasses, mangroves and a small area of saltmarsh), and the water column. Over 73 per cent of the park is intertidal. French Island Marine National Park provides important feeding and roosting habitat for forty listed bird species such as the grey-tailed tattler Heteroscelus brevipes and the intermediate egret Ardea intermedia and the critically endangered orange-bellied parrot Neophema chrysogaster. The park is also feeding habitat for twenty-seven internationally important migratory bird species. Syngnathids, the group that includes seahorses and pipefish, are protected and are found in the park (ParksVic, 2019c).

2.2.8.18 Churchill Island Marine National Park - VIC

Churchill Island Marine National Park covers 670 hectares and is located south of Rhyll on the eastern shore of Phillip Island. The main habitats protected by the park include intertidal and subtidal soft sediments (including small areas of mangroves and saltmarsh, and seagrasses), some shingle-cobble rock areas, and the water column. The park provides important feeding and roosting habitat for forty-one listed bird species including the critically endangered orange-bellied parrot Neophema chrysogaster. The park and surrounds is a feeding area for twenty-nine internationally important migratory bird species (ParksVic, 2019 a).

2.2.8.19 Yaringa Marine National Park - VIC

Yaringa Marine National Park covers 970 ha along the north of Western Port Bay in Victoria. It is typified by saltmarsh communities, coastal heaths and open woodlands and forms part of the Western Port Ramsar Site. The areas above high water mark are protected within Western Port Nature Conservation Reserve. The natural values include the seagrass, mangrove and saltmarsh communities that provide habitat for migratory wader and shorebird species. Extensive intertidal mudflats support a diverse range of invertebrate and fish species. The areas are also a place of Indigenous cultural significance. Boating, birdwatching and marine education are elements of its social value (ParksVic, 2007).

2.2.8.20 Mornington Peninsula National Park - VIC

Mornington Peninsula National Park covers 2,686-hectares along the coastline of the Mornington Peninsula situated approximately 90 km south of Melbourne. It contains important areas of native vegetation remaining on the Mornington Peninsula following depletion since European settlement. Of particular note are communities of coastal grassy forests, banksia woodlands and sand heathlands. The park has known breeding habitat in Victoria for the threatened Hooded Plover. The park's tourism values are important to Victoria (ParksVic, 2019 b).

2.2.8.21 Great Otway National Park - VIC

Great Otway National Park (103,185 ha) includes extensive forests and heathlands on much of the southern fall and many northern areas of the Otway Ranges, and much of the coastline between Torquay in the east and Princetown in the west. The area of the park is not continuous but contains large areas of public land, private and rural communities with larger towns nearby such as Anglesea, Lorne and Apollo Bay. The park is an integral element of Victoria's most popular regional tourism destination. The Great Ocean Road and Scenic Environs, also on Australia's National Heritage list (refer Section 2.2.2.1) intersects the park in many places. Covering a large area both on the coast and inland, the park has many values from European and Indigenous historic significance to educational and scientific significance for its geomorphic and geological forms. Its proximity to Melbourne and its past (logging) and present uses for rural and forestry are managed with the high demand for its scenic and recreational values including fishing, hunting and touring. Relevant to this plan are the conservation values of the park in the coastal regions and the numerous tourist and recreational values the coastline and beaches offer, primarily due to their natural beauty. The park supports several species of migratory birds and listed threatened species include the Shy Albatross, Wandering Albatross and Fairy Prion (ParksVic and DSE, 2009).

2.2.8.22 Port Campbell National Park and Bay of Islands Coastal Park - VIC

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 extending past the limits of the Great Ottway National Park and covering a total area of 2,700 ha. The park extends to the limits of the National Heritage Great Ocean Road and Scenic Evirons place (refer Section 2.2.2.1). The Parks' geomorphical features including sheer cliffs and gorges, the arches and the off-shore stacks draw over five million visitors to the Great Ocean Road region each year. The park contains a wide range of remnant coastal vegetation types, including important coastal heathlands, which provide a valuable link between other patches of remnant vegetation in the area and contains a high diversity of plants. The area supports the endangered Australasian Bittern and listed marine species like the Great Egret and White-bellied sea-eagle (ParksVic, 1998).

2.2.8.23 Hogan Group - TAS

Hogan Island, the largest island in the Hogan Group, is a 232 ha granite island located in northern Bass Strait between the Furneaux Group and Wilsons Promontory. Recorded breeding seabird and wader species include Little penguin, Short-tailed shearwater, Pacific gull, Silver gull and Sooty oystercatcher (Brothers et al., 2001).

2.2.8.24 West Moncoeur Island and East Moncoeur Island - TAS

West Moncoeur Island and East Moncoeur Island are part of Tasmania's Rodondo Group lying in northern Bass Strait south of Wilsons Promontory. The islands are granite islands ringed by steep cliffs. Recorded breeding seabird and wader species include Little penguin, Short-tailed shearwater, Fairy prion, Common diving petrel, Pacific gull and Sooty oystercatcher. Both islands are considered important breeding sites for seabirds (Brothers et al., 2001). West Moncoeur Island holds an important breeding colony of Australian fur seals and is a nature reserve (DPIPWE, 2000).

2.2.8.25 Curtis Island Nature Reserve and Devils Tower Nature Reserve - TAS

Curtis Island, part of the Curtis Group, is a granite island with an area of 150 ha lying in northern Bass Strait between the Furneaux Group and Wilsons Promontory. It is a nature reserve and supports up to 390,000 breeding pairs of Short-tailed shearwaters. Other recorded breeding seabird and wader species include Little penguin, Fairy prion, Pacific gull and Sooty oystercatcher.

Other islands in the Curtis Group are Cone Islet, Sugarloaf Rock and Devils Tower. Devils Tower comprises two small granite islands with a combined area of 4.77 ha. It is a nature reserve and recorded breeding seabird species include Short-tailed shearwater, Fairy prion and Common diving-petrel. The island is also used as a regular haul-out site for Australian fur seals (Brothers et al., 2001)

2.2.8.26 Kent Group National Park and Kent Group Marine Reserve - TAS

The six islands and islets of the Kent Group comprise Tasmania's northernmost National Park. Surrounding the largest of the islands, the Kent Group Marine Reserve covers 29,000 ha of marine habitat including deep and shallow reefs as well as extensive sponge beds (TPWS 2017). The waters around the Kent Group include the southernmost strongholds of several fish species including the violet roughy, mosaic leatherjacket and Wilson's weedfish, and the southern limit of distribution of Maori wrasse, one spot puller and Bank's shovelnose. The Marine Protected Area (MPA) is made up of a sanctuary zone which is a 'no take' zone, and a habitat protection zone which allows for lower impact fishing (e.g. abalone and rock lobster fishing, hand line fishing).

The North East Isle is a 32.62 ha unpopulated granite island with a peak elevation of 125 m above sea level. Recorded breeding seabird and wader species include Little penguin, Short-tailed shearwater, Fairy prior, Common diving petrel, Pacific gull and Sooty oystercatcher (Brothers et al., 2001).

2.2.8.27 Logan Lagoon Conservation Area - TAS

Logan Lagoon Conservation Area is also a Ramsar wetland of international significance. Refer to Section 2.2.3.3 Logan Lagoon Ramsar Site for further information.

2.2.8.28 Strzelecki National Park - TAS

Strzelecki National Park covers 4216 hectares in the south-western corner of Flinders Island. Flinders is the main island in the Furneaux Group, a group of 54 islands in Bass Strait off the north-east coast of mainland Tasmania.

The national park protects rich and varied ecosystems as well as spectacular coastal and granite mountain landscapes. Strzelecki forms an area where plant and animal species found on mainland Australia and Tasmania overlap, making the park of important biogeographic significance. The park is also home to a high number of endemic species, rare flora and fauna and significant vegetation communities.

Flinders Island has particular significance as an important stop-over point for bird species migrating between the Australian mainland and Tasmania. A number of rare and threatened species occur in the park, including the Swift parrot, Forty-spotted pardalote, Grey-tailed tattler, and the Hooded plover (Tas Parks, 2018).

2.2.8.29 Lavinia State Reserve – TAS

Lavinia State Reserve located on the north-eastern side of King Island contains the Lavinia Ramsar wetland site which accounts for its primary values. Refer to Section 2.2.3.10 for information on this reserve.

2.2.8.30 Hunter Island Group – TAS

The Hunter Group of Islands is a group of 13 islands which lay off the north-west tip of Tasmania in Bass Strait. The two largest islands are Hunter Island and Three Hummock Island and they are surrounded by many smaller islands including Albatross Island, Kangaroo Island (Tasmania), Bird Island and Stack Island. The group supports large numbers of migratory and seabirds. The endangered Northern Royal Albatross, southern Giant Petrel and Grey- headed Albatross are only some of the listed migratory species. The Critically endangered Great Knot and endangered Sand Plover are known to roost on the islands. The Critically endangered Curlew Sandpiper and Eastern Curlew are known to occur in the area and the islands are breeding and feeding or foraging areas for many other threatened bird species (DoEE, 2019r). The Hunter Group of Island is listed as an Important Bird Area by Birdlife International, formerly the International Council for Bird Preservation.

2.2.8.31 Rocky Cape National Park - TAS

Rocky Cape National park has an area of about 3064 ha on the north coast of Tasmania. As the name suggests the park is valued for its geoheritage where the age of the rocks and the geomorphosis, movement and erosion over time has created a spectacular coastline, including caves which are now 20M above the waterline. Threatened species habitat for critically endangered Curlew Sandpiper, Swift Parrot, Bar-tailed Godwit, Far Eastern Curlew and a migration route for the critically endangered Orange-Bellied Parrot (TSSC, 2006).

2.2.8.32 Narawntapu National Park - TAS

The Park has a total area of about 4,500 hectares and stretches on the north coast of Tasmania along the coast of Bass Strait from the Port Sorell estuary in the west to the mouth of the Tamar River in the east. The Park includes the adjacent islands in the Port Sorell estuary and The Carbuncle, covers primarily land mass extending to the low water mark and the tidal flats but does not include marine or estuarine waters. Threatened ecological communities of saltmarsh occur in the area. Endemic flora species such as velvet bush, threatened species such as the grass tree, and several plant communities which are unreserved or poorly reserved elsewhere in the State reserve system make this park an area of high conservation value for Tasmania. Threatened fauna species recorded are the Green and Gold frog, Swift Parrot, Wedge Tail Eagle and Great Crested Grebe. Endemic species found here are the Tasmanian Pademelon and the Bettong (TPWS, 2016).

2.2.8.33 Mt William National Park - TAS

Mt William National Park located in the far north-east corner of Tasmania is an important area for the conservation of Tasmania's coastal heathlands and dry sclerophyll plants. Being a coastal park, Mt. William is an excellent area for observing sea birds. Gulls, terns, gannets, and albatrosses can be seen, as well as both the Pied and Sooty oystercatcher. Although not common, both the White-bellied sea eagle and the Wedge-tailed eagle can sometimes be spotted soaring overhead. Mt William is also the first and last stop off point for some migratory birds such as shearwaters (TPWS, 2014).

2.2.8.34 Freycinet National Park and Wye River State Reserve - TAS

Freycinet National Park on the east coast of Tasmania comprises a total area of some 16,803 hectares and includes Freycinet Peninsula, Schouten Island and nearby offshore islets and rocks extending in each case to the low water mark. The park has visitor, recreation and conservation zones which also include cultural and historical values. Freycinet National Park is important for the conservation of Tasmania's dry sclerophyll plant communities on granite and dolerite, and the conservation of a range of rare and endemic plant species, including several threatened species. The Park is important for wading birds due to its proximity to Moulting Lagoon, a wetland of international importance. All of the Park's offshore islands, islets and rocks are important breeding and resting sites for seabirds. Australian Fur Seals and Leopard Seals haul out to rest on the Islands. Vulnerable species include the Hooded Plover, Swift Parrot, Wedge Tail Eagle, White-bellied Sea Eagle, Shy Albatross and Black-browed Albatross, White-fronted Tern and Fairy Tern. With the wide diversity in habitats, the park is important for conservation of numerous native and endemic species of flora and fauna and together with its social values is a renowned Tasmanian recreation and tourist destination (TPWS, 2000).

2.2.8.35 Maria Island National Park and Ile des Phoques Nature Reserve - TAS

Maria Island lies off the south-east coast of Tasmania and has a total area of about 11,550 hectares which includes a marine area of 1878 hectares. Except for Lachlan Island in Mercury Passage, the Park includes all the islands, rocks, and reefs adjacent to the coastline, most notably Ile du Nord (Rabbit Island) and Ile des Phoques Nature Reserve located midpoint between Maria Island and Schouten Island (TPWS, 1998). Threatened ecological communities include Giant Kelp Marine Forests and subtropical and temperate coastal saltmarsh (EPBC, 2019a). The area includes 53 threatened species including the critically endangered Swift Parrot, Curlew Sandpiper, Eastern Curlew and Bar-tailed Godwit. The waters around Maria Island are known foraging and feeding areas for vulnerable Humpback Whales and other marine mammals may also feed in the area. The park is rich in poorly reserved flora species. The Australian Convict Site, Darlington Probation Station is listed in the world Heritage list and was a penal colony established by Governor Arthur.

The Maria Island Marine Reserve on the north and north-west coast of the island covers 1250 ha and extend out to 1km from shore (or 20m depth) and include a sanctuary zone for the protection of kelp species (TPWS, 2019).

2.2.8.36 Tasman National Park and Reserves - TAS

Tasman National Park in the south-east of Tasmania has an area of 10,755 hectares and includes the adjacent offshore rocks and islands and includes several reserves. As many of the national parks on the east coast, the Tasman park has geoheritage significance. Due to the substantially undisturbed landscape it is significant for flora and fauna conservation. Threatened fauna include the endangered Wedge- Tailed Eagle, Shy Albatross, Swift Parrot, Live-Bearing Sea Star. Several threatened flora species also occur in the Park. Several historic sites have been recorded in the park and reserves, and include examples of historic heritage from the convict era, through to maritime history and timber harvesting (TPWS, 2011). Whilst it does not include the world heritage Port Arthur site, the park spans either site of the entry to the port.

2.2.8.37 Lord Howe Island Permanent Park Preserve - NSW

Lord Howe Island Permanent Park Preserve includes a major part of the Lord Howe Island Group but excludes the settlement areas of the island (residential and tourist accommodation and agricultural lands). Whereas a National Park does not allow any harvesting, the management of the *Preserve* allows for sustainable harvesting of some natural resources, in this case mainly palm seeds. Lord Howe is listed as World Heritage (refer to Section 2.2.1.3) for its exceptional natural beauty and for a place which has habitats where populations of rare or endangered species of plants and animals still survive. The Lord Howe Island Group forms one of the major seabird breeding sites in the Tasman Sea and is thought to be home to the most diverse and largest number of seabirds in Australia, 34 bird species regularly breed on the island. The summit and slopes of Mt Lidgbird and Mt Gower support almost the entire breeding population of the marine bird, providence petrel (Pterodroma solandri); the only known breeding locality in Australasia of the grey ternlet (Procelsterna cerulea) and vulnerable Kermadec petrel (Pterodroma neglecta neglecta); and the southernmost breeding locality in the world for the threatened masked booby (Sula dactylatra tasmani), sooty tern (Sterna fuscata) and common noddy (Anous stolidus) (DECCW, 2010a).

2.2.8.38 Muttonbird Island Nature Reserve - NSW

Muttonbird Island Nature Reserve covers an area of around 9 hectares and is located adjacent to the coastline at Coffs Harbour on the mid north coast of NSW. It consists of two islands: Muttonbird Island and Little Muttonbird Island. As the name suggests, the reserve is a significant breeding site for the listed migratory wedge-tailed shearwaters (Puffinus pacificus) which migrate from Asia every year in August to breed on the island. As well as the migratory birds a number of threatened species have been recorded on the island including the vulnerable black-winged petrel (Pterodroma nigripennis), osprey (Pandion haliaetus) and sooty oystercatcher (Haematopus fuliginosus) (NPWS, 2009b)

2.2.8.39 Bongil Bongil National Park - NSW

Located 10km south of Coffs Harbour on the north coast of NSW is the 4,316 ha Bongil Bongil National Park. The park has over 10 km of coastline and is important as it protects coastal wetlands, creeks and estuaries that are crucial habitat for many native plant and animal species. The park contains diverse range of vegetation including threatened ecological communities such as Littoral Rainforest and Swamp Sclerophyll Forest on Coastal Floodplains. The park supports many species of shorebirds including the endangered Curlew sandpiper and Little Tern. With its close proximity to Coffs Harbour city and other smaller town, visitation to the park and enjoyment of the coastal areas is high (NSW OEH, 2017b)

2.2.8.40 Jagun Nature Reserve - NSW

Jagun reserve is located adjacent to the township of Valla Beach on the mid north coast of NSW. Although it is only 103 ha, the reserve is a critical part of a regional habitat corridor known as the

Oyster Creek Urunga Corridor linking large areas of coastal vegetation from Deep Creek in the south to the Bellinger River in the north, providing potential key linkages for threatened forest fauna. Jagun Nature Reserve has a number of small drainage lines which flow into Oyster Creek, which intermittently opens and closes to the ocean thereby having a short distance of transition between marine and freshwater vegetation, and variations in salinity dependent upon contact with the ocean. The entrance to Oyster Creek is highly significant to the Aboriginal Gumbaynggir people (NPWS, 2008).

2.2.8.41 Gaagal Wanggaan (South Beach) National Park- NSW

Gaagal Wanggaan (South Beach) National Park (637ha) is owned by the Aboriginal Gumbaynggir people and leased back to and jointly managed with the NSW Parks and Wildlife Service. Encompassing Warrell Creek, Gaagal Wanggaan (South Beach) National Park covers an undisturbed coastal dune system, littoral rainforest, shrubland, and estuarine mangroves which support a diverse range of coastal fauna and flora. The park contains significant Aboriginal cultural values including sites that show the continuous use of the area by Aboriginal people, as they have for thousands of years (NSW OEH, 2019b).

2.2.8.42 Hat Head National Park- NSW

Together with Limeburners Creek Nature Reserve, Sea Acres Nature Reserve and Crowdy Bay National Park, Hat Head National Park (7,220 ha) forms a system of protected areas between Harrington in the south and South West Rocks in the north which is broken only by the coastal towns and villages. Extensive wetlands of the Limeburners Creek Nature Reserve discussed below (refer Section 2.2.8.43) parallel the beaches of Hat Head National Park although these are being invaded by huge mobile dunes. Hat Head National Park contains the northern range limit of a number of temperate species of flora and fauna as well as the southern limit of many tropical and sub-tropical species as it is located at the Macleay-Mcpheerson Overlap; an ecological transition zone between the temperate southern areas of eastern Australia and the tropical north. The zone of overlap has significance for the number and diversity of both plant and animal species (NPWS, 1998a).

2.2.8.43 Limeburners Creek National Park- NSW

Limeburners Creek National Park covers 9,123 ha of coastal land north of Port Maquarie on the NSW mid-north coast. It incorporates large portion of Limeburners Creek Nature Reserve which is nationally significant freshwater and estuarine weltland. These provide habitat for many threatened and migratory bird species. Oher natural values include wet and dry heathland, littoral rainforest, eucalypt forest and woodland. The park contains a high concentration of indigenous relics including what may be fish trap, one of only three in the north coast of New South Wales (NPWS, 1998b).

2.2.8.44 Sea Acres National Park - NSW

Sea Acres National Park is located near Port Macquarie on the mid-north coast region of New South Wales. It is famous for its 1.3 km rainforest walk however has a coastal region also where evidence of its indigenous heritage and the way that the Birpai People likely used the area for fishing, hunting and gathering (NPWS, 2019c).

2.2.8.45 Crowdy Bay National Park and Watson Taylors Lake - NSW

Located on the mid-north coast of New South Wales, 25 km north-east of Taree is the 8,022 ha Crowdy Bay National Park which has within it the nationally significant, freshwater Watson Taylors Lake wetland. Part of the wetland is Blackfellows Bog, which is of high scientific value as it contains a wealth of palynological material which will allow scientists to reconstruct the many vegetative and climatic changes that have occurred over the last several thousand years in the Crowdy Bay area. Other significant natural values of the park include remnant stands of littoral rainforest at Crowdy Gap and Diamond Head and both wet and dry heath communities. The heath contributes to the park’s attraction as a place for spring wildflower display, being renowned for many scenic features of the park together with beaches, headlands and sand plains. The park also contains undisturbed indigenous middens dating back approximately 6,000 years (NPWS, 1987).

2.2.8.46 Darawank, Khappinghat and Kattang Nature Reserves - NSW

Along the coast between Forster and Camden Haven are the Darawank (1191 ha), Khappinghat and Kattang (68 ha) Nature Reserves. Darawank Nature Reserve, occupies the largest area along the coast and supports a diversity of wetland and coastal vegetation communities providing habitat for threatened shorebird species including the Australian pied oystercatcher (Haematopus longirostris) and little tern (Sternula albifrons) and nesting site for the endangered black-necked stork (Ephippiorhynchus asiaticus). Consistent with the adjacent parks, these reserves have important ecological communities of littoral rainforest and subtropical rainforest (NSW OEH, 2014). Khappinghat is mainly inland but includes the approximately 3.45km of beach and Kattang is a dramatic cliffed headland which is a popular spot for fishing, viewing wildflowers and whale hatching (NPWS, 2019b).

2.2.8.47 Booti Booti National Park and Wallis Lake - NSW

Booti Booti National Park is 1566 ha park, approximately 10km long, 3.25 km wide at its widest point and 400m wide at its narrowest. It's a peninsula which runs between the Forster town in the North and Charlotte Head in the south and separates the ocean from Wallis Lake, which is a nationally important wetland. The park consists of what was 3 hill, island complexes that have been joined to the mainland through deposited sand. The dominant plant community is dry, subtropical rainforest and also includes Littoral rainforest as well as other plant communities (Griffith et al., 2014). Its estuarine waters provide habitat to over 200 bird species including the endangered little tern (NPWS, 2019d).

Wallis Lake is a nationally significant wetland and one of the lakes which form The Great Lakes of NSW (including Myall Lakes see Section 2.2.8.48 below). Wallis Lake supports the northern-most limit of the seagrass Posidonia australis and 20 per cent of the total seagrass communities in New South Wales (DoEE, 2006).

2.2.8.48 Myall Lakes National Park Little Broughton Island and Stormpetrel Nature Reserves-NSW

The extensive waterways including Bombah Broadwater, Boolambayte Lake and Myall Lake are the dominant feature of this park. The Myall Lakes Ramsar site also overlaps with the park (refer Section 2.2.3.10). Its proximity to Newcastle and Forster on the central coast of NSW and the dunes, waterways and 40kms of beach make Myall National Park the most frequently visited National Park in northern NSW.

The Myall Coast Reserves include Little Broughton Island (36 ha) and two islands known as Inner Rock and North Rock which together form Stormpetrel Nature Reserve (8 ha). They are located about 3 km offshore near Broughton Island. The three islands are important breeding sites for seabirds, of particular note are the White-bellied Sea Eagle and the Wedge-tailed Shearwater. Little Broughton Island is also recognised as the northern most breeding site for the short-tailed Shearwater (NPWS, 2002).

2.2.8.49 Tomaree National Park - NSW

Tomaree National Park is located in the Port Stephens area of NSW, approximately 45km north of Newcastle and covers an area of approximately 2,310 ha. The park is one of a group of conservation reserves in the Port Stephens area which protect a coastal landscape of regional and state importance. Nearby Nelson Bay is a popular holiday destination for people in Sydney and the park has over 100,000 visitors per year. The park's important values include evidence of important geological events, essential wintering habitat for a variety of birds, conservation of heath communities on volcanic rock (rhyodacite) which have restricted distribution in NSW (NPWS, 2006).

2.2.8.50 Worimi Conservation Lands - NSW

The Worimi Conservation Lands covers a total area of 4029 ha comprising the Worimi National Park (1812 ha), 881 ha of state conservation area and 1336 ha of regional park. It is located north of the Hunter River, Newcastle and covers approximately 25km of coastline including the intertidal zone down to the low water mark. Ownership of the land is by the Aboriginal Worimi people and it is leased back to the New South Wales government. It is managed under a jointly between the government and the Wolimi people. It has significant indigenous heritage values with burial sites, ceremonial cites, middens extensive archaeological material. Worimi is an important habitat link within a broader wildlife corridor comprising the Wetlands National Park in the south-east and Tomaree National Park in the north-east (refer Section 2.2.8.49), linking Port Stephens to the Watagans, south-east of Newcastle. Many listed bird species are known to occur there including the endangered curlew sandpiper, little tern and pied oystercatcher (NSW, OEH, 2015).

2.2.8.51 Glenrock State Conservation Area and Awabakal Nature Reserve- NSW

Glenrock State Conservation Area of 534 ha is significant as it contains ten nationally significant vegetation communities, including lagoon (Glenrock Lagoon) and the threatened ecological community of littoral rainforest. The conservation area contains many cultural records, both Aboriginal and European, and is located within the Awabakal Local Aboriginal Land Council area (NPWS, 2010).

Awabakal Nature Reserve to the south of Glenrock State Conservation Area has similar values to Glenrock. The Redhead Lagoon provides one of the most important sources of information on the vegetation history of eastern Australia through the last full glacial–interglacial cycle.

Both areas are important habitat for the threatened terrestrial birds and mammal species. The proximity of these areas (8km and 15km to Newcastle city respectively) makes these highly used areas for educational and recreational purposes (NPWS, 2014c).

2.2.8.52 Munmorah State Conservation Area and Bird Island Nature Reserve and Wallarah National Park - NSW

Munmorah State Conservation Area is on the coast of NSW, approx. 40 km north of Gosford and has an area of 1,515 ha, including 12km of coastline. A range of vegetation communities including woodlands, open forests, wetlands, coastal tea tree shrubland and coastal heath support diverse fauna including the listed osprey (*Pandion haliaetus)* and sooty oystercatcher *(Haematopus fuliginosus).* The 7.3 ha Bird Island with its steep vertical cliffs is an important nesting and roosting area for seabirds including listed and migratory species including species of shearwater, godwit, curlew, terns and the arctic jaeger (also known as arctic skua) (*Stercorarius parasiticus)* (DoEE, 2019o) (NPWS, 2009a).

To the north of the park is the Wallarah National Park, primarily an inland park of 178 ha with approximately 2km of coastline. Seabirds and migratory birds found in the Munmorah State Conservation Area may also occur here (NPWS, 2014b)

2.2.8.53 Wyrrabalong National Park - NSW

Wyrrabalong National Park is located on the Central Coast of New South Wales approximately 105 km north of Sydney. The 620 ha park conserves the largest stands of littoral rainforest and Sydney red gums on the NSW Central Coast as well as significant freshwater wetlands. It also contains six endangered ecological communities (coastal saltmarsh, Littoral rainforest, swap oak and swap sclerophyll forest, freshwater wetlands and themeda grassland), significant habitat for a number of threatened animal species and a variety of Aboriginal sites, including an extensive midden at Pelican Point. The protected lake and foreshore and island provide important habitat for migratory birds and seabirds (NPWS, 2013).

2.2.8.54 Bouddi National Park, Brisbane Water National Park & Ku-ring-gai Chase National Park - NSW

Broken Bay, 46 km north of Sydney has three national parks at its entrance and is also the mouth of the Hawksbury River. Bouddi is at the north headland and comprises approximately 1,532 ha (NPWS, 2019a) and one of the first marine parks to extend down to the low water mark and therefore one of the first marine protected areas. Brisbane Waters National Park comprises approximately 11,506 ha. Both parks are significant is their representation of sandstone parks, coastal habitats and communities typical of the Sydney region. They are important in that together with the Ku-ring-gai Chase National Park on the south of the bay, also a National Heritage listed place (refer Section 2.2.2.2), they are a part of a system of reserves which protects the State and regionally significant waterways of the lower Hawkesbury River, Broken Bay, Pittwater and Brisbane Waters. The extensive areas covered by the three parks support a diverse range of communities which support native floral and faunal species. The parks also contain a large number of significant indigenous sites and representations of Sydney rock art (NPWS, 1992). With their proximity to suburbans Sydney they are popular tourist and recreational locations.

2.2.8.55 Sydney Harbour National Park - NSW

Sydney Harbour National Park covers 393 ha of headlands, beaches and islands in and around Sydney Harbour. The park includes six headlands including North Head on the northern side and South Head on the south side. The five islands within the park are Shark Island, Clark Island, Fort Denison, Goat Island and Rodd Island, extending well into the harbour past the Sydney Harbour Bridge. All parts of the park are within suburban Sydney city. Its list of values include historic, conservation values for the protection of native flora and fauna, indigenous heritage, landscape and recreation and tourism (NPWS, 2012),

2.2.8.56 Malabar Headland National Park - NSW

The Malabar headland, located in Malabar, 12 km south of Sydney, is a 177 ha park which has dramatic sandstone cliffs and provides spectacular coastal views. The western and eastern sections of the headland contain rare examples of the once extensive Port Jackson mallee scrub (Eucalyptus obstans, formerly Obtusiflora). Malabar headland also contains one of the largest, continuous remnants of the endangered ecological community listed as Eastern Suburbs Banksia Scrub. The site is a renowned site for viewing seabirds and marine mammals, in particular the white bellied sea eagle and the humpback whale (NPWS, 2014a). The headland also has indigenous heritage significance and includes shell middens that can be seen today.

2.2.8.57 Towra Point Nature Reserve - NSW

Located at Kurnell, Botany Bay, in Southern Sydney, Towra Point Nature Reserve is a 603 ha reserve. The site is one of the first contacts between European and Aboriginal peoples, Towra Point is a hugely important place for Australia as we know it today. In April 1770, the Cook expedition explored the area and mapped Towra Lagoon as a source of fresh water. Its fresh drinking water and historical richness in seafood provided an abundant source of food to the indigenous people and the nature reserve is now a dedicated Aboriginal Place. Towra Point Nature reserve forms the largest and most diverse estuarine wetland complex in NSW. Representing around half of the remaining mangrove area near Sydney, and most of the saltmarshes remaining in the region. The abundance of mudflat, fresh water wetlands and sea grass beds, it provides breeding, feeding and roosting sites for many threatened and migratory bird species. Towra Point can only be accessed by boat or kayak (DECCW, 2010b).

2.2.8.58 Kamay Botany Bay National Park - NSW

Located within the Sydney metropolitan area, Kamay Botany Bay National Park (or Botany Bay National Park) covers approximately 456 ha of the northern and southern headlands of the entrance to Botany Bay and includes over 13 km of coastline. As discussed in the section on National Heritage (Section 2.2.2) the park includes the Kurnell Peninsula and Botany Bay botanical sites, listed National Heritage Places. It is also renowned for the place of arrival of the French expedition under the command of Jean-Francois de Galaup, Comte de Laperouse in 1788 before the departure of the first fleet. Laperouse stayed in Botany Bay for six weeks and built a stockade, observatory and a garden for fresh produce on the La Perouse peninsula before leaving and not seen again. The association of the park with the history of the European exploration and the botanical collection of native plants by Banks and Solander are the two most prominent values, however, together with those is the symbolism of the meeting of the Indigenous and European cultures and the historical social issues that have developed from that and the opportunity to further explore current social issues such as reconciliation (NPWS, 2016). The retention of the largest remnants of the original vegetation communities of the Kurnell Peninsula and Eastern Suburbs and prominent scenic coastal headlands at the entrance to Botany Bay are also defined as core values of the park. The park is also part of a broader network of conservation areas in the region that provide secure protection for native plants and animals, sites of Aboriginal and historic heritage value and recreational opportunities for a growing population. On the southern Headland, the park abuts the Caltex fuel import terminal on the inland side of the park (NPWS, 2018).

2.2.8.59 Royal National Park - NSW

Royal National Park is a 15,068 ha park situated on the coast of NSW, adjacent to the southern fringe of metropolitan Sydney and about 30 km north of Wollongong. Royal National Park adjoins Heathcote National Park (2,251 ha) to the west and Garawarra State Recreation Area (900ha) to the southwest. These adjoining parks do not include coastal areas. The parks are significant for many reasons and these can be partially attributed to their accessibility to suburban Sydney combined with the parks' diversity of natural and cultural heritage which makes for high public profile and visitation rates for recreation, scientific and educational purposes (NPWS, 2000)

The park is amongst the most floristically diverse areas of its size in the temperate parts of the world. Well over 1000 plant species have been recorded, including 26 species which are listed as nationally rare or threatened. The place is important for its richness in a wide array of species including heaths

(Epacridaceae), peas and wattles (Mimosaceae and Fabaceae), orchids (Orchidaceae), grevilleas and banksias (Proteaceae) and members of the eucalypt family (Myrtaceae) (DoEE, 2019).

Royal National Park is also recognised for its rich invertebrate fauna. The place is also extremely important as a centre of temperate animal species richness for a range of groups including perching birds (Passeriformes) especially honeyeaters (Meliphagidae), tree-frogs (Hylidae), reptiles (Reptilia) and butterflies (Lepidoptera). The place can be regarded as exemplifying the biodiverse Hawkesbury Sandstone environment.

Royal NP is one of only four coastal national parks in NSW that protect land below high water mark and associated estuarine habitats. The submerged and intertidal lands of South West Arm and Cabbage Tree Basin, both in Port Hacking, are part of Royal NP. Both areas are sheltered bodies of water which support nursery grounds for juvenile fish and invertebrates, seagrass beds and a diverse benthic fauna. Cabbage Tree Basin also supports a mangrove community and is an area frequented by migratory birds (NPWS 2000).

The Royal National Park and Garawarra State Conservation Area are listed on the National Heritage list, recognised for its importance as Australia's first National Park and the diverse and fascinating nature environments protected in the area (refer Section 2.2.2).

Other values of the park include:

Indigenous Heritage

- Aboriginal sites in the parks are of importance to the present day Aboriginal community for cultural revival, educational and historical reasons.
- Provides protection for a large number of Aboriginal sites, particularly rock engravings stylistically distinct from those north of the Georges River.
- Royal National Park protects several cultural landscapes, including the Audley precinct and the Bulgo and South Era cabins.

Natural Heritage

- The three reserves comprise a moderately large area of land protecting important landforms and plant and animal communities which are typical of the coastal and sub-coastal parts of the Sydney Basin.
- The three reserves are an important link in a corridor of natural lands extending from southern and south-western Sydney southwards to the Illawarra escarpment, the water catchment areas and beyond.

Historic

- Royal National Park protects several cultural landscapes, including the Audley precinct and the Bulgo and South Era cabins.

2.2.8.60 Five Islands Nature Reserve - NSW

Five Islands Nature Reserve includes five small islands clustered off the coast of Port Kembla, immediately south of the city of Wollongong within the Wollongong Local Government Area. The islands are clustered between approximately 0.5 kilometres and 3.5 kilometres off the coast. The main values of the islands include (NPWS, 2005):

- Evidence of geological and geomorphologic processes related to the formation of the Sydney Basin and subsequent landscape evolution;
- Habitat and breeding sites for the sooty oystercatcher (Haematopus fuliginosus), classified as vulnerable
- Breeding sites for the wedge-tailed shearwater (Puffinus pacificus), the shorttailed shearwater (Puffinus tenuirostris) and habitat for the white-bellied sea-eagle (Haliaeetus leucogaster), all of which are listed migratory species
- Importance to the Aboriginal community due to continuing cultural associations and past occupation of the area.

2.2.8.61 Seven Mile Beach National Park and Comerong Island Nature Reserve - NSW

Seven Mile Beach National Park and Comerong Island Nature Reserve are located on the south coast of NSW, approximately 50 km south of Wollongong. The national park covers much of the sand dune barrier along Seven Mile Beach and part of adjacent Coomonderry Swamp (NPWS, 2019). It was reserved in 1971 and has a current area of 898 ha. The nature reserve comprises several islands in the Shoalhaven delta and the beds of Comerong Bay, Comerong Lagoon and the channels between the islands. It was reserved in 1986 and has an area of 660 ha. Seven Mile Beach National Park contains one of the largest areas of natural coastal dune vegetation on the central part of the NSW coastline and the uncommon orchid *Dipodium hamiltonianum* occurs there.

Coomonderry Swamp is the only large semi-permanent freshwater wetland on the south coast and protects approximately one third of this type of habitat within NSW. It is an important drought refuge when smaller coastal wetlands and inland wetlands are dry and supports a diverse range of bird species. The swamp has a large population of the threatened green and golden bell frog *Litoria aurea*. Other threatened fauna recorded at Coomonderry Swamp include the Australasian bittern *Botaurus poiciloptilus* and black-necked stork *Ephippiorhynchus asiaticus*. Threatened species recorded elsewhere in the national park include the tiger quoll *Dasyurus maculatus*, yellow-bellied sheathtail-bat *Saccolaimus flaviventris*, greater broad-nosed bat *Scoteanax rueppellii*, swift parrot *Lathamus discolor*, olive whistler *Pachycephala olivacea*, regent honeyeater *Xanthomyza phrygia*, masked owl *Tyto novaehollandiae* and powerful owl *Ninox strenua*.

The Comerong Island nature reserve protects one of the few large naturally vegetated delta systems in NSW. It contains an important sample of three major habitat types - tidal shallows, mangrove swamp and has the largest remaining area of littoral forest on the south coast of NSW. It provides habitat for a large number of threatened waterbirds and shorebirds including two species of oystercatchers and sandpipers and is an important estuarine system for waders. The park and reserve are important recreational resources for sightseeing and fishing (NPWS 1998).

2.2.8.62 Jervis Bay Marine Park - NSW

Jervis Bay Marine Park on the NSW South coast covers approximately 215 km2 and spans over 100 km of coastline and adjacent oceanic and estuarine waters. It extends from Kinghorn Point south to Sussex Inlet. It includes most of the waters of Jervis Bay, with the remainder forming part of the Booderee National Park on Bherwerre Peninsula. It contains the tidal waters of Currambene Creek, Moona Creek, Carama Inlet, Wowly Gully, Callala Creek and Currarong Creek, and the mean high water mark along the shores. The marine park has six estuaries, excluding Jervis Bay, four small coastal creeks and two larger, wave-dominated estuaries. Four seagrass species are abundant making it an important nursery for fish and providing food and shelter for recreationally and commercially valuable species such as snapper, bream, luderick, whiting and flathead. The rocky shores are important roosting and feeding grounds for shorebirds including the threatened sooty oystercatcher. Shallow and intermediate reefs support a wide range of biodiversity, including habitat for commercially and recreationally valuable fish and for invertebrates such as cuttlefish, crabs and rock lobsters (NSW DPI, 2019).

The park was established in 1998. The park contains important habitat for the endangered grey nurse shark. Protected species known to occur in the park include the eastern blue devilfish, elegant wrasse, black rockcod, some hard and soft corals, sea anemones, zooanthids, and all pipefishes and seahorses. Pied and sooty oystercatchers, hooded plovers and ospreys are among the threatened bird species known to nest, roost and/or feed on the rocky shores. Humpback and southern right whales are often spotted during migration and are an important tourist attraction.

Indigenous people have strong ties to the land with midden sites located in areas around the marine park. Nine shipwrecks have been found in Jervis Bay, including the Hive which was the only convict transport ship to be wrecked on mainland Australia.

2.2.8.63 Booderee National Park - NSW

Booderee National Park stretches across 6,379 hectares at the southern section of Jervis Bay on the south coast of New South Wales and includes 875 hectares of marine environment with values similar to those in Jervis Bay Marine Park. Booderee National Park is owned by the Wreck Bay Aboriginal Community and is jointly managed with Parks Australia. The park includes Bowen Island which has a sanctuary zone on the west coast to protect nesting seabirds and their habitat from disturbance. The marine environment has a habitat protection zoning designed to safeguard sensitive, rare and endangered habitats, including littoral areas and seagrass beds (PA, 2019 b).

2.2.8.64 Conjola National Park - NSW

Located in the mid coast of NSW the Conjola National Park covers 11,060 ha including forests, woodlands, rainforest, coastal scrub and wetlands and four endangered ecological communities: Coastal Saltmarsh; Swamp Sclerophyll Forest (important feeding; Swamp Oak Floodplain Forest and Bangalay Sand Forest. 429 plant species are represented, five of which are threatened. Twenty five species of threatened fauna occur in the park. Of these the regent honeyeater (Xanthomyza phrygia), swift parrot (Lathamus discolor), little tern (Sterna albifrons), hooded plover (Thinornis rubricollis) and green and golden bell frog (Litoria aurea) are endangered. High diversity and occurrence of Aboriginal sites including middens, campsites, rock shelters and grinding grooves. A number of heritage features are located in the park including a burial and monument for the 1870 shipwreck of the Walter Hood (NPWS, 2009).

2.2.8.65 Narrawallee Creek Nature Reserve - NSW

Narrawallee Creek Nature Reserve is located on the mid south coast of New South Wales approximately 7km north of Ulladulla and covers an area of 878 ha. It includes five endangered ecological communities being Coastal Saltmarsh, Swamp Sclerophyll Forest (dominated by swamp mahogany, an important food source for several threatened fauna including the yellow-bellied glider and grey-headed flying fox), Swamp Oak Floodplain Forest, Littoral Rainforest and Bangalay Sand Forest). Eleven species of threatened fauna recorded, including breeding sites for the little tern, hooded plover and pied oystercatcher. Both indigenous and historical values are placed on the reserve (NPWS, 2006).

2.2.8.66 South Pacific Heathland Reserve - NSW

The South Pacific Heathland Reserve is a 14 hectare flora and fauna reserve on the cliffs above the rock platform between Rennies Beach and Racecourse Beach at the southern end of Ulladulla. Its value is based on its diversity of local flora, birdlife, and spectacular heathland and panoramic coastal views and is a popular nature walking track. Whales may be seen from the viewing platforms during their migration seasons (DNSW, 2019).

2.2.8.67 Parks & Reserves – Meroo National Park - NSW

Meroo National Park is 3,731 ha of coastline, coastal lakes and inland forested areas located 5 km south of Ulladulla on the NSW south coast. High conservation values are attributed to the coastal lakes included in the park (Termeil, Tabourie and Wairo Beach Lagoon) and the foreshores and fringing wetlands of the adjoining lakes s (Meroo, Burrill and Willinga Lakes). As per the Narrawallee Creek Nature Reserve it includes endangered ecological communities Swamp Oak Floodplain Forest (Casuarina glauca – Melaleuca ericifolia), Coastal Saltmarsh, Littoral Rainforest, Bangalay Sand Forest (E. botryoides – Banksia serrata) and Themeda Grassland on Seacliffs and Coastal Headlands. At least 12 threatened fauna species including significant populations of the nationally endangered green and golden bell frog (Litoria aurea) have been recorded here. The park also has indigenous and recreational values due to mythological sites and a range of bush camping locations (NPWS, 2010).

2.2.8.68 Murramurang National Park - NSW

Murramurang National Park spans 44 km of coastline on the NSW south coast and supports more than 90 species of bird including gannets, shearwaters, White-faced storm petrels, Sooty oystercatchers and Little penguins. The forest of spotted gums stretches right to the ocean (NPWS, 2018).

2.2.8.69 Batemans Marine Park - NSW

The Batemans Marine Park was established in 2006 and covers approximately 85,000 hectares, extending from the north end of Murramarang Beach near Bawley Point to Wallaga Lake in the south. It includes all of the seabed and waters from the mean high water mark on the coast to three nautical miles offshore. It includes all estuaries, creeks, rivers and lakes (except Nargal Lake) to the limit of tidal influence. Scuba diving, snorkelling, beach going, whale, seal and other wildlife watching, fishing, swimming, surfing and boating are all popular pastimes.

The park covers a range of habitats, including continental shelf sea floor along with sponge gardens, beaches, rocky shores, kelp beds, coralline algal banks, rocky reefs, islands, seagrass, mangroves and estuarine habitats.

The Montague Island Nature Reserve, within the Marine Park, is a breeding and nesting place for over 40,000 sea birds including Shearwaters, Little penguins, Crested terns and Silver gulls and is a haul out site for Australian and New Zealand fur seals. Both Montague Island and the Tollgate Islands (also within the park) are aggregation sites for Grey nurse sharks.

Local Aboriginal communities have strong links to the area within and adjoining the Marine Park. The local Aboriginal communities within the Yuin Nation are actively involved in consultation on park issues affecting traditional use (DPI, 2018).

2.2.8.70 Eurobodalla National Park - NSW

Eurobodalla National Park contains a range of aquatic environments including lagoons, lakes, estuaries, sheltered and wild beaches that protect a wide variety of plants and animals. The National Park provides an important habitat for a wide variety of birds with 131 bird species having been recorded in the park. Estuaries and headlands are important over-wintering areas for migratory birds, including 17 species of waders, and the Hooded plover and Little tern nest on the sand islands, sandspits and dunes.

Water based activities such as boating, fishing and swimming are all popular in the park (NPWS, 2018).

2.2.8.71 Mimosa Rocks National Park - NSW

Mimosa Rocks National Park takes its name from the Paddle Steamer Mimosa that wrecked in 1863 after running aground on rocks at the northern end of the park. The rocks of the park have distinctive castle-like features that are the result of geological folds, faults and intrusions.

The park provides important habitat for many migratory birds, including Hooded plovers and Pied oystercatchers that nest along the coastline. The Bar tailed godwit rests briefly here in summer months during its migration from Alaska to New Zealand.

The park is popular for fishing, surfing, snorkelling and birdwatching. From May to November, the headlands are excellent whale watching vantage points (NPWS, 2018).

2.2.8.72 Bournda National Park - NSW

Bournda has been a special place for the Dhurga and Yuin people for thousands of years and its name means ‘place of tea tree and kangaroos’. The estuarine wetlands provide roosting and feeding areas for a large variety of waders and waterfowl including threatened species such as Little tern, Hooded plover and Pied oystercatcher (NPWS, 2018).

2.2.8.73 Ben Boyd National Park - NSW

The Ben Boyd National Park is comprised of three sections, extending approximately 45 km along the coast north and south of Twofold Bay near Eden. The park’s vegetation reflects its location in the driest, windiest part of the state’s coastline. Open forest and woodland cover most of the park. The park’s varied habitat supports a highly diverse bird population and about 50 species of mammal including a number of threatened species. Migrating whales can often be seen from the coast between late May and December and the former Davidson Whaling Station located on Twofold Bay is a tourist attraction (NPWS 2017b).

2.2.8.74 Special Management Areas

Skerries

The Skerries, offshore from Wingan Inlet, near Croajingalong National Park is home to a major seal breeding colony with an estimated population of 11,500 representing approximately 12% of the national population.

Montague Island

The Montague Island Nature Reserve, within the Batemans Marine Park (Refer Section 2.2.8.69), is a breeding and nesting place for over 40,000 sea birds including Shearwaters, Little penguins, Crested terns and Silver gulls and is a haul out site for Australian and New Zealand fur seals. Both Montague Island and the Tollgate Islands (also within the park) are aggregation sites for Grey nurse sharks.

2.3 Ecological Environment

2.3.1 Fauna

The EPBC Act Protected Matters search tool on the Department of Environment and Energy site was used to inform the listed marine, migratory and threatened faunal species (or species habitat) that occur, or may occur in the DA (DoEE, 2019x) (Refer Appendix C).

2.3.1.1 Fish

2.3.1.1.1 Fish (bony)

Bony fish are a diverse group of fish that have skeletons primarily compose of bone tissue, as opposed to cartilage; most living species of fish are bony fish. The vast majority of fish are members of Osteichthyes, which is an extremely diverse and abundant group consisting of 45 orders, and over 435 families and 28,000 species.

Syngnathidae is a group of bony fishes that includes seahorses, pipefishes, pipehorses and sea dragons; the closely related Solenostomidae family includes ghost pipefish. These species occupy a range of habitats, however generally display a preference for seagrass and macroalgal beds, coral reefs, mangroves or sponge gardens (i.e. a habitat offering a protective environment. Habitat that supports syngnathid populations is generally patchy, so populations of syngnathid species may be dispersed and fragmented (DSEWPaC, 2012f). Syngnathids are typically carnivorous, feeding in the water column on or near the sea floor; their diet including small crustaceans, invertebrates, and zooplankton. Generally, the pipefishes, seahorses and seadragons are associated with vegetation in sheltered to moderately exposed reef areas at a range of depths from 0 to 50 m, depending on the species (Edgar, 1997), but usually at depths of between 5 and 25 m. Given that these species normally inhabit shallow reefs and kelp beds (Kuiter 2000).

It is estimated that there are over 500 species of fish found in the Gippsland Basin, including a number of species of importance to commercial and recreational fisheries (LCC, 1993). Species of commercial importance are covered in Section 2.4.1.

Fish species listed under the EPBC Act that may occur in the DA are given in Table 2-27 (DoEE, 2019b, DoEE, 2019l, DoEE, 2019m). Two species listed as ‘critically endangered’, the Spotted handfish and the Red handfish, may occur within the DA. There are less than forty Red handfish known to exist with a second (secret) location only recently discovered along the east coast of Tasmania (ABC 2018). Ziebell’s Handfish, also may occur in the DA and is listed as vulnerable. Handfish have a depth distribution of 3-20 metres and use their hand-like fins to crawl across the sea floor. The species’ diet includes small crustaceans and polychaete worms and the species is endemic to Tasmania (DoEE, 2015).

Two other fish species potentially occurring within the DA were listed as ‘vulnerable’ under the EPBC Act; the Australian grayling (Prototroctes maraena) and the Black rockcod (Epinephelus daemelii) (DoEE 2017a). The Australian grayling is a small to medium-sized, slender, silvery fish with soft-rayed fins. It is endemic to south-eastern Australia, including Victoria, Tasmania and New South Wales, and is a migratory species that inhabits estuarine waters and coastal seas as larvae/juveniles, but spend most of their lives in freshwater, inhabiting rivers and streams as adults (DSE, 2008). The Black cod’s range includes warm temperate and subtropical waters of the southwestern Pacific, including south-eastern Australia and the North Island, Kermadec Islands and Poor Knights Islands of New Zealand. Black cod generally inhabit near-shore rocky and offshore coral reefs at depths down to 50 m. In coastal waters juveniles are often found in estuary systems with adults moving into rock caves, rock gutters and on rock reefs (DoEE, 2012a).

Pipefishes, seahorses and seadragons, as listed under the EPBC Act, require a permit to remove them from the area. Generally, the pipefishes, seahorses and seadragons are associated with vegetation in sheltered to moderately exposed reef areas at a range of depths from 0 to 50 m, depending on the species (Edgar, 1997), but usually at depths of between 5 and 25 m. These species normally inhabit shallow reefs and kelp beds, they are not commonly found within the operational area itself but occur around adjacent shorelines in the DA (Kuiter 2000). Four additional species of pipefish and seadragon are listed as may occur within the DA.

A review of data collected in 1998 and 1999 by Neira (2005) suggested that the presence of Bass Strait offshore production facilities (and subsea infrastructure) within and near the Gippsland Basin Exclusion Zone provides additional habitat for early life stages of a large suite of teleost fish families. However, it is likely that both species composition and abundance around the operational area are closely linked to the ichthyofauna inhabiting hard/soft megahabitats off the Gippsland coastline and, to a lesser extent, those at the south-east corner of mainland Australia (e.g. Howe/Gabo complex).

Table 2-27 EPBC Act listed fish species or species habitat that may occur within the DA (DoEE, 2019b, DoEE, 2019l, DoEE, 2019m)

Scientific Name	Common Name	Threatened Species	Migratory Species	Listed Marine Species	BIA	Type of Presence
			Fish			
Acentronura tentaculata	Shortpouch pygmy pipehorse			✓		MO
Brachionichthys hirsutus	Spotted Handfish	CE				MO
Brachiopsilus ziebelli	Ziebell's Handfish	V				MO
Campichthys tryoni	Tryon's Pipefish			✓		MO
Corythoichthys amplexus	Fijian Banded pipefish			✓		MO
Corythoichthys ocellatus	Orange-spotted Pipefish,			✓		MO
Cosmocampus howensis	Lord Howe pipefish			✓		MO
Epinephelus daemelii	Black rockcod	V				MO
Festucalex cinctus	Girdled Pipefish			✓		MO
Filicampus tigris	Tiger Pipefish			✓		MO
Halicampus grayi	Mud Pipefish,			✓		MO
Heraldia nocturna	Upside-down pipefish			✓		MO
Hippichthys cyanospilos	Blue-speckled Pipefish			✓		MO
Hippichthys heptagonus	Madura Pipefish			✓		MO
Hippichthys penicillus	Beady Pipefish,			✓		MO
Hippocampus abdominalis	Big-belly seahorse			✓		MO
Hippocampus breviceps	Short-head seahorse			✓		MO
Hippocampus kelloggi	Kellogg's Seahorse			✓		MO

Hippocampus kuda	Spotted Seahorse			✓		MO
Hippocampus minotaur	Bullneck seahorse			✓		MO
Hippocampus planifrons	Flat-face Seahorse			✓		MO
Hippocampus trimaculatus	Three-spot Seahorse,			✓		MO
Hippocampus whitei	White's seahorse			✓		MO
Histiogamphelus briggsii	Briggs' crested pipefish			✓		MO
Histiogamphelus cristatus	Rhino pipefish			✓		MO
Hypselognathus rostratus	Knife-snout pipefish			✓		MO
Kaupus costatus	Deep-bodied pipefish			✓		MO
Kimblaeus bassensis	Trawl pipefish			✓		MO
Leptoichthys fistularius	Brushtail pipefish			✓		MO
Lissocampus caudalis	Smooth pipefish			✓		MO
Lissocampus runa	Javelin pipefish			✓		MO
Maroubra perserrata	Sawtooth pipefish			✓		MO
Micrognathus andersonii	Anderson's Pipefish,			✓		MO
Micrognathus brevirostris	Thorn-tailed Pipefish			✓		MO
Microphis manadensis	Manado Pipefish			✓		MO
Mitotichthys mollisoni	Mollison’s pipefish			✓		MO
Mitotichthys semistriatus	Halfbanded pipefish			✓		MO
Mitotichthys tuckeri	Tucker's pipefish			✓		MO
Notiocampus ruber	Red pipefish			✓		MO
Phycodrus eques	Leafy seadragon			✓		MO
Phyllopteryx taeniolatus	Weedy seadragon			✓		MO
Prototroctes maraena	Australian grayling	V				LO
Pugnaso curtirostris	Pugnose pipefish			✓		MO

Solegnathus dunckeri	Duncker's Pipehorse			✓		MO
Solegnathus hardwickii	Pallid Pipehorse			✓		MO
Solegnathus robustus	Robust spiny pipehorse			✓		MO
Solegnathus spinosissimus	Australian spiny pipehorse			✓		MO
Solenostomus cyanopterus	Robust ghostpipefish			✓		MO
Solenostomus cyanopterus	Robust Ghostpipefish			✓		MO
Solenostomus paradoxus	Ornate Ghostpipefish			✓		MO
Stigmatopora argus	Spotted pipefish			✓		MO
Stigmatopora nigra	Widebody pipefish			✓		MO
Stipecampus cristatus	Ringback pipefish			✓		MO
Syngnathoides biaculeatus	Double-ended pipehorse			✓		MO
Thymichthys politus	Red handfish	CE				MO
Trachyrhamphus bicoarctatus	Bentstick Pipefish			✓		MO
Urocampus carinirostris	Hairy pipefish			✓		MO
Vanacampus margaritifer	Mother-of-pearl pipefish			✓		MO
Vanacampus phillipi	Port Phillip pipefish			✓		MO
Vanacampus poecilolaemus	Australian long-snout pipefish			✓	-	MO
<u>Threatened Species</u>: *V Vulnerable* *CE Critically Endangered*	*<u>Type of Presence</u>:* *MO Species or species habitat may occur within the area*					

Table 2-28 Key threats and management actions for threatened fish species or species habitat that may occur within the DA

Common Name	Conservation Advice or Recovery Plan	Key Threats (relevant to petroleum activities)
Spotted Handfish	Approved Conservation Advice for *Brachionichthys hirsutus* (spotted handfish) (DoEE, 2012c). Australian national Recovery Plan for Three Handfish Species: spotted handfish	None identified

	(*Brachionichthys hirsutus*), red handfish (*Thymichthys politus*) and Ziebell's handfish (*Brachiopsilus ziebelli*) (DoEE, 2015e	
Ziebell's Handfish	Australian national Recovery Plan for Three Handfish Species: spotted handfish (*Brachionichthys hirsutus*), red handfish (*Thymichthys politus*) and Ziebell's handfish (*Brachiopsilus ziebelli*) (DoEE, 2015)	None identified
Red Handfish	Australian national Recovery Plan for Three Handfish Species: spotted handfish (*Brachionichthys hirsutus*), red handfish (*Thymichthys politus*) and Ziebell's handfish (*Brachiopsilus ziebelli*) (DoEE, 2015)	None Identified
Black Rock cod	Approved Conservation Advice for *Epinephelus daemelii* (black cod) (DoEE, 2012a)	None Identified
Australian Grayling	National Recovery Plan for the Australian Grayling Prototroctes maraena, 2008 (VDSE, 2008)	Reduction in water quality

2.3.1.1.1 Fish (cartilaginous)

Cartilaginous fish are jawed vertebrates with skeletons made of cartilage rather than bone. This group includes two subclasses:

- Elasmobranchii (sharks, rays, skates and sawfish); and
- Holocephali (chimaeras or ghost sharks).

There are five shark and two ray species (or species habitat) that may occur within the DA; this includes species classified as threatened and migratory (

Table 2-29) (DoEE, 2019b, DoEE, 2019l, DoEE, 2019m). Only one species (Great White Shark) has an important behaviour (breeding) identified for the DA.

A list of the conservation advice and/or recovery plans, with relevant management actions, is shown in Table 2-30.

Sharks and Rays

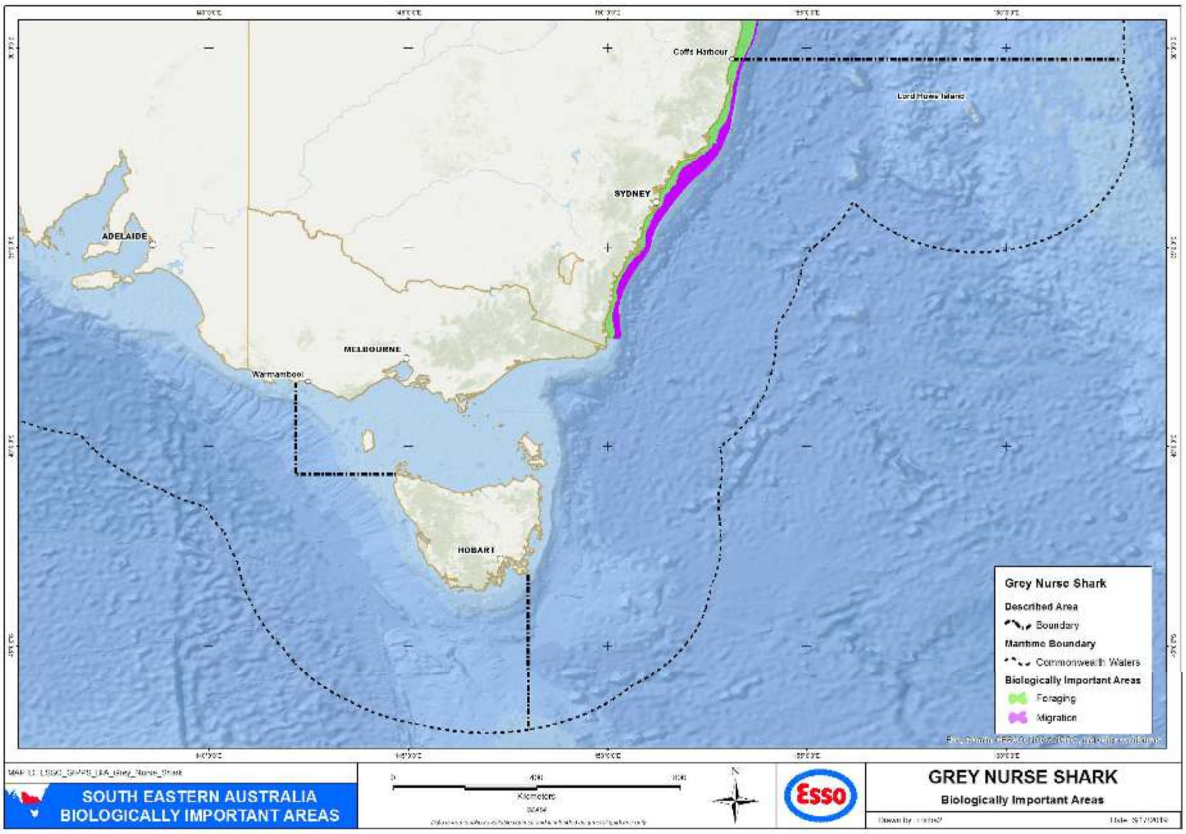
In Australia, the Grey Nurse Shark primarily has an inshore coastal distribution in sub-tropical to cool temperate waters on the continental shelf (DoE, 2014). The east coast population covers a range extending from the Capricornia coast (central Queensland) to Narooma in southern New South Wales (DoE, 2014), and is listed as critically endangered (TSSC, 2001). The species is rarely found travelling in the northern section of the Commonwealth south-east marine bioregion (DoEE 2015a and is uncommon in Victorian, South Australian and Tasmanian waters. The Grey Nurse Shark generally occurs as solitary individuals or in small schools; larger aggregations of individuals may occur for courtship and mating (DoE, 2014). A number of key aggregation sites[2] and habitat critical for the survival of the Grey Nurse Shark have been identified; the following two areas occur within the DA: Tollgate Islands (near Batemans Bay), and Montague Island (near Narooma). The Grey Nurse Shark migrates within its range, making seasonal north–south movements to form aggregations at critical habitat sites, thought to be related to breeding (DoEE, 2017f). The precise timing of mating and pupping in Australian waters is unknown; however, in South Africa mating occurs between late-October and late-

[2] 'Key Aggregation Sites' defined as being locations where five or more Grey Nurse Sharks were consistently found throughout the year (DoEE, 2014).

November (DoEE, 2017f). A BIA for foraging and migration has been identified for the Grey Nurse Shark along the east coast of Australia (Figure 2-22).

The shortfin mako shark (*Isurus oxyrinchus*) has been recorded in offshore waters all around the Australian coastline except for the Arafura Sea, Gulf of Carpentaria and Torres Strait in the north (TSSC, 2014b). It is a pelagic species, primarily occurring in offshore, oceanic waters (Last and Stevens, 2009). The shortfin mako is highly migratory and can cover large distances, migrating from Australian waters to areas well beyond the Australian Exclusive Economic Zone (Rogers et al., 2009). The shortfin mako inhabits depths down to 600 m, with a slight trend indicating the species spend the majority of the night in shallow water, and the majority of daylight hours in deeper waters (Rogers et al., 2009). It is not normally found in waters below 16°C (RPS, 2015). Satellite tracking data for shortfin mako showed a potential for year round occupation of the Otway, Bass Strait and Gippsland Basins (Rogers and Bailleul, 2015).

The Great White Shark has a range extending from central Queensland, around the south coast, to north-west Western Australia (DSEWPaC, 2013a). The shark is primarily found on the continental shelf and coastal waters, including inshore waters around oceanic islands. The Great White Shark is not evenly distributed throughout its range, with observations more frequent in some areas, including those around fur-seal or sea-lion colonies (DSEWPaC, 2013a). Juveniles appear to aggregate seasonally in key areas, including Wilsons Promontory (Victoria), and the Skerries (DSEWPaC, 2013a). Recent studies have found that juvenile white sharks (<3m) occupy estuaries Corner Inlet, Victoria during October to January (Harasti *et al.*, 2017). A BIA for breeding (nursery ground) has been established in the coastal region extending east from Wilsons Promontory (Figure 2-22). The Great White Shark moves seasonally along the south and east Australian coasts, moving northerly along the coast during autumn and winter, and returning to southern Australian waters by early summer. The Great White Shark is not known to form and defend territories, however, its ability to return on a seasonal basis implies a degree of site fidelity (DSEWPaC, 2013a).



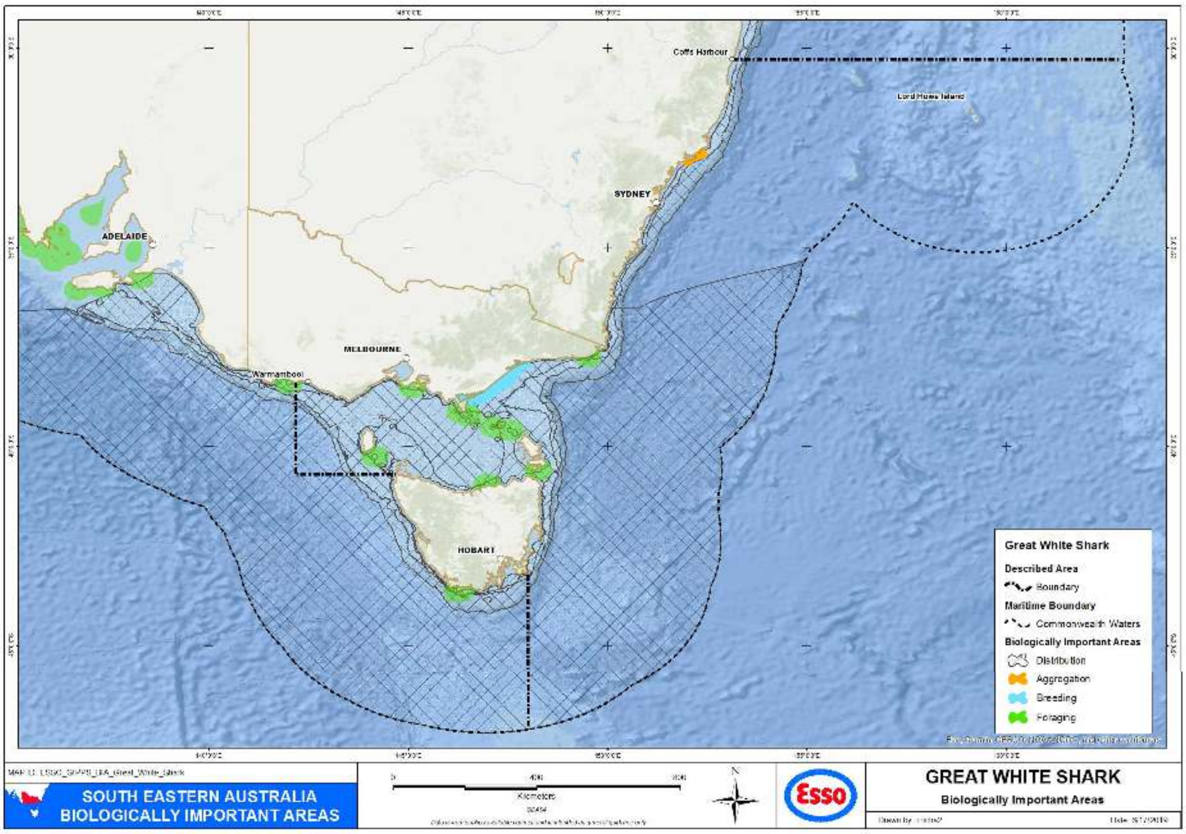


Figure 2-22 Biologically important areas for shark species

Whale sharks (*Rhincodon typus*) are generally found in warmer oceanic waters (where temperatures range from 21 to 25°C) and mainly occur in waters off the Northern Territory, Queensland and northern Western Australia. However, there have been a few isolated reports of immature male whale sharks in New South Wales and Victoria (Last & Stevens 1994). The Whale sharks are not likely to occur in the EGBPA.

The Porbeagle or Mackerel Shark (*Lamna nasus*) is listed as a migratory marine species under the EPBC Act, likely to occur in the DA. The timing and details of these migratory movements are not well-understood for the Porbeagle however it primarily inhabits oceanic waters and areas around the edge of the continental shelf. They occasionally move into coastal waters, but these movements are temporary. The Porbeagle utilises a broad vertical range of the water column and is known to dive to depths exceeding 1300 m. The Porbeagle is thought to be reasonably flexible in the types of habitat used for foraging. Whilst protected from targeted fishing, bycatch remains its greatest threat.

The **Giant manta ray** (*Manta birostris*) (Australian Museum, 2014) is the largest species of ray in the world. The Manta ray lives in tropical waters but is also found occasionally in temperate seas. In Australia it is recorded from south-western Western Australia, around the tropical north of the country and south to the southern coast of NSW, where it may overlap with the DA. The Manta ray feeds on plankton which are filtered from the water through the gills (DoEE, 2018c).

Another species of the Manta found in the DA is the **Reef manta ray** (*Manta alfredi*), distinguishable from the Giant manta ray as it has dark spots on the ventral surface between the gills (Australian Museum, 2019). It is a listed migratory species and has similar distribution and feeding habits as the Giant Manta ray. No specific conservation advice exits for either species of the ray (DoEE, 2019x).

Table 2-29 Fish species or species habitat that may occur within the DA (DoEE, 2019b, DoEE, 2019l, DoEE, 2019m)

Scientific Name	Common Name	Threatened Species	Migratory Species	Listed Marine Species	BIA	Type of Presence
Sharks and Rays						
Carcharias Taurus (east coast population)	Grey Nurse Shark (east coast population)	CE			d	KO
Carcharodon carcharias	Great White Shark	V	✓		b, d	BKO
Isurus oxyrinchus	Shortfin Mako		✓			LO
Lamna nasus	Porbeagle		✓			LO
Manta birostris	Giant Manta Ray		✓			KO
Manta aldfredi	Reef Manta Ray		✓			KO
Rhincodon typus	Whale Shark	V	✓			MO
<u>Threatened Species</u>: *V Vulnerable* *CE Critically Endangered* *<u>Biologically Important Areas</u>:* *b Breeding* *d Distribution*	*<u>Type of Presence</u>:* *MO Species or species habitat may occur within the area* *LO Species or species habitat likely to occur within the area* *KO Species or species habitat known to occur within the area* *BKO Breeding known to occur within the area*					

Table 2-30 Key threats and management actions for threatened fish species or species habitat that may occur within the DA

Common Name	Conservation Advice or Recovery Plan	Key Threats (relevant to petroleum activities)
Grey Nurse Shark	Recovery Plan for the Grey Nurse Shark (*Carcharias Taurus*)	None identified
Great White Shark	Recovery Plan for the White Shark (*Carcharodon carcharias*)	None identified
Whale Shark	Approved Conservation Advice for *Rhincodon typus* (Whale Shark)	Vessel strike Habitat disruption from mineral exploration, production and transportation Marine debris

2.3.1.2 Birds

Birds in the marine environment can include both seabirds and shorebirds:

- Seabirds refers to those species of bird whose normal habitat and food sources are derived from the ocean (both coastal and pelagic); seabirds include such species as pelicans, gannets, cormorants, albatrosses and petrels.
- Shorebirds (sometimes referred to as wading birds) refers to those species of bird commonly found along sandy or rocky shorelines, mudflats, and shallow waters; shorebirds include such species as plovers and sandpipers.

There are 114 seabird and shorebird species (or species habitat) that may occur within the DA; this includes species classified as threatened and migratory (Table 2-31) (DoEE, 2019b, DoEE, 2019l, DoEE, 2019m). The type of presence varies between species, and includes important behaviours (e.g. foraging, roosting, breeding) for some species.

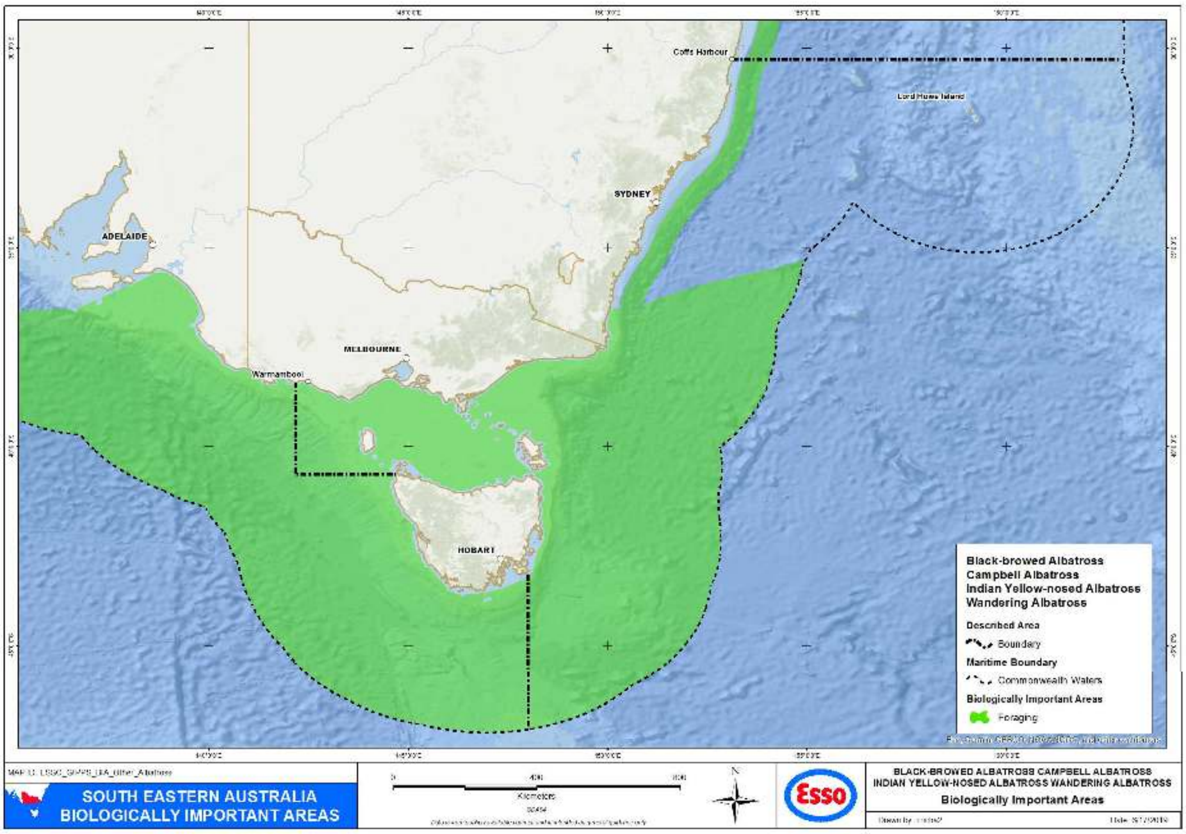
The coast and neighbouring islands within the DA provide feeding and nesting habitats for many coastal and migratory bird species. Seabirds spend much of their lives at sea in search of prey only to return for a short time to breed and raise chicks. Most species tend to forage on their own, though large feeding flocks will gather at rich or passing food sources. Squid, fish and krill are common sources of food. Islands in the Gippsland Basin are nesting sites for many seabird species, many of which migrate to these islands each year. Colonies of seabirds occur in Corner Inlet and on the islands around Wilsons Promontory, to the east at The Skerries, Tullaberga Island and Gabo Island and to the south on Curtis Island and the Hogan Island Group (Harris & Norman 1981). Species that nest and breed on these islands include the listed marine species, Little penguin (*Eudyptula minor*), White-faced storm petrel (*Pelagodroma marina*), Short-tailed shearwater (*Puffinus tenuirostris*) and the Fairy prion (*Pachyptila turtur*).

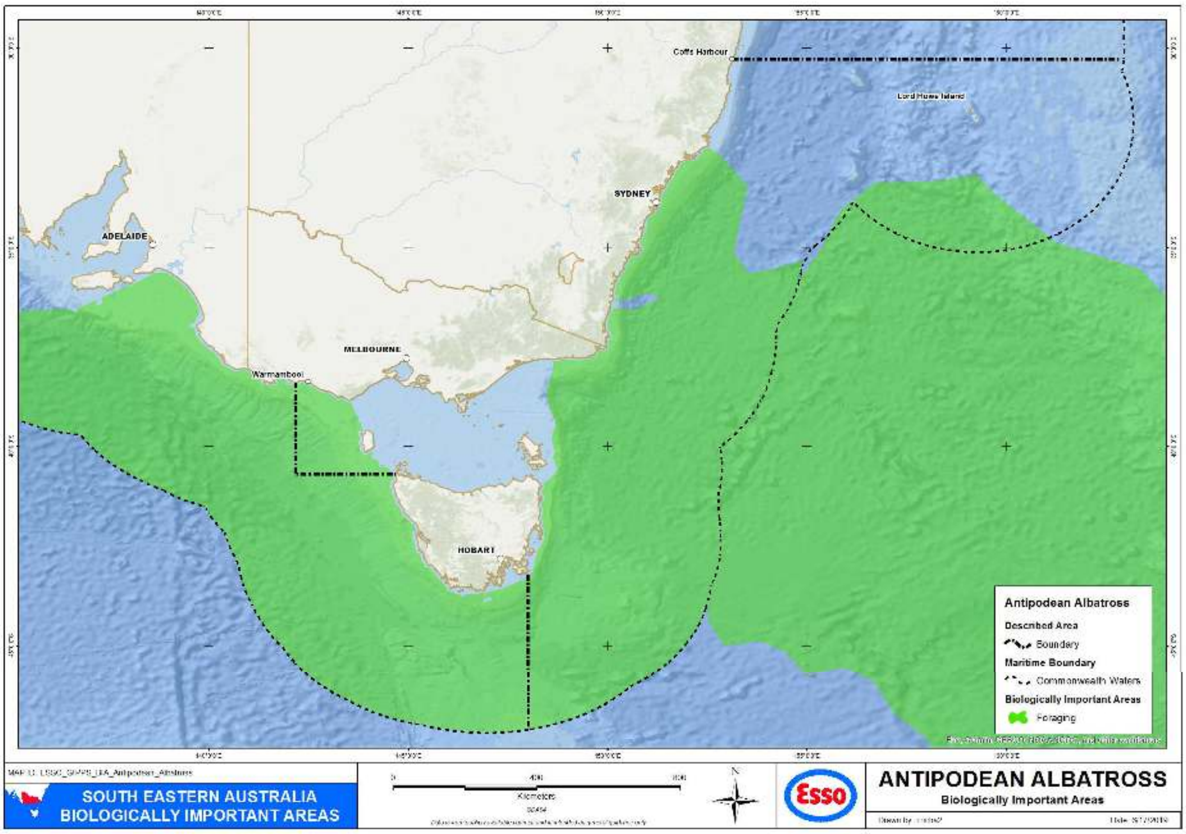
A list of the conservation advice and/or recovery plans, with relevant management actions for petroleum activities, is shown in Table 2-32.

Albatross

There are 15 species of albatross that may occur within the DA, and all except two (Sooty Albatross and Grey-headed Albatross) has been identified as using the area for foraging (Table 2-31). Albatross species exhibit a broad range of diets and foraging behaviours; this combined with their ability to cover vast oceanic distances, means all waters within Australian jurisdiction can be considered foraging habitat for this species (DSEWPaC, 2011a). However, the most critical foraging habitat is considered to be in waters south of 25°S where most species spend the majority of their foraging time (DSEWPaC, 2011a).

Albatross' typically feed offshore, mainly along the edge of the continental shelf and over open waters, where they catch fish and cephalopods (e.g. squid, cuttlefish) by diving into the water (DSEWPaC, 2011a). A BIA for foraging, has been identified for the following albatross species: Antipodean, Buller's, Shy, Black-browed, Campbell, Wandering, Indian Yellow-nosed and White-capped (Figure 2-23) (DoEE, 2015h). There is only one species, the Shy Albatross, that is known to breed within the waters off mainland Australia, and this occurs outside of the DA.


Coffs Harbour
Lord Howe Island
SYDNEY
ADELAIDE
MELBOURNE
Warrnambool
HOBART
Black-browed Albatross
Campbell Albatross
Indian Yellow-nosed Albatross
Wandering Albatross
Described Area
Boundary
Maritime Boundary
Commonwealth Waters
Biologically Important Areas
Foraging
SOUTH EASTERN AUSTRALIA
BIOLOGICALLY IMPORTANT AREAS
Kilometers
BLACK-BROWED ALBATROSS CAMPBELL ALBATROSS
INDIAN YELLOW-NOSED ALBATROSS WANDERING ALBATROSS
Biologically Important Areas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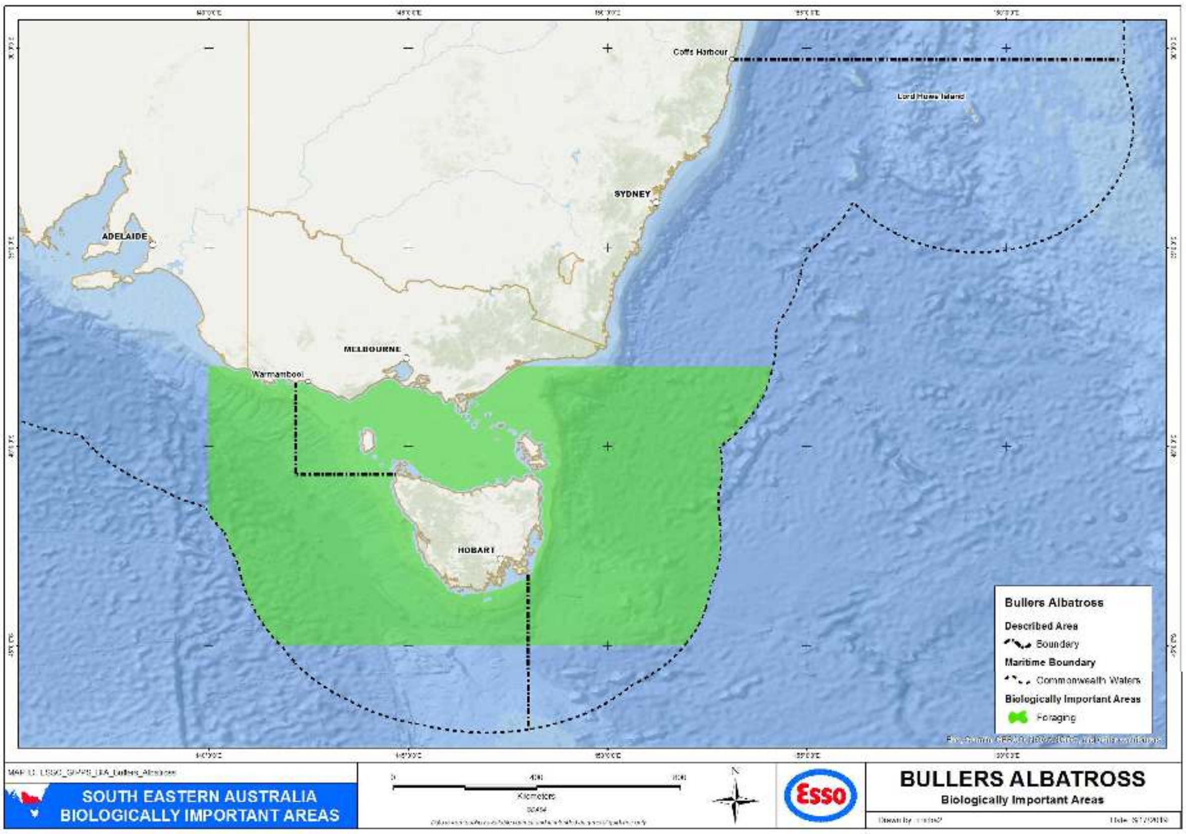
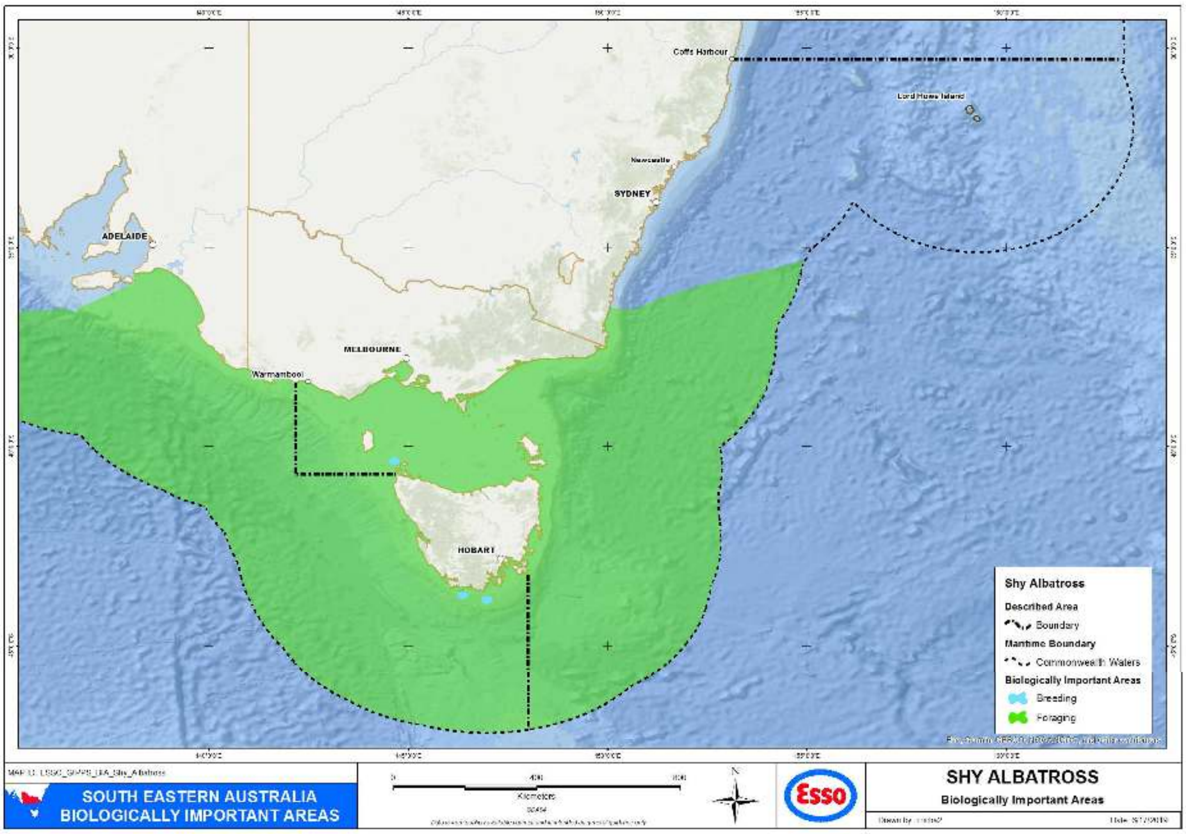
Lord Howe Island
SYDNEY
ADELAIDE
MELBOURNE
Warrnambool
HOBART
Antipodean Albatross
Described Area
Boundary
Maritime Boundary
Commonwealth Waters
Biologically Important Areas
Foraging
SOUTH EASTERN AUSTRALIA
BIOLOGICALLY IMPORTANT AREAS
Kilometers
ANTIPODEAN ALBATROSS
Biologically Important Areas


Coffs Harbour
Lord Howe Island
SYDNEY
ADELAIDE
MELBOURNE
Warrnambool
HOBART
Bullers Albatross
Described Area
Boundary
Maritime Boundary
Commonwealth Waters
Biologically Important Areas
Foraging
SOUTH EASTERN AUSTRALIA
BIOLOGICALLY IMPORTANT AREAS
Kilometres
BULLERS ALBATROSS
Biologically Important Areas


Coffs Harbour
Lord Howe Island
Newcastle
SYDNEY
ADELAIDE
MELBOURNE
Warrnambool
HOBART
Shy Albatross
Described Area
Boundary
Maritime Boundary
Commonwealth Waters
Biologically Important Areas
Breeding
Foraging
SOUTH EASTERN AUSTRALIA
BIOLOGICALLY IMPORTANT AREAS
Kilometres
SHY ALBATROSS
Biologically Important Areas

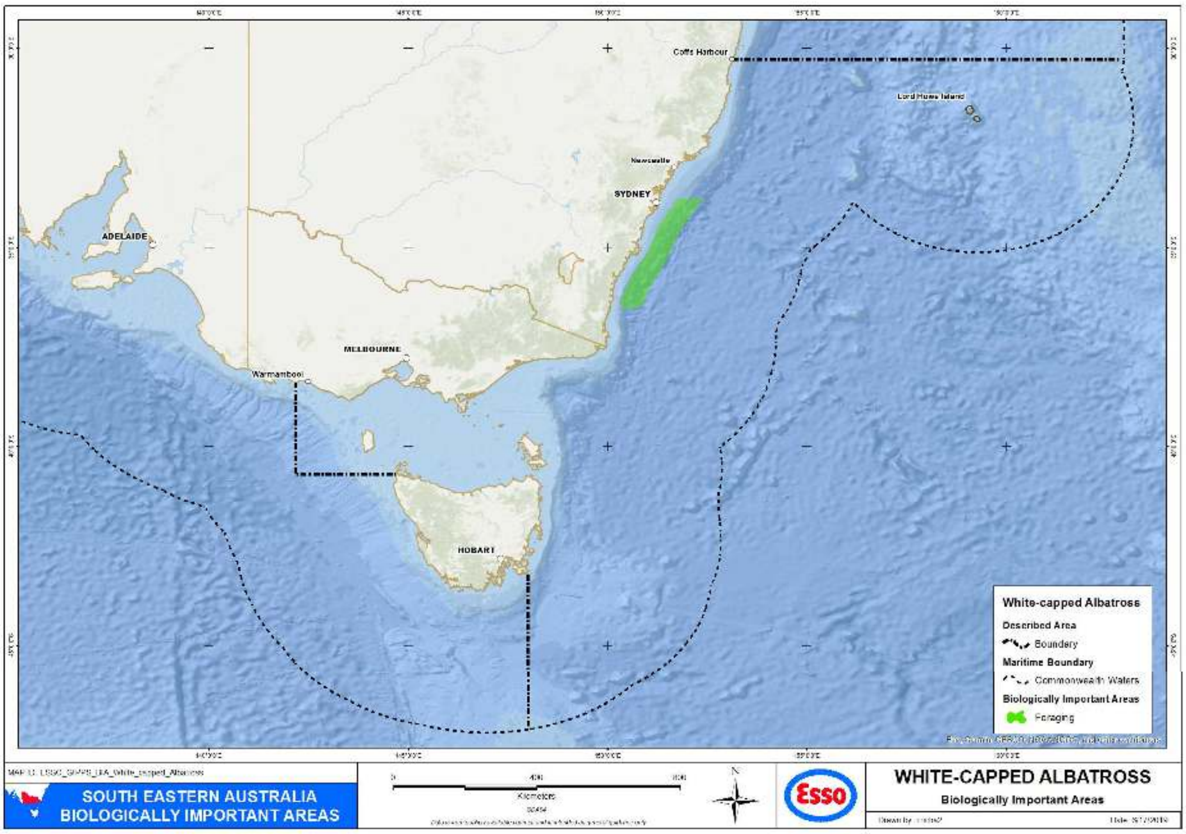


Figure 2-23 Biologically Important Areas for albatross species

Petrels

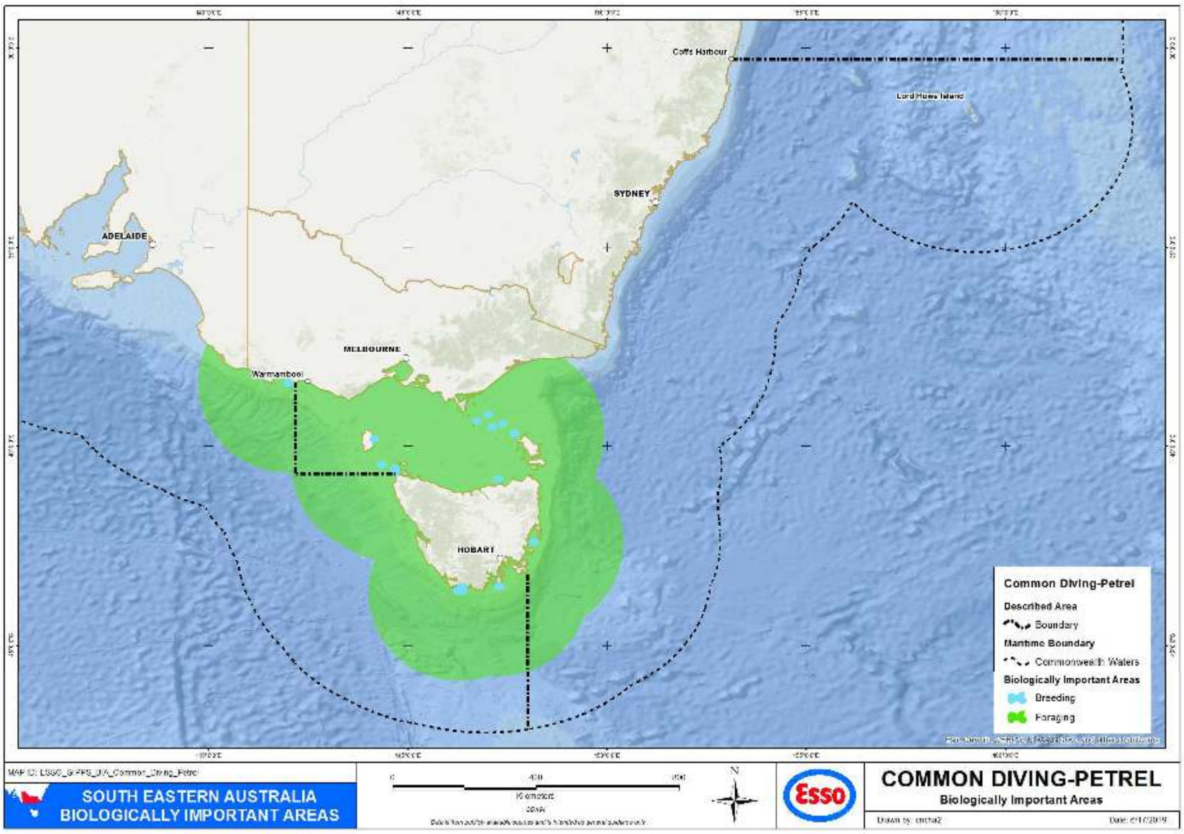
There are 13 species of petrel that may occur within the DA, with most either foraging and/or breeding within the area (Table 2-31). Similar to albatrosses, the petrels have a diverse foraging range, and all waters within Australian jurisdiction can be considered foraging habitat for this species. Typical diet for petrels includes cephalopods (e.g. squid) and fish, and prey is predominately caught by surface-seizing (DSEWPaC, 2011a).

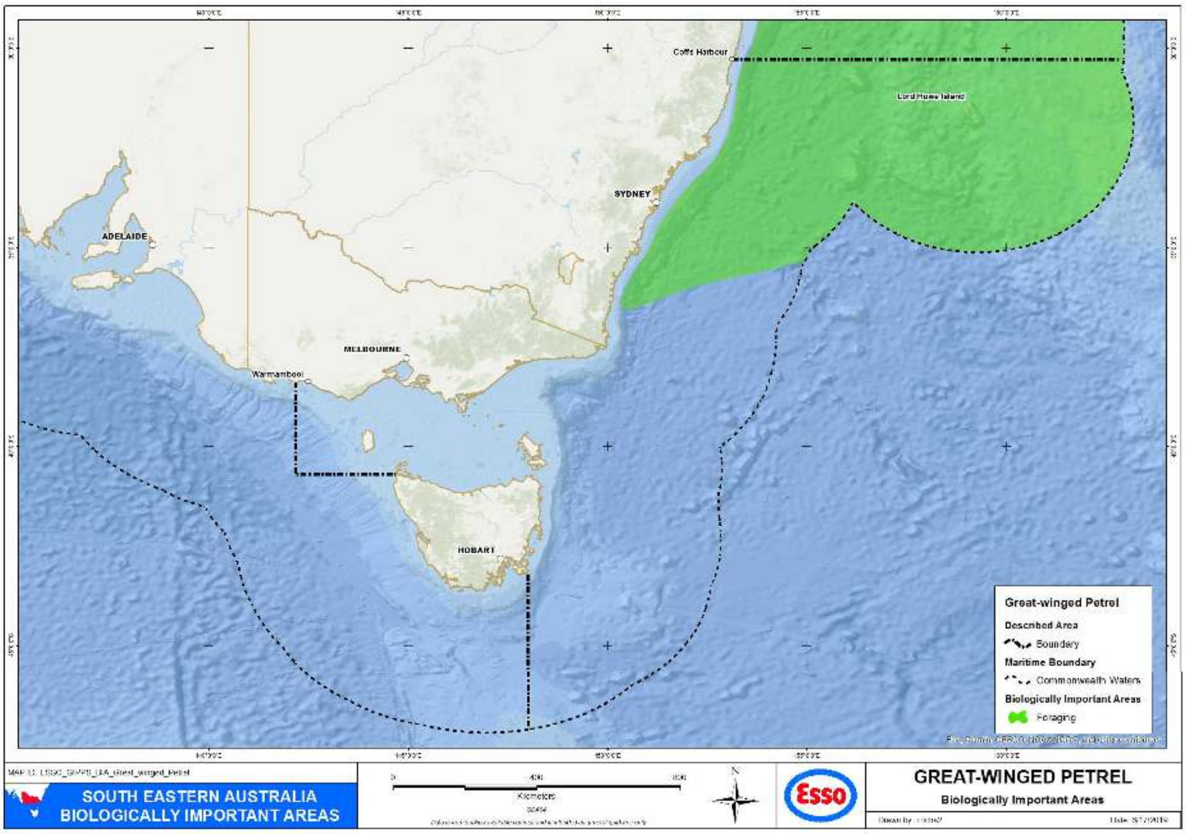
BIAs, for foraging and breeding, have been identified for the White-faced Storm Petrel, Common Diving-Petrel, Black-winged Petrel and Providence Petrel. BIAs for foraging have also been defined for the Northern and Southern Giant Petrel and the Great-winged Petrel (Figure 2-24) (DoEE, 2015h).

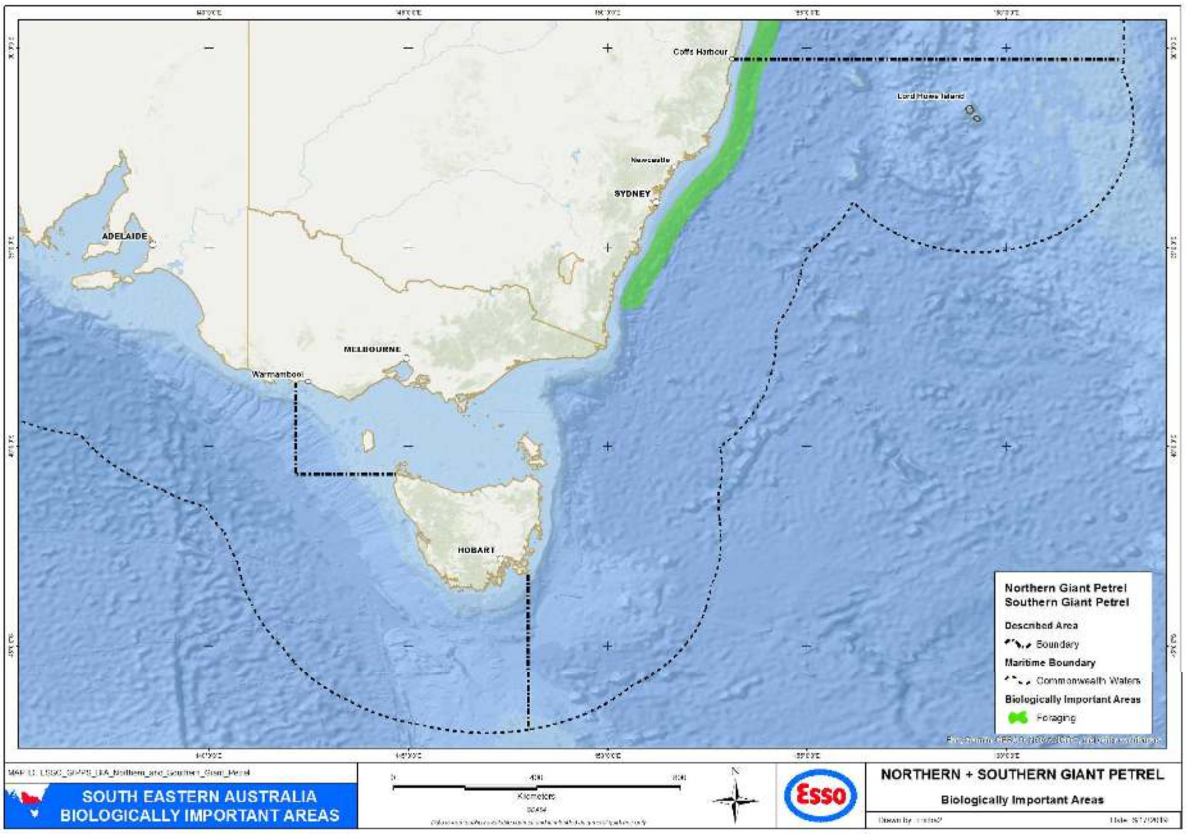
Both the Common Diving-Petrel and the White-faced Storm Petrel are listed as marine species under the EPBC Act, and have large populations within Australia, accounting for 5% and 25% respectively of the global population (DoEE, 2015a). The Common Diving-Petrel breeds on islands off south-east Australia 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) (DoEE, 2015a). There are 15 sites with significant breeding colonies in Tasmania, and three sites with Victoria, for the White-faced Storm Petrel (DoEE, 2015a). One critically endangered species, the Herald Petrel has been estimated to only have about 10-25 breeding birds in Australia. Although they are known to breed on Raine Island in North Queensland waters, they are highly oceanic birds that are listed as likely to occur in the DA (TSSC 2015).

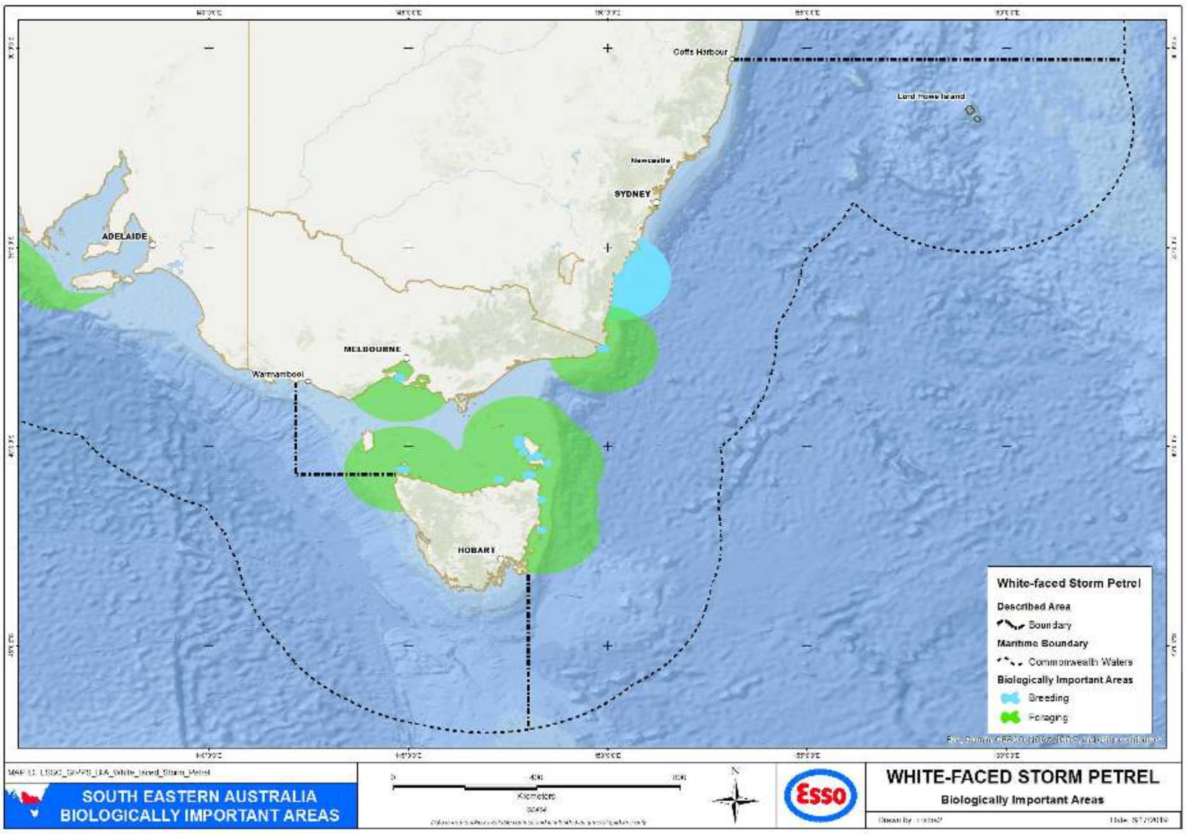
The Black-winged Petrel (Pterodroma nigripennis) and Providence Petrel (Pterodroma solandri) are listed marine species whose only known breeding sites in Australia are on Lord Howe Island, and for the Providence Petrel, Philip Island (in NSW off Norfolk island). Both have been identified as a conservation value in the Temperate East Marine Region (DoEE, 2019af). The Black-winged Petrel forms a burrow of up to 1m long in sandy soil to nest and is prone to predation by the Masked Owl and introduced rodents. The Black-winged Petrel is also known to occur in other parts of the Pacific (NSW

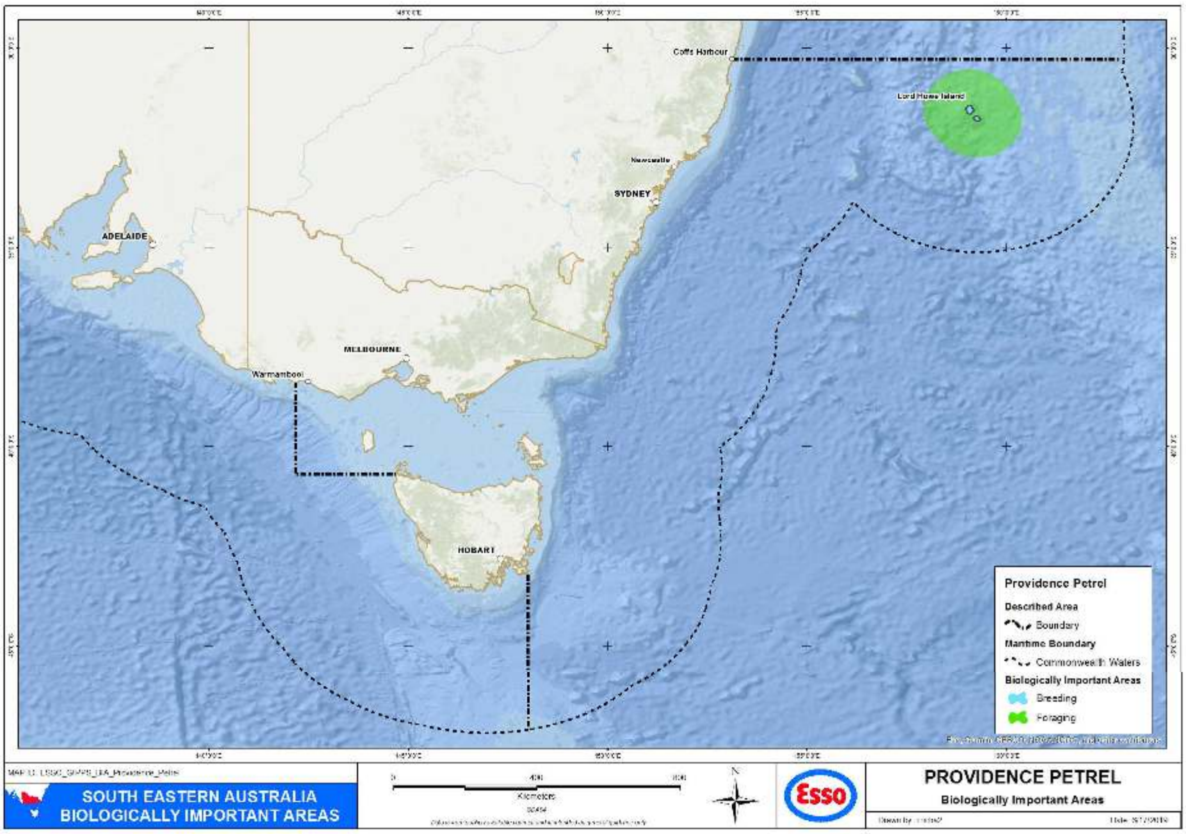
OEH, 2019c). The distribution of the Providence Petrel is far more restricted with breeding sites only known to occur in Lord Howe and Philip Island. Their main known threats are from predation and disturbance of nests by tourists on the island. They nest on the tops of Mount Gower and Mount Lidgbird and to a less extent, on the lower slopes of the mountains (NSW OEH, 2019d).




Coffs Harbour
Lord Howe Island
SYDNEY
ADELAIDE
MELBOURNE
Warrnambool
HOBART
Great-winged Petrel
Described Area
Boundary
Maritime Boundary
Commonwealth Waters
Biologically Important Areas
Foraging
SOUTH EASTERN AUSTRALIA
BIOLOGICALLY IMPORTANT AREAS
Kilometers
GREAT-WINGED PETREL
Biologically Important Areas


Coffs Harbour
Lord Howe Island
Newcastle
SYDNEY
ADELAIDE
MELBOURNE
Warrnambool
HOBART
Northern Giant Petrel
Southern Giant Petrel
Described Area
Boundary
Maritime Boundary
Commonwealth Waters
Biologically Important Areas
Foraging
SOUTH EASTERN AUSTRALIA
BIOLOGICALLY IMPORTANT AREAS
Kilometers
NORTHERN + SOUTHERN GIANT PETREL
Biologically Important Areas


Coffs Harbour
Lord Howe Island
Newcastle
SYDNEY
ADELAIDE
MELBOURNE
Warrnambool
HOBART
White-faced Storm Petrel
Described Area
Boundary
Maritime Boundary
Commonwealth Waters
Biologically Important Areas
Breeding
Foraging
SOUTH EASTERN AUSTRALIA
BIOLOGICALLY IMPORTANT AREAS
0
400
800
Kilometers
N
WHITE-FACED STORM PETREL
Biologically Important Areas


Coffs Harbour
Lord Howe Island
Newcastle
SYDNEY
ADELAIDE
MELBOURNE
Warrnambool
HOBART
Providence Petrel
Described Area
Boundary
Maritime Boundary
Commonwealth Waters
Biologically Important Areas
Breeding
Foraging
SOUTH EASTERN AUSTRALIA
BIOLOGICALLY IMPORTANT AREAS
0
400
800
Kilometers
N
PROVIDENCE PETREL
Biologically Important Areas

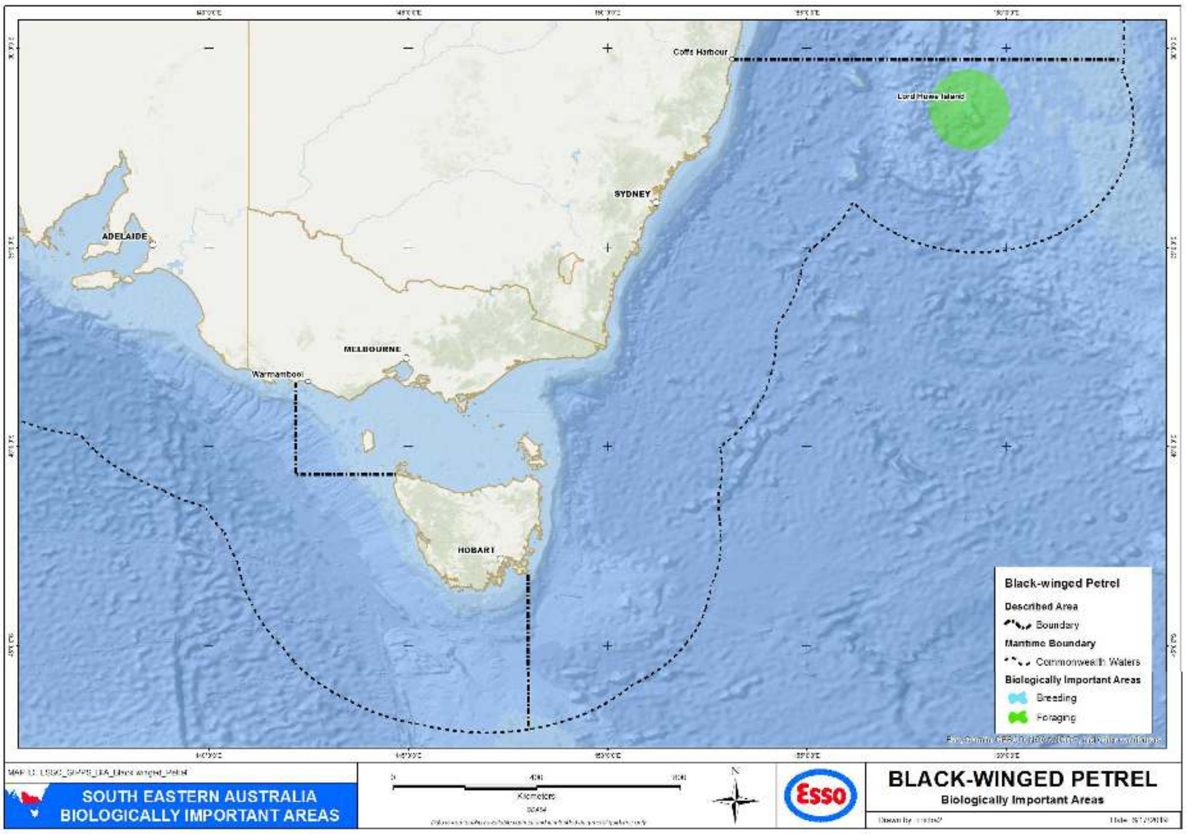


Figure 2-24 Biologically Important Areas for Petrel species.

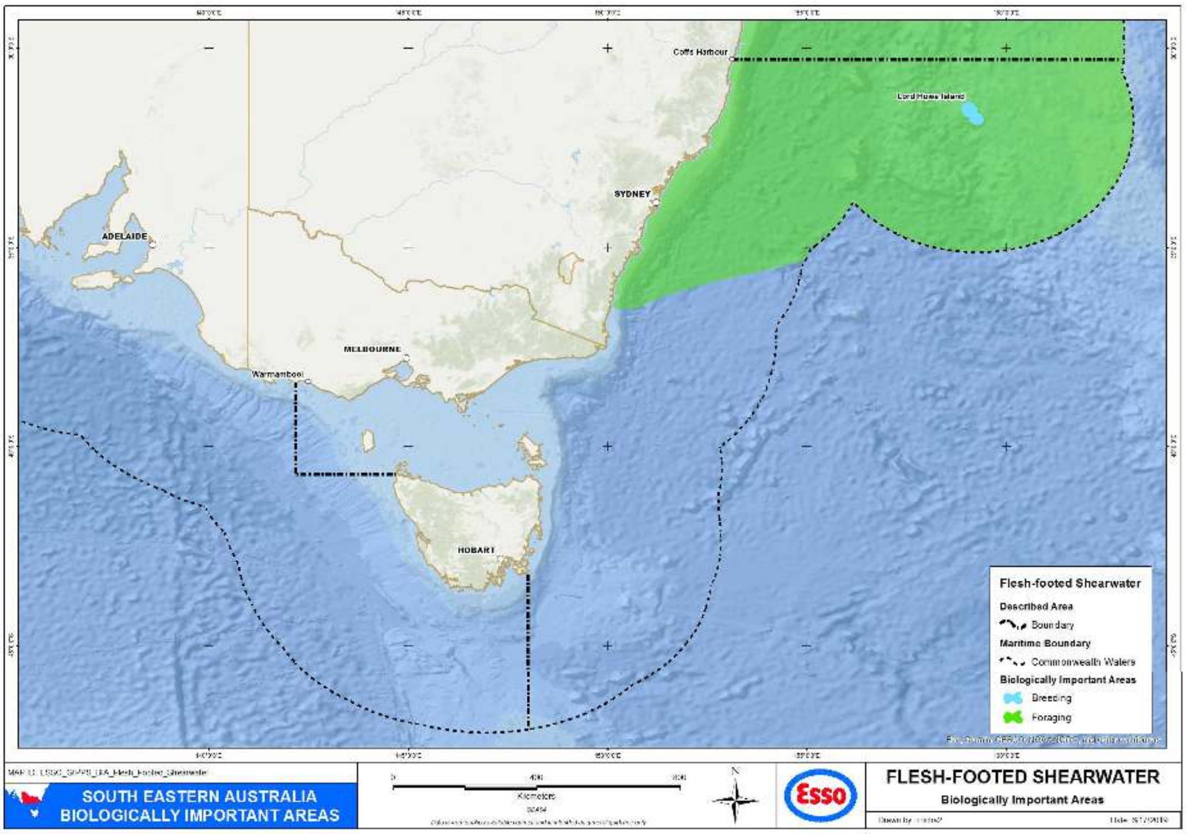
Shearwaters

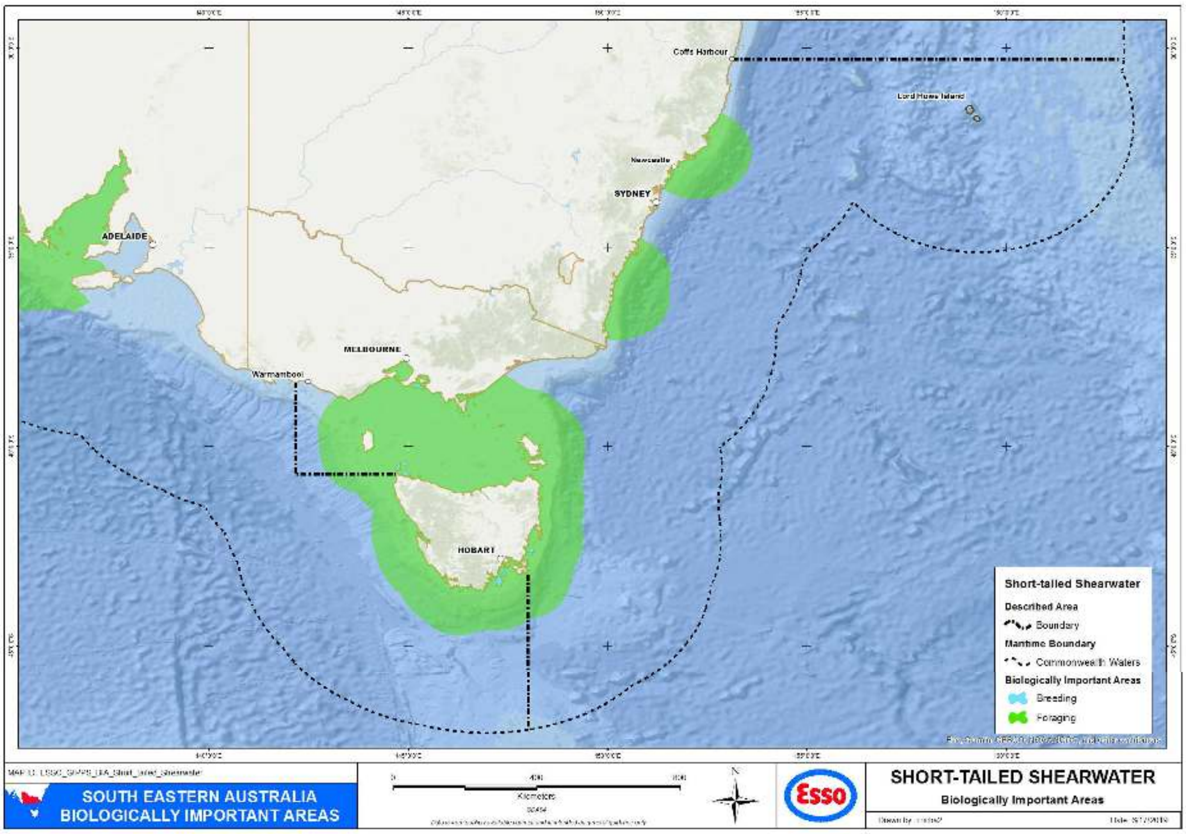
The shearwaters represent the most abundant seabird in Australia. There are five species of shearwater that may occur within the DA, and all have been identified as using the area for foraging and breeding (Table 2-31). BIAs, for foraging and breeding, have been identified for the following species: Sooty, Wedge-tailed, and Short-tailed shearwaters; and a BIA for foraging for the Flesh-footed Shearwater (Figure 2-25) (DoEE, 2015h).

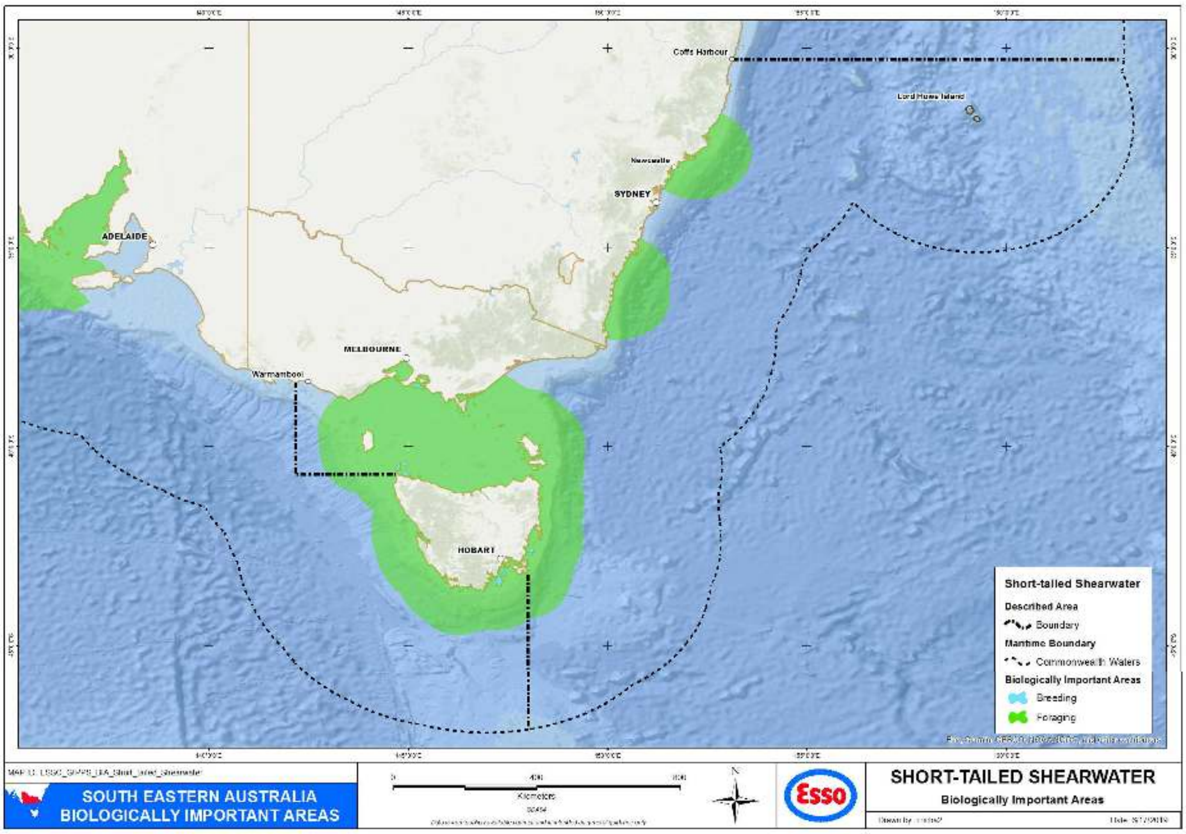
Shearwaters are typically pelagic species, except during breeding seasons where they are found on remote islands or coastal headlands. Known breeding locations include New South Wales oceanic islands (e.g. Solitary Island, Cabbage Tree Island, Muttonbird Island, Bird Island) (Sooty Shearwater, Wedge-tailed Shearwater). Breeding season in south-eastern Australia for shearwaters is typically over summer; late-August/early-September to May (DoEE 2017a, 2017b, 2017d, 2017e). Shearwater nests are usually in burrows or rock crevices.

Shearwaters are known to forage for a variety of pelagic prey, including krill, cephalopods, fish and crustaceans. Food is usually taken by pursuit-plunging, surface plunging or surface-seizing; however other methods (e.g. hydroplaning, deep plunging) may be used.

The Short-tailed Shearwater is one of few native birds that is commercially harvested (Tasmania Parks & Wildlife Service, 2014).


Coffs Harbour
Lord Howe Island
SYDNEY
ADELAIDE
MELBOURNE
Warrnambool
HOBART
Flesh-footed Shearwater
Described Area
Boundary
Maritime Boundary
Commonwealth Waters
Biologically Important Areas
Breeding
Foraging
SOUTH EASTERN AUSTRALIA
BIOLOGICALLY IMPORTANT AREAS
Kilometers
FLESH-FOOTED SHEARWATER
Biologically Important Areas


Coffs Harbour
Lord Howe Island
Newcastle
SYDNEY
ADELAIDE
MELBOURNE
Warrnambool
HOBART
Short-tailed Shearwater
Described Area
Boundary
Maritime Boundary
Commonwealth Waters
Biologically Important Areas
Breeding
Foraging
SOUTH EASTERN AUSTRALIA
BIOLOGICALLY IMPORTANT AREAS
Kilometers
SHORT-TAILED SHEARWATER
Biologically Important Areas



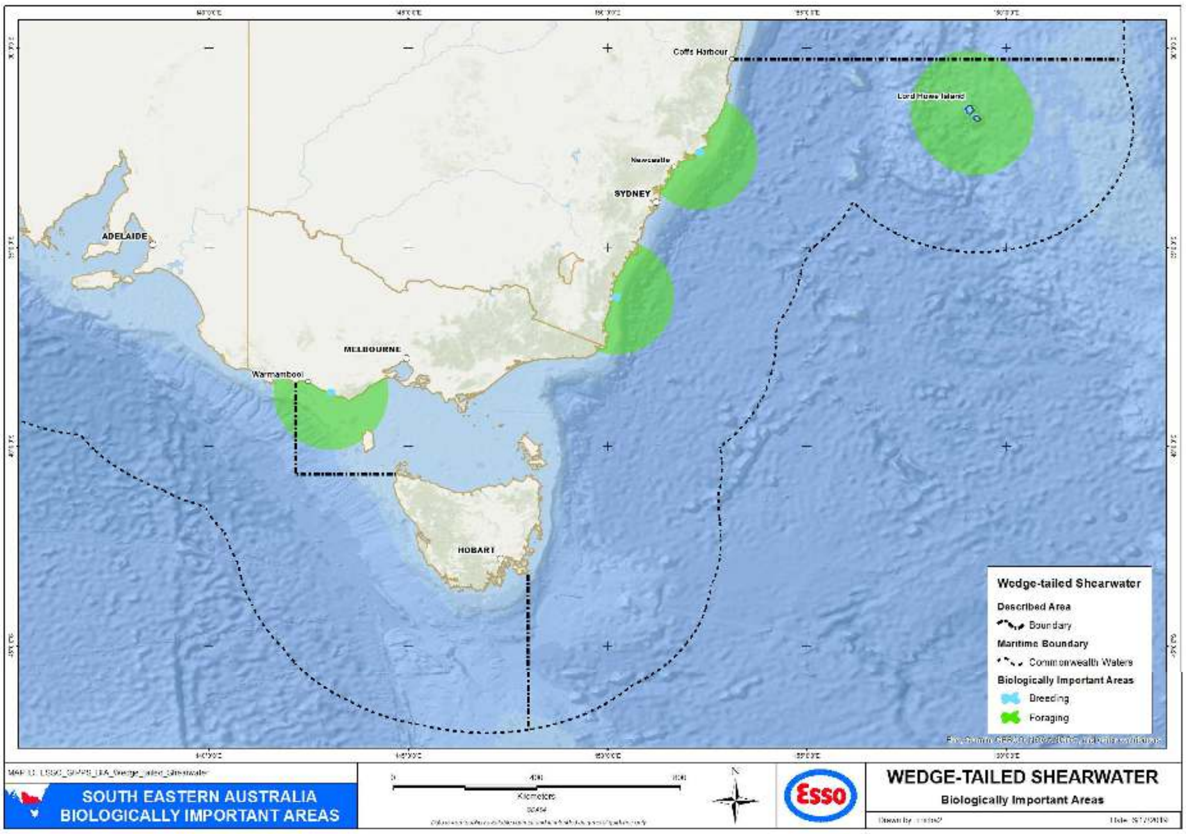


Figure 2-25 Biologically Important Areas for Shearwater species

Terns

There are seven species of tern that may occur within the DA, and all have been identified as using the area for breeding (Table 2-31). A BIA, for foraging and breeding, has been identified for the Crested Tern (Figure 2-26) (DoEE, 2015h).

Many of the tern species are widespread and occupy beach, wetland, grassland and beach habitats. Terns rarely swim; they hunt for prey in flight, dipping to the water surface or plunge-diving for prey (Flegg, 2002) usually within sight of land, for fish, squid, jellyfish and sometimes crustaceans (DEHWA, 2007).

Terns breed in colonies on small offshore islands, including those of the Furneaux Group in eastern Bass Strait. Nests are typically in sand or coral scrapes (Birdlife Australia, 2017a, 2017b; NSW OEH, 2017a).

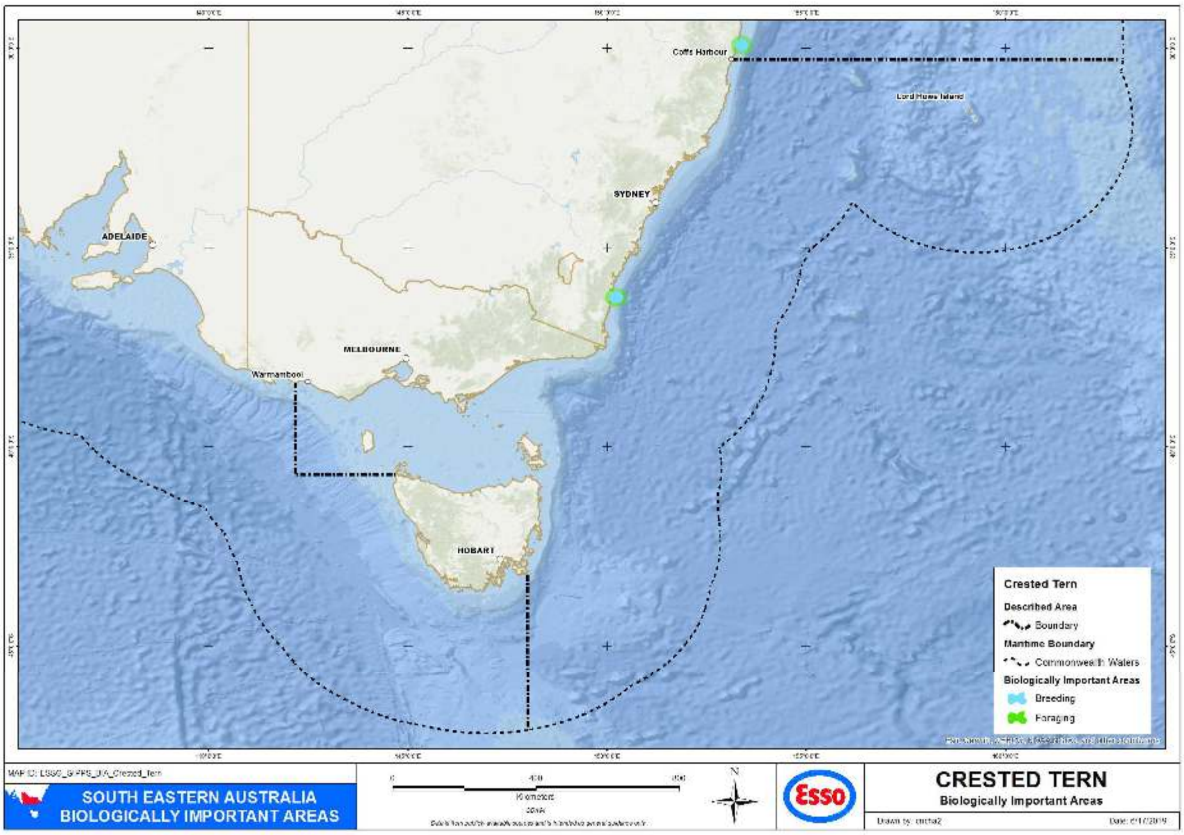


Figure 2-26 Biologically Important Areas for Crested Tern

Migratory Waterbirds

Migratory birds are species where a substantial proportion of the global or a regional population makes regular cyclical movements beyond the breeding range, with predictable timing and destinations. Many species of migratory waterbirds occur in the DA including eight species of sandpipers

Plovers

There are nine species of plover that are known to occur in the DA, six of which are wetland migratory species and most of which have a known to feed or form rookeries in the DA. Many plovers feed by running along wet sand, mud or beaches and shorelines, snapping up small, aquatic, molluscs and insects for food. The nest is in a slight hollow in the ground where two to five (usually four) spotted eggs are laid and both parents incubate and care for the young. Some of the species here including the vulnerable Greater Sand Plover and the endangered Lesser Sand Plover are strongly migratory, birds breeding in the northern hemisphere and wintering in sandy beaches of Asia and Australasia. These are part of the East Asian – Australasian Flyway (EAAF) (DoEE, 2019ah) which stretches from the Russian Far East and Alaska, southwards through East Asia and South-east Asia, to Australia and New

Zealand and encompasses 22 countries. During migration, waterbirds rely on a system of highly productive wetlands to rest and feed, building up sufficient energy to fuel the next phase of their journey. Whilst wintering in Australia, they occur in coastal areas of all states though the greatest numbers occur in northern Australia. Of the three non-migratory species, the eastern form of the Hooded Plover (*Thinornis cucullatus cucullatus)* is listed as vulnerable. It is a small bird that nests on the back of usually wide beaches above the high water mark. Its main threat is human disturbance from unleashed domestic dogs (DoEE, 2019ai).

Sandpipers

Eight sandpiper species are known to occur within the DA. Sandpiper refers to the small to middle sized shorebirds (15-30sm) in the family Scolopacidae which are seen at beaches and inland mudflats during migration and wintering. They are all migratory breeding in the northern hemisphere Arctic and sub-Arctic regions and travel in large flocks when migrating. The majority of these species eat small invertebrates probed out of the mud or soil or sand with their sensitive bills which distinguishes them from the plovers that are darting across the surface feeding by sight. The critically endangered Curlew Sandpiper's (*Calidris ferruginea*) sighted population in Australia has significantly declined. Breeding does not occur in Australia, it is part of the EAAF and breeding occurs in Siberia, however its wetland resting habitat on its winter migration, particularly in East Asia, is being threatened by degradation through habitat loss, pollution and other human disturbance resulting in an estimated reduction in population size in Australia by >80% (DoEE, 2015b). In Australia the main threat for all sandpipers is from disturbance from humans and their domestic animals.

Also in the Scolopacidae family are all of the other listed wetland migratory species found in the DA (other than the Osprey) including the snipes, knots, godwits, dowitchers, sanderlings, turnstones, shanks, curlews, phalarope, whimbrel and tatters. These have similar breeding habits as the Sandpipers. Their feeding habitat is generally coastal with large intertidal mudflats or sandflats and they roost on sandy beaches, sandbars, and spits. There are three critically endangered species, the Great Knot, the Northern Siberian Bar-tailed Godwit and the Eastern Curlew. The Red Knot is listed as endangered and the Bar-tailed Godwit (auera) is listed as vulnerable (note the Bar-tailed Godwit is a subspecies of the Siberian Bar-tailed Godwit (TSSC, 2016a)). These species are all migratory birds breeding in the northern hemisphere (e.g., Siberia/Alaska) and migrating south during their winter. Recorded numbers are in decline in Australia and, like the Sandpipers, this is largely attributed to the decline in wetlands in Asia used as staging areas for resting and feeding during migration. In Australia threats include human disturbance as well as habitat loss and degradation from pollution, changes to the water regime and invasive plants (DoEE, 2015c).

Other

Many other species also occur within areas of the DA (Table 2-31), those that are critically endangered, endangered or vulnerable are discussed below.

The Swift Parrot and Orange-bellied Parrot are both critically endangered, they both breed in Tasmania and migrate to the mainland for the non-breeding season. The Swift parrot's habitat is mainly forest and it's threatened mainly by native predators and also loss of forest habitat (TSSC, 2016b). The orange bellied parrot is ground feeding and inhabits salt marshes, coastal dunes, pastures, shrub lands, estuaries, islands, beaches and moorlands generally within 10 km of the coast. As with many of the migratory species, it is threatened by the loss of wetland habitat, in this case through changes to land use practices such as drainage of wetlands for grazing, alteration and destruction of saltmarsh for industrial and urban development, vegetation clearance for agricultural purposes (TSSC, 2006).

The Australian Painted snipe, a listed endangered species has been recorded at wetlands in all states of Australia and whilst called a snipe it is in the family Rostratulidae. It is known to nest in Australia and generally inhabits shallow terrestrial freshwater but also brackish wetland and also seen in saltmarshes. Its decline has been attributed to the loss of wetland habitat since European settlement in Australia (DoEE, 2019aj).

The endangered Australasian Bittern is mainly a freshwater wetland species and rarely occurs in estuaries or tidal wetlands, favouring tall dense vegetation where it forages on small aquatic animals including frogs, fish, freshwater crayfish, reptiles and insects. These birds are also culturally significant to Aboriginal people. This species is capable of moving between habitats from south-east Queensland to south-east South Australia as suitability changes. Wetland habitat loss and degradation is a threat to the Australasian Bittern (TSSC, 2019).

The endangered Eastern Bristlebird is a small, well-camouflaged, ground-dwelling bird spending most of its time in low, dense vegetation in coastal, subcoastal and coastal escarpment scrubland / grassland / sedgeland and in open grassy forest on inland ranges. The species has contracted to four genetically isolated populations in three disjunct areas of south-eastern Australia. Within the DA these are the Illawarra and Jervis Bay regions of eastern NSW (central populations) and the NSW/Victorian border coastal region (southern population) near Nadgee Mallacoota. They feed mainly on invertebrates but also on seeds and grasses. Habitat loss through clearing of coastal heath and escarpment forest is recognised as the main process that has reduced the distribution and abundance of the Eastern Bristlebird in the last 150 years. Another potential threat to the species is predation, particularly by feral predators and particularly after fire (NSW OEH, 2012c).

Within Australia, the vulnerable Fairy Prion (southern) breeds only on Maquarie Island (outside of the DA) and outside Australia is also known to breed in other subantarctic islands including New Zealand and Falklands. During the non-breeding season it frequents sub-tropical waters and it feeds by plucking food off the ocean surface. Its main threat in Australia was predation from introduced black rats which have now been eradicated on Macaquarie Island (TSSC, 2015e).

The Little Penguin is the smallest species of penguin in the world and are permanent residents on a number of inshore and offshore islands. The Australian population is large but not thought to exceed one million birds (DoEE, 2015a). Bass Strait has the largest proportion (approximately 60%) of the known breeding colonies in Australia; however, breeding populations are also found on the New South Wales coast. Individuals exhibit strong site fidelity, returning to the same breeding colony each year to breed in the winter and spring months (Gillanders *et al.*, 2013). The diet of a Little Penguin includes small school fish, squid and krill. Prey is typically caught with rapid jabs of the beak and swallowed whole. A BIA for breeding and foraging, has been identified for the Little Penguin (Figure 2-27) (DoEE, 2015h). Little penguins are also an important component of the Australian and New Zealand fur-seals' diet (PoSA, 2011).

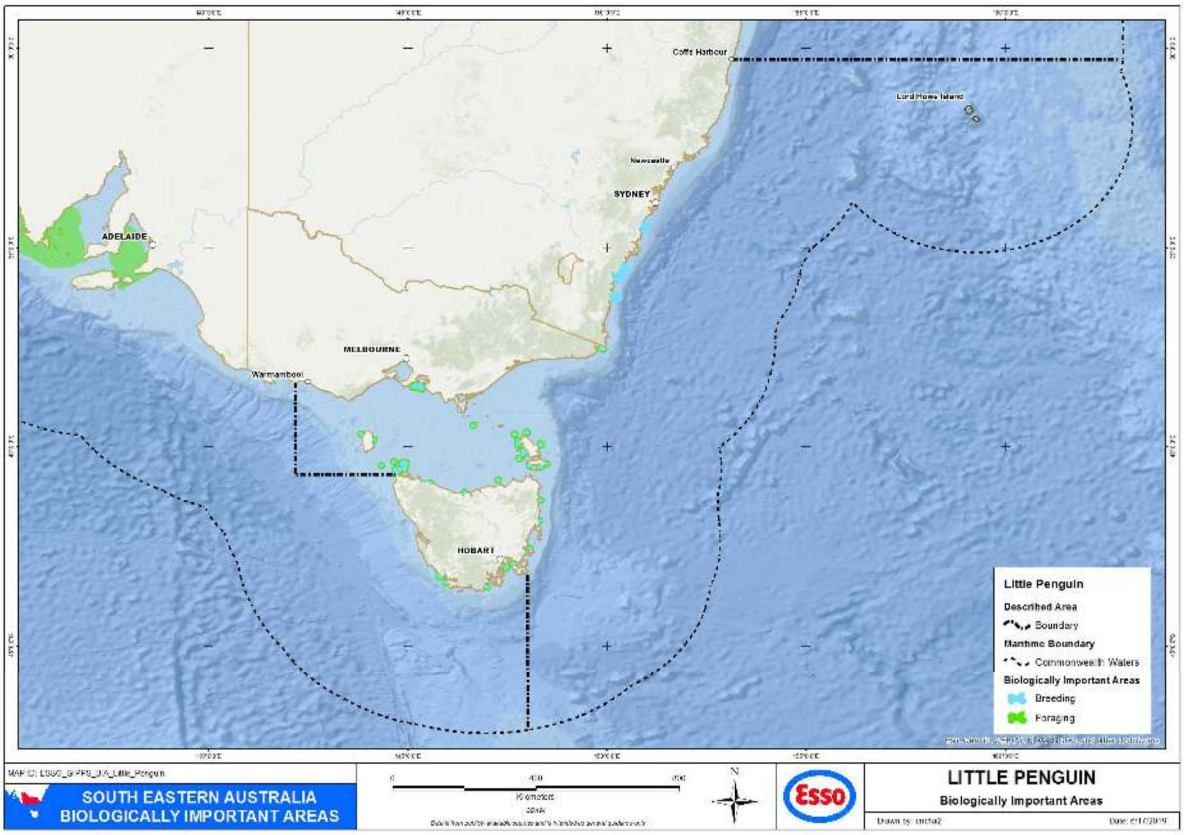


Figure 2-27 Biologically Important Area for Little Penguin

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 (DoEE, 2015a). While breeding behaviour has been identified (Table 1), known important breeding locations for the Australian Gannet occur outside the DA at Pedra Branca, Eddystone Rocks, Sidmouth Rocks, and Black Pyramid (Tasmania) and Lawrence Rocks (Victoria).

The Black-faced Cormorant is endemic to southern Australia (DoEE, 2015a); and favours rocky coasts. The species feeds in coastal waters on a variety of fish, typically catching prey by pursuit-diving. There are 40 significant breeding sites (defined as more than 10 breeding pairs) known for the species in southern Australia. Breeding usually occurs on rocky islands, but also on stacks, slopes and sea cliffs in colonies of up to 2500 individuals (DoEE, 2015a).

The Red-tailed Tropicbird is a medium sized (45-55cm) seabird and listed marine and migratory species that exists in tropical Pacific and Indian oceans (DoEE, 2019v). It nests on cliffs by the water's edge, and less so inland on smaller islands and has been identified as a conservation value in the Temperate East Marine Region. The red-tailed tropicbird is mostly a plunge-diver, diving anywhere from an above-water height 6 to 50 metres to a depth of about 4.5 metres (AOLA, 2019a). No specific conservation plans exist for this species.

The Masked Booby is a large listed marine and migratory species that has a breeding population on Lord Howe Island (Mutton Bird Point, King Point, Roach Island, South Island, Sugarloaf Island, Mutton Bird Island, Gower Island, Sail Rocks and Ball's Pyramid) that is the most southerly known breeding colony in the world (DoEE, 2019w). The masked Booby nests in small colonies, laying on sandy beaches and feeds by plunge diving on the ocean (AOLA, 2019b).

The Red-necked Phalarope (*Phalaropus lobatus*) is a listed migratory and marine wader and the smallest of the Phalarope species (18-19 cm). This is one of only two Phalaropes that occurs regularly at sea where feeding is expected to occur. In Australia it is recorded in both coastal and inland lakes/swamps including highly saline waters and saltfields. In Victoria it has been seen in near coastal lakes such as Lake Cooewarre and Lake Victoria near the entrance to Port Phillip Bay. Sightings occur from Mid October to early April. From a global perspective there are no important sites for this species in Australia (i.e. a site is considered important if it is occupied by more than 1% of the bird's total population). It breeds in the Arctic and sub-Arctic North America and spends its non-breeding winter season at sea (DoEE, 2019ag).

The Magpie Goose is widespread in northern Australia, where it may congregate in huge flocks, often comprising thousands of birds. They were also commonly found in the southern parts of Australia but are now not seen in Tasmania, endangered in Victoria and vulnerable in NSW. They are a listed marine species, a waterfowl which nests near wetlands on floating reeds or tree-tops. They feed on aquatic vegetation (Birdlife Australia, 2019).

Some listed bird species, whilst not seabirds or shorebirds, inhabit islands and nearshore habitats such as forests and freshwater wetlands and include the critically endangered Regent Honeyeater, endangered Wedge-tailed Eagle (Tasmanian), Forty-spotted Pardalote, and the vulnerable Masked Owl and Painted Honeyeater. These are terrestrial/freshwater species and though they occur in or near the DA they are not expected to be impacted by petroleum activities.

The Regent Honeyeater is most commonly associated with box-ironbark eucalypt woodland and dry sclerophyll forest. Its utilisation of lowland coastal forest occurs when its usual habitat is affected by drought and coastal regions become a refuge. Its diet primarily consists of nectar, but also includes invertebrates (mostly insects) and their exudates. Loss of habitat is its primary threat (TSSC, 2015d).

The Wedge-tailed Eagle (Tasmanian) is found only in Tasmania and nearby islands. The subspecies is widespread on mainland Tasmania, where it inhabits coastal, lowland and highland regions. It is carnivorous, and feeds on both live prey and carrion, capable of killing prey several times its own body weight with birds being approximately 10% of items consumed. The major threats to the Wedge-tailed Eagle (Tasmanian) are loss of nesting habitat (old growth Eucalyptus forest) and disturbance of nesting birds and, to a lesser degree, persecution by humans. The loss of suitable habitat has also increased conflict between the Wedge-tailed Eagle (Tasmanian) and the White-bellied Sea-Eagle Haliaeetus leucogaster for nest sites, and this is known to have caused breeding failures in both species (DoEE, 2019ak)

The Masked Owl (Tasmanian) is endemic to Tasmania, including several near-shore islands. It is the second largest nocturnal raptor in Australia with a wingspan up to 128cm. It feeds predominately on introduced rodents and Rabbits and other native fauna in less disturbed habitats. Its greatest threat is loss of habitat through clearing and fragmentation (DEWHA, 2010a).

The Forty-spotted Pardalote is confined to south-eastern Tasmania including the offshore islands. It inhabits sclerophyll forests and open woodlands where White Gum is present and feeds on invertebrates, manna from Eucalyptus trees (including E. dalrympleana and White Gum) and lerps (sugary secretions produced by psyllid insects) (TSSC, 2016c). Its primary threat is of habitat through clearing and fragmentation. Similar to the Pardalote, the Regent Honeyeater also occurs in woodland, mostly box ironbark, and feeds on nectars, insects and their lerps. Its distribution is patchy but extends from south east Queensland to through to Victoria (DoEE, 2015 f). The Painted Honeyeater is the most specialized of Australia's honeyeaters and inhabits eucalypt forests/woodlands but its diet consists mainly of mistletoe fruits and therefore its primary threat is loss of habitat through clearing (DoEE, 2015g).

The endangered Tasmanian Azure Kingfisher is endemic to Tasmania and occurs along several river systems on the south, west and north-west coast with outlying occurrences in the north-east, east, centre and Bass Strait islands. It utilizes a wide range of forest types but mainly wet sclerophyll eucalypt forests. It feeds on small fish, freshwater crayfish, aquatic insects and occasionally amphibians. Its primary threat is habitat clearing and acidic runoff from mining activities (DEWHA, 2010b).

Table 2-31 Seabird and shorebird species or species habitat that may occur within the DA (DoEE, 2019b, DoEE, 2019l, DoEE, 2019m)

Scientific Name	Common Name	Threatened Species	Migratory Species	Listed Marine Species	BIA	Type of Presence
Albatross						
Diomedia antipodensis	Antipodean Albatross	V	✓ (M)	✓	f	FLO
Diomedia epomophora	Southern Royal Albatross	V	✓ (M)	✓		FLO
Diomedia exulans	Wandering Albatross	V	✓ (M)	✓	f	FLO
Diomedia gibsoni	Gibson's Albatross	V		✓		FLO
Diomedia sanfordi	Northern Royal Albatross	E	✓ (M)	✓		FLO
Phoebetria fusca	Sooty Albatross	V	✓ (M)	✓		LO
Thalassarche bulleri	Buller's Albatross	V	✓ (M)	✓	f	FLO
Thalassarche bulleri platei	Northern Buller's Albatross	V		✓		FLO
Thalassarche cauta	Shy Albatross	V	✓ (M)	✓	f	FLO
Thalassarche chrysostoma	Grey-headed Albatross	E	✓ (M)	✓		MO
Thalassarche eremita	Chatham Albatross	E	✓ (M)	✓		FLO
Thalassarche impavida	Campbell Albatross	V	✓ (M)	✓	f	FLO

Scientific Name	Common Name	Threatened Species	Migratory Species	Listed Marine Species	BIA	Type of Presence
Thalassarche melanophris	Black-browed Albatross	V	✓ (M)	✓	f	FLO
Thalassarche salvini	Salvin's Albatross	V	✓ (M)	✓		FLO
Thalassarche steadi	White-capped Albatross	V	✓ (M)	✓	f	FLO
Petrels						
Fregetta grallaria grallaria	White-bellied Storm-Petrel	V				LO
Halobaena caerulea	Blue Petrel	V		✓		MO
Macronectes giganteus	Southern Giant Petrel	E	✓ (M)	✓	f	FLO
Macronectes halli	Northern Giant Petrel	V	✓ (M)	✓	f	MO
Pelagodroma marina	White-faced Storm Petrel			✓	b, f	BKO
Pelecanoides urinatrix	Common Diving-Petrel			✓	b, f	BKO
Pterodroma heraldica	Herald Petrel	CE		✓		LO
Pterodroma leucoptera leucoptera	Gould's Petrel	E				BKO
Pterodroma macroptera	Great-winged Petrel			✓	f	
Pterodroma mollis	Soft-plumaged Petrel	V		✓		MO
Pterodromoa neglecta neglecta	Kermadec Petrel (western)	V				FMO
Pterodroma nigripennis	Black-winged Petrel			✓		BKO
Pterodroma solandri	Providence Petrel			✓		BKO
Plovers						
Charadrius bicinctus	Double-banded Plover		✓ (W)	✓		RKO
Charadrius leschenaultii	Greater Sand Plover	V	✓ (W)	✓		FKO
Charadrius mongolus	Lesser Sand Plover	E	✓ (W)	✓		FKO
Charadrius ruficapillus	Red-capped Plover			✓		RKO
Charadrius veredus	Oriental Plover		✓ (W)	✓		FKO
Pluvialis fulva	Pacific Golden Plover		✓ (W)	✓		RKO
Pluvialis squatarola	Grey Plover		✓ (W)	✓		RKO

Scientific Name	Common Name	Threatened Species	Migratory Species	Listed Marine Species	BIA	Type of Presence
Thinornis rubricollis	Hooded Plover			✓		KO
Thinornis rubricollis rubricollis	Hooded Plover (eastern)	V		✓		KO
Scolopacidae -Sandpipers						
Actitis hypoleucos	Common Sandpiper		✓ (W)	✓		KO
Calidris acuminata	Sharp-tailed Sandpiper		✓ (W)	✓		RKO
Calidris ferruginea	Curlew Sandpiper	CE	✓ (W)	✓		KO
Calidris melanotos	Pectoral Sandpiper		✓ (W)	✓		KO
Limicola falcinellus	Broad-billed Sandpiper		✓ (W)	✓		KO
Tringa glareola	Wood Sandpiper		✓ (W)	✓		FKO
Tringa stagnatilis	Marsh Sandpiper		✓ (W)	✓		FKO
Xenus cinereus	Terek Sandpiper		✓ (W)	✓		FKO
Scolopacidae - Other						
Arenaria interpres	Ruddy Turnstone		✓ (W)	✓		RKO
Calidris alba	Sanderling		✓ (W)	✓		RKO
Calidris canutus	Red Knot	E	✓ (W)	✓		KO
Calidris ruficollis	Red-necked Stint		✓ (W)	✓		RKO
Calidris tenuirostris	Great Knot	CE	✓ (W)	✓		RKO
Gallinago hardwickii	Latham's Snipe		✓ (W)	✓		RMO
Gallinago megala	Swinhoe's Snipe		✓ (W)	✓		RLO
Gallinago stenura	Pin-tailed Snipe		✓ (W)	✓		RLO
Heteroscelus brevipes	Grey-tailed Tattler		✓ (W)	✓		FKO
Limnodromus semipalmatus	Asian Dowitcher		✓ (W)	✓		KO
Limosa lapponica	Bar-tailed Godwit		✓ (W)	✓		KO
Limosa lapponica baueri	Bar-tailed Godwit (auera)	V				KO
Limosa lapponica menzbieri	Northern Siberian Bar-tailed Godwit	CE				MO

Scientific Name	Common Name	Threatened Species	Migratory Species	Listed Marine Species	BIA	Type of Presence
Limosa limosa	Black-tailed Godwit		✓ (W)	✓		FKO
Numenius madagascariensis	Eastern Curlew	CE	✓ (W)	✓		KO
Numenius minutus	Little Curlew		✓ (W)	✓		RLO
Numenius phaeopus	Whimbrel		✓ (W)	✓		RKO
Phalaropus lobatus	Red-necked Phalarope		✓ (W)	✓		KO
Philmachus pugnax	Ruff		✓ (W)	✓		FKO
Tringa brevipes	Grey-tailed Tattler		✓ (W)	✓		KO
Tringa incana	Wandering Tattler		✓ (W)	✓		KO
Tringa nebularia	Common Greenshank		✓ (W)	✓		KO
Shearwaters						
Calonectris leucomelas	Streaked Shearwater		✓ (M)			MO
Puffinus carneipes	Flesh-footed Shearwater		✓ (M)	✓	f	FLO
Puffinus griseus	Sooty Shearwater		✓ (M)	✓	b, f	BKO
Puffinus pacificus	Wedge-tailed Shearwater		✓ (M)	✓	b, f	BKO
Puffinus tenuirostris	Short-tailed Shearwater		✓ (M)	✓	b, f	BKO
Terns						
Sterna albifrons	Little Tern		✓ (M)	✓		BKO
Sterna bergii	Crested Tern		✓ (M)	✓	b, f	BKO
Sterna caspia	Caspian Tern		✓ (M)	✓		BKO
Sterna fuscata	Sooty Tern			✓		BKO
Sterna nereis	Fairy Tern			✓		BKO
Sterna striata	White-fronted Tern			✓		BKO
Sternula nereis nereis	Australian Fairy Tern	V				BKO
Others						
Anthohaera Phrygia	Regent Honeyeater	CE				KO
Anous stolidus	Common Noddy		✓ (M)	✓		MO
Apus pacificus	Fork-tailed Swift		✓ (M)	✓		LO
Ardea alba	Great Egret			✓		BKO

Scientific Name	Common Name	Threatened Species	Migratory Species	Listed Marine Species	BIA	Type of Presence
Ardea ibis	Cattle Egret			✓		MO
Aseranas semipalmata	Magpie Goose			✓		MO
Aulia audax fleayi	Tasmanian Wedge-tailed Eagle	E				BLO
Botaurus poiciloptilus	Australasian Bittern	E				KO
Catharacta skua	Great Skua			✓		MO
Ceyx azureus	Tasmanian Azure Kingfisher	E				BKO
Cuculus saturatus	Oriental Cuckoo		✓ (T)	✓		KO
Dasyomis brachypterus	Eastern Bristlebird	E				KO
Eudyptula minor	Little Penguin			✓	b, f	BKO
Fregata ariel	Least Frigatebird		✓ (M)	✓		LO
Fregata minor	Great Frigatebird		✓ (M)	✓		MO
Grantiella picta	Painted Honeyeater	V				BKO
Haliaeetus leucogaster	White-bellied Sea Eagle			✓		BKO
Himantopus himantopus	Black-winged Stilt			✓		RKO
Hirundapus caudacutus	White-throated Needletail		✓ (T)	✓		KO
Larus dominicanus	Kelp Gull			✓		BKO
Larus novaehollandiae	Silver Gull			✓		BKO
Larus pacificus	Pacific Gull			✓		BKO
Lathamus discolor	Swift Parrot	CE		✓		KO
Merops ornatus	Rainbow Bee-eater			✓		MO
Monarcha melanopsis	Black-faced Monach		✓ (T)	✓		KO
Monarcha trivirgatus	Spectacled Monach		✓ (T)	✓		KO
Morus serrator	Australian Gannet			✓		BKO
Motacilla flava	Yellow Wagtail		✓ (T)	✓		MO
Myiagra cyanoleuca	Satin Flycatcher		✓ (T)	✓		KO
Neophema chrysogaster	Orange-bellied Parrot	CE		✓		KO

Scientific Name	Common Name	Threatened Species	Migratory Species	Listed Marine Species	BIA	Type of Presence
Pachyptila turtur	Fairy Prion			✓		KO
Pachyptila turtur subantartica	Fairy Prion (southern)	V				KO
Pandion haliaetus	Osprey		✓ (W)	✓		KO
Pardalotus quadragintus	Forty-spotted Pardalote	E				KO
Phaethon rubricauda	Red-tailed Tropicbird		✓(M)	✓		BKO
Phalacrocorax fuscescens	Black-faced Cormorant			✓		BKO
Recurvirostra novaehollandiae	Red-necked Avocet			✓		FKO
Rhipidura rufifrons	Rufous Fantail		✓ (T)	✓		LO
Rostratula australis	Australian Painted Snipe	E		✓		LO
Sula dactylatra	Masked Booby		✓(M)	✓		BKO
Tyto novaehollandiae castanops	Masked Owl (Tasmanian population)	V				BKO
Threatened Species: *V Vulnerable* *E Endangered* *CE Critically Endangered* *Migratory Species*: *M Marine* *W Wetland* *T Terrestrial* *Biologically Important Areas*: *b Breeding* *f Foraging*	*Type of Presence*: *MO Species or species habitat may occur within the area* *LO Species or species habitat likely to occur within the area* *KO Species or species habitat known to occur within the area* *FMO Foraging, feeding or related behaviour may occur within the area* *FLO Foraging, feeding or related behaviour likely to occur within the area* *FKO Foraging, feeding or related behaviour known to occur within the area* *BKO Breeding known to occur within the area* *RMO Roosting may occur within the area* *RLO Roosting likely to occur within the area* *RKO Roosting known to occur within the area*					

Table 2-32 Key threats and management actions for seabird and shorebird threatened species or species habitat that may occur within the DA

Common Name	Conservation Advice or Recovery Plan	Key Threats (relevant to petroleum activities)
Antipodean Albatross	National Recovery Plan for Threatened Albatrosses and Giant Petrels, 2011-2016	Marine pollution, including marine debris
Southern Royal Albatross		
Wandering Albatross		
Gibson's Albatross		
Northern Royal Albatross		
Sooty Albatross		

Common Name	Conservation Advice or Recovery Plan	Key Threats (relevant to petroleum activities)
Buller's Albatross		
Pacific Albatross		
Shy Albatross		
Chatham Albatross		
Campbell Albatross		
Black-browed Albatross		
Salvin's Albatross		
White-capped Albatross		
Grey-headed Albatross	National Recovery Plan for Threatened Albatrosses and Giant Petrels, 2011-2016 Approved Conservation Advice for *Thalassarche chrysostoma* (Grey-headed Albatross)	Marine pollution, including marine debris
White-bellied Storm-Petrel	Lord Howe Island Biodiversity Management Plan	None identified
Blue Petrel	Approved Conservation Advice for *Halobaena caerulea* (Blue Petrel)	None identified
Southern Giant Petrel	National Recovery Plan for Threatened Albatrosses and Giant Petrels, 2011-2016	Marine pollution, including marine debris
Northern Giant Petrel		
Gould's Petrel	Gould's Petrel (*Pterodroma leucoptera leucoptera*) Recovery Plan	Oil spills Note: oil spills in the vicinity Cabbage Tree Island are not considered a threat because the Gould's Petrel does not feed in coastal waters however, oceanic oil spills may pose some risk (NSW DEC, 2006)
Kermadec Petrel (western)	Norfolk Island Region Threatened Species Recovery Plan Lord Howe Island Biodiversity Management Plan	None identified
Herald Petrel	Conservation Advice (*Pterodroma heraldica)* Herald petrel. Canberra: Department of the Environment, 2015 (TSSC, 2015a).	None identified
Greater Sand Plover	Approved Conservation Advice for *Charadrius leschenaultia* (Greater Sand Plover)	Habitat loss and degradation from pollution
Lesser Sand Plover	Approved Conservation Advice for *Charadrius mongolus* (Lesser Sand Plover)	Habitat loss and degradation from pollution
Hooded Plover (eastern)	Approved Conservation Advice for *Thinornis rubricollis* (Hooded Plover, Eastern)	Oil spills Entanglements and ingestion of marine debris
Curlew Sandpiper	Approved Conservation Advice for *Calidris ferruginea* (Curlew Sandpiper)	Habitat loss and degradation from pollution Environmental pollution
Australian Fairy Tern	Approved Conservation Advice for *Sternula nereis nereis* (Fairy Tern)	Oil spills, particularly in Victoria, where the close proximity of oil

Common Name	Conservation Advice or Recovery Plan	Key Threats (relevant to petroleum activities)
		facilities poses a risk of oil spills that may affect the species' breeding habitat
Tasmanian Wedge-tailed Eagle	Threatened Tasmanian Eagles Recover Plan, 2006-2010 (DPIW, 2006)	Oiling, entanglement, pollution
Australasian Bittern	Approved Conservation Advice for *Botaurus poiciloptilus* (Australasian Bittern)	Reduced water quality as a result of increasing salinity, siltation and pollution
Red Knot	Approved Conservation Advice for *Calidris canutus* (Red Knot)	Habitat loss and degradation from environmental Pollution Pollution or contamination impacts
Great Knot	Approved Conservation Advice for *Calidris tenuirostris* (Great Knot)	Habitat loss and degradation from environmental Pollution Pollution or contamination impacts
Red knot, Great knot, Bar-tailed godwit, Greater sand plover	Wildlife conservation plan for migratory shorebirds	Habitat loss and degradation from environmental Pollution Pollution or contamination impacts
Eastern Bristlebird	National Recovery Plan for Eastern Bristlebird (*Dasyornis brachypterus*)	None identified
Swift Parrot	Approved Conservation Advice for *Lathamus discolour* (Swift Parrot)	None identified
Bar-tailed Godwit (baueri)	Approved Conservation Advice for *Limosa lapponica bauera* (Bar-tailed Godwit)	Habitat loss and degradation from pollution Pollution/contamination
Tasmanian Masked Owl	Approved Conservation Advice for *Tyto novaehollandiae castanops* (Tasmanian Masked Owl)(DEWHA, 2010)	None identified
Northern Siberian Bar-tailed Godwit	Approved Conservation Advice for *Limosa lapponica menzbieri* (Northern Siberian Bar-tailed Godwit)	Habitat loss and degradation from pollution Pollution/contamination
Orange-bellied Parrot	National Recovery Plan for the Orange-bellied Parrot (*Neophema chrysogaster*)	None identified
Eastern Curlew	Approved Conservation Advice for *Numenius madagascariensis* (Eastern Curlew)	Habitat loss and degradation from pollution Environmental pollution
Fairy Prion (southern)	Approved Conservation Advice for *Pachyptila turtur subantartica* (Fairy Prion Southern)	None identified
Australian Painted Snipe	Approved Conservation Advice for *Rostratula australis* (Australian Painted Snipe)	None identified
Forty-spotted Pardalote	Conservation Advice Pardalotus quadraginatus forty-spotted pardalote (TSSC, 2016c)	None Identified
Regent Honeyeater	Conservation Advice Anthochaera phrygia regent honeyeater. Canberra: Department of the Environment (DOEE, 2015 f)	None Identified

Common Name	Conservation Advice or Recovery Plan	Key Threats (relevant to petroleum activities)
Tasmanian Azure Kingfisher	Approved Conservation Advice for *Ceyx azureus diemenensis* (Tasmanian Azure Kingfisher) (DEWHA, 2010c)	None Identified
Painted Honeyeater	Conservation Advice Grantiella picta painted honeyeater. Canberra: Department of the Environment (DoEE, 2015 g).	None Identified

2.3.1.3 Marine Mammals

2.3.1.3.1 Cetaceans

Cetaceans are a widely distributed and diverse group of carnivorous, finned, aquatic marine mammals. They comprise whales, dolphins and porpoises. Cetaceans are generally found in the ocean, but can also inhabit river systems.

There are 25 whale, and eleven dolphin species (or species habitat) that may occur within the DA; this includes species classified as threatened and migratory (Table 2-33) (DoEE, 2019b, DoEE, 2019l, DoEE, 2019m). A list of the conservation advice and/or recovery plans, with relevant key threats and management actions, is shown in Table 2-34. The type of presence varies between species, and includes important behaviours (e.g. foraging, breeding) for some species.

Whales

Southern Right Whales generally occur along the southern coast of Australia, they migrate annually along the eastern coastline from high latitude feeding grounds to lower latitudes for calving between mid-May and September (DoEE, 2017h). Known calving and aggregation grounds in the south-east region are Warrnambool, Port Fairy, Port Campbell and Portland in Victoria, and Encounter Bay in South Australia (DSEWPaC, 2012d; DoEE, 2015a). Nursery grounds are occupied from May to October, with female-calf pairs generally staying in the area for two to three months (Charlton, 2017). Calving itself usually occurs in very shallow (<10 m depth) waters. Other population classes stay in the nursery grounds for shorter and variable periods of time; there is typically a lot of movement along the coast, and thus habitat connectivity is important for this species. The summer offshore distribution and migration routes of Southern Right Whales largely is unknown, but is known to include directly southern and western migration pathways, but may include offshore habitat where mating (Burnell, 2001; Mackay et al., 2015). Figure 2-28 shows whale migration pathways and aggregation around the Bass Strait petroleum permit areas, including those for the Southern Right Whales. A BIA for the Southern Right Whale, for migration and distribution exists within the DA (Figure 2-31) (DoEE, 2015h).

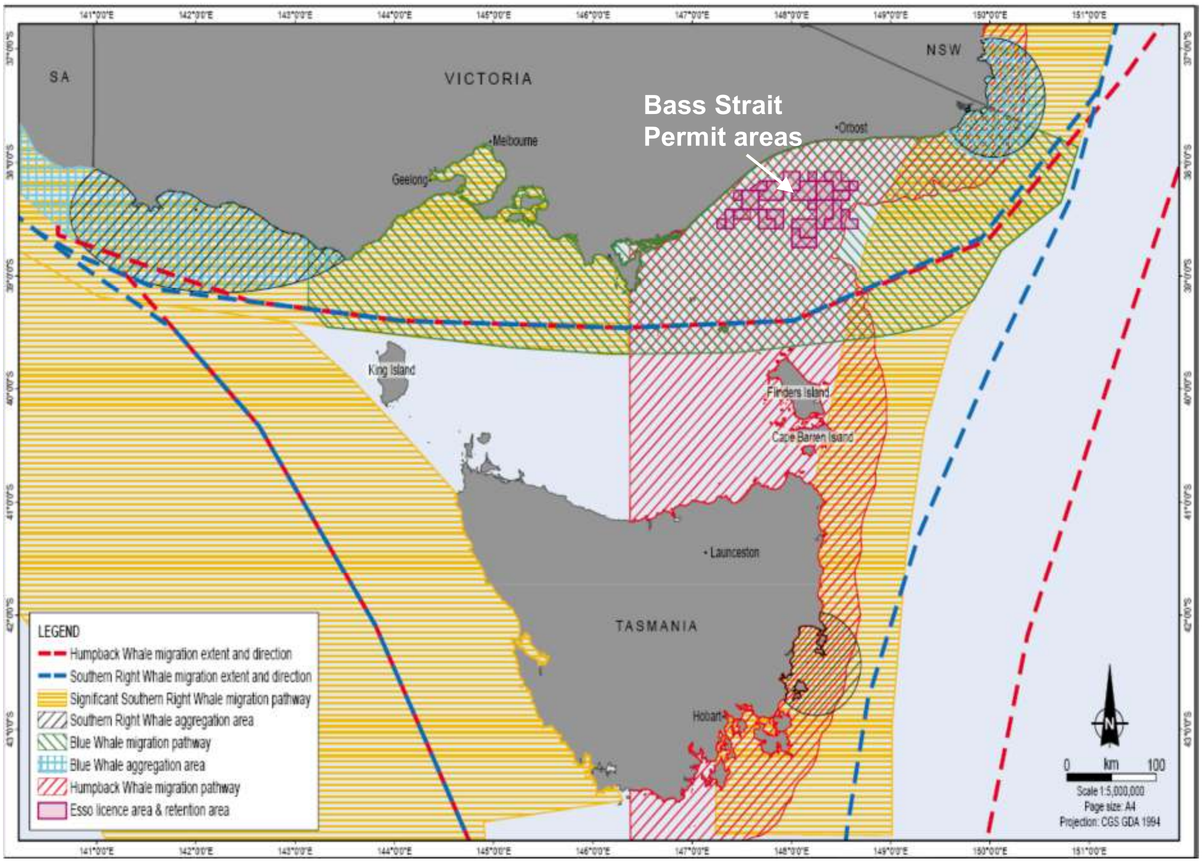


Figure 2-28 Whale migration pathways and aggregation around the Bass Strait petroleum permit areas

Humpback whales migrate annually along the eastern coast of Australia heading north to tropical calving grounds from June to August, and south to Southern Ocean feeding areas from September to November (Figure 2-29). While the main migration route of this species is along the east coast of Australia along the continental shelf to the east of Bass Strait, some animals migrate through Bass Strait. Humpback whales do not feed, breed or rest in Bass Strait and the Victorian coastal waters are not a key location for this whale species (Bannister et al., 1996). Most feeding grounds are south of Australian waters (TSSC, 2015c). A BIA for the Humpback Whale, for migration and breeding, has been identified along the east coast of Australia (Figure 2-31) (DoEE, 2015h). Humpback whales in the southern Hemisphere primarily feed on Antarctic krill (Euphausia superba). While most feeding grounds are south of Australian waters, there are some feeding grounds that are regularly used on the southern migration in Australian coastal waters: off the coast of Eden in New South Wales, and east coast of Tasmania (TSSC, 2015c).

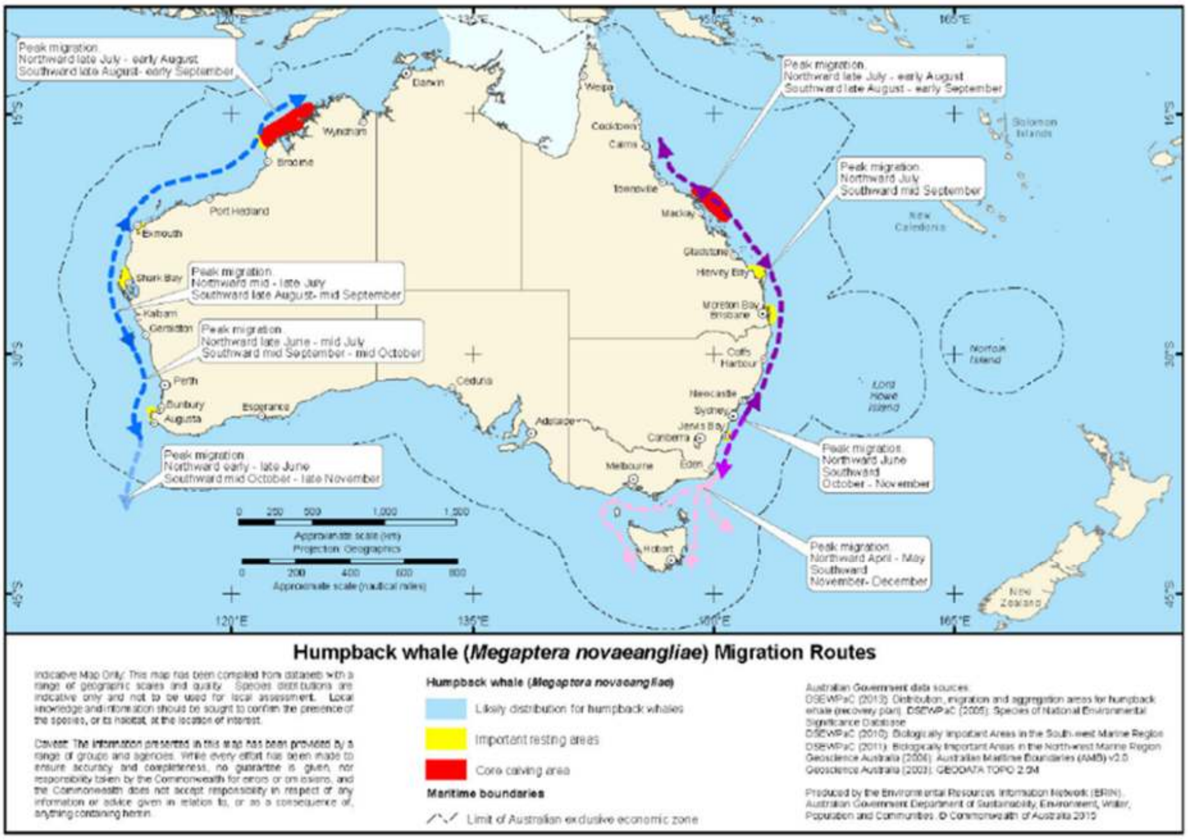


Figure 2-29 Migration routes for Humpback Whales around Australia (TSSC, 2015c)

There are two subspecies of Blue Whale that occur within Australian waters: Antarctic Blue Whale, and the Pygmy Blue Whale. Blue Whales have the highest known prey requirements, consuming up to two tonnes of krill per day (DoEE, 2015d). Blue whale sightings in Australia are widespread, and much of the shelf and coastal waters are unlikely to hold significance for this species with the exception of some foraging locations. Australia has two known seasonal feeding aggregations of Pygmy Blue Whales, one occurs adjacent to the Bonney Upwelling system off South Australia and Victoria (Figure 2-30) (Gill 2002; Gill & Morrice 2003). Pygmy Blue Whales are typically foraging in this area between January and April (DoEE, 2015d). The abundance of whales in the area varies within and between seasons (DoEE, 2015d). Outside these main feeding areas, foraging areas for the Pygmy Blue Whale also include in Bass Strait, and diving and presumably feeding at depth off the west coast of Tasmania (DoEE, 2015d). A BIA for the Pygmy Blue Whale for foraging and distribution has been identified in the DA (Figure 2-31) (DoEE, 2015h). Acoustic detections of blue whales indicates that New Zealand pygmy blue whales occur predominantly eastward of Bass Strait, Australian pygmy blue whales occur west of Bass Strait, and Antarctic blue whales occur along the entire southern coastline (McCauley et al., 2018). Sightings of Blue whales in the Gippsland Basin are reasonably rare (Bannister et al. 1996).

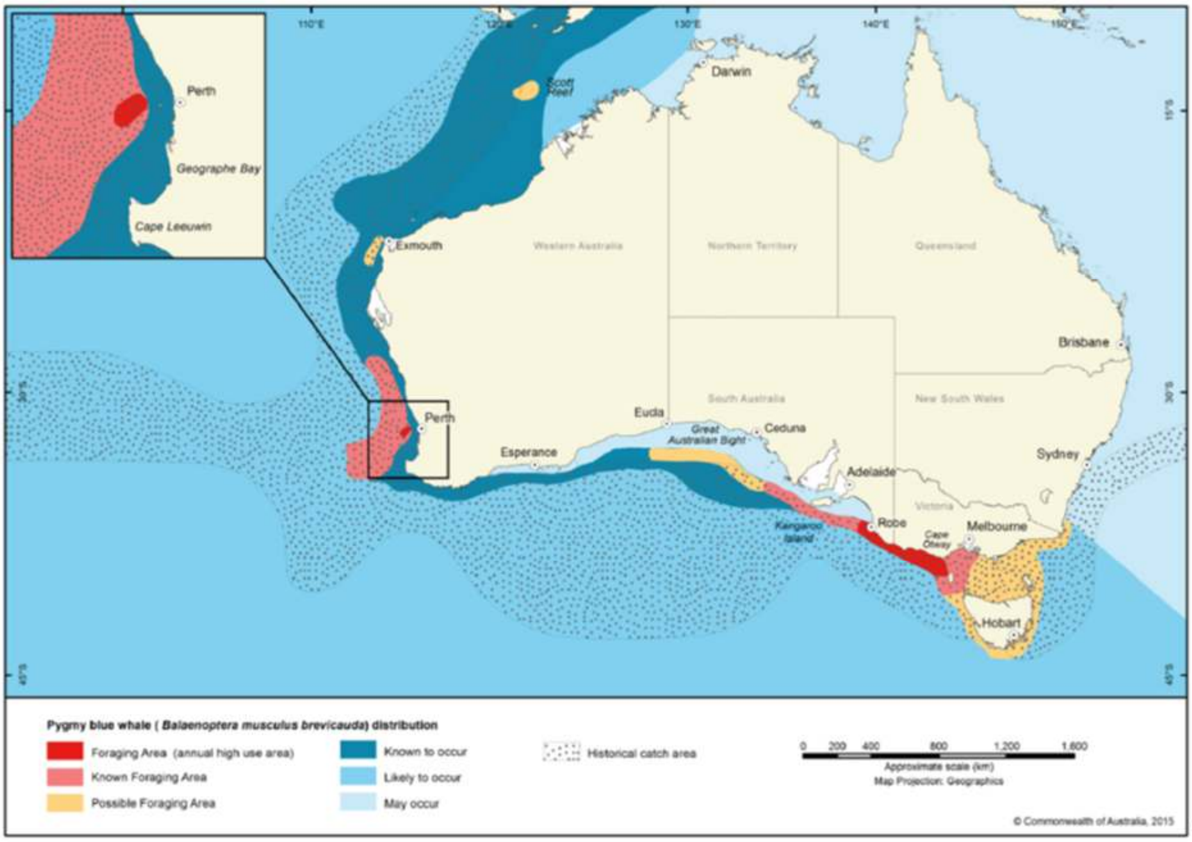
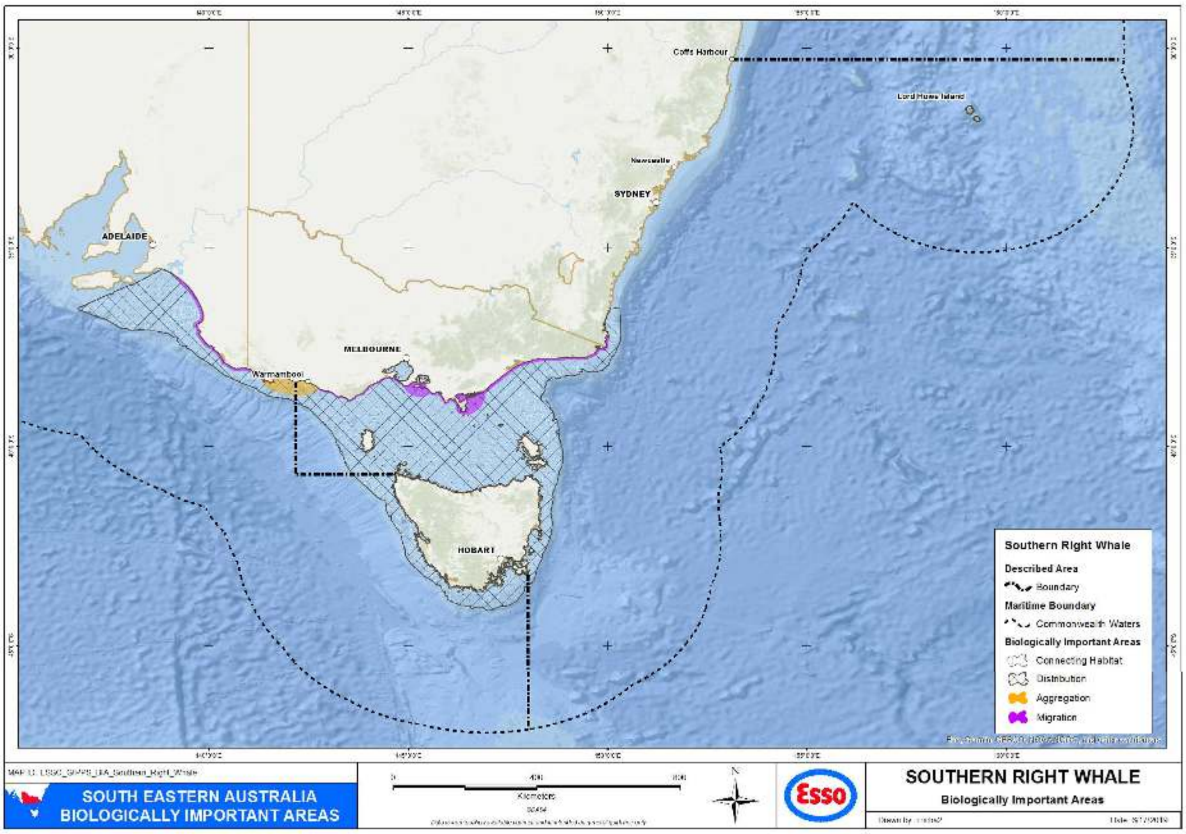


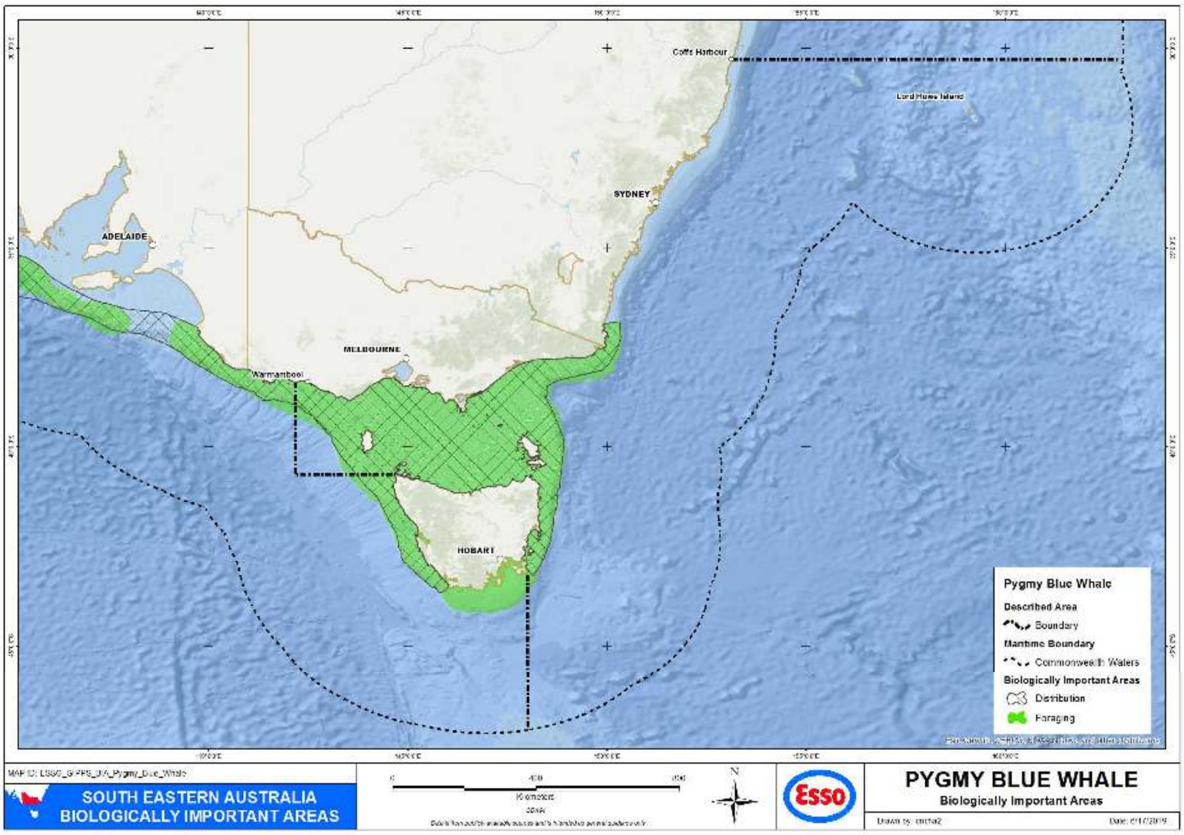
Figure 2-30 Distribution and foraging areas for the Pygmy Blue Whale (DoE, 2015d)

Sei Whales have been infrequently recorded in Australian waters; however occasional sightings have been recorded off Tasmania, New South Wales, Queensland and within the Great Australian Bight (DoEE, 2017p). Sie Whales typically feed between the Antarctic and Subtropical convergences, and their diet is planktonic crustacea, in particular copepods and amphipods. However, Sei Whales have also been observed feeding on the continental shelf in the Bonney Upwelling region during November and May, suggesting the area may be used for opportunistic feeding (DoEE, 2018a).

The distribution of Fin Whales in Australian waters is uncertain, but they have been recorded in Commonwealth waters off most States (the species is rarely found in inshore waters) (DoEE, 2017r). Fin Whales frequently lunge or skim feed, at or near the surface, feeding on planktonic crustacea, some fish and cephalopods (DoEE, 2017r). Fin Whales generally feed in high latitudes, however depending upon prey availability and locality, it may also feed in lower latitudes. Fin whales have been observed in waters off the Bonney Upwelling during November and May, suggesting the region may be used for opportunistic feeding (DoEE 2018b). Fin whales have also been detected acoustically south of Portland, Victoria (Erbe et al., 2016).

Records of Pygmy Right Whales in Australian waters are distributed between 32°S and 47°S, but are not uniformly spread around the coast (DoEE, 2017t). Areas of coastal upwelling events appear to be an important component regulating Pygmy Right Whale distribution. Pygmy right whales (Caperea truncates) have primarily been recorded in areas associated with upwellings and with high zooplankton abundance, which constitute their main prey. There is some evidence to indicate that the area south of 41°S is important for weaned Pygmy Right Whales, possibly because of the higher prey abundance in these waters (DoEE, 2017t).


Coffs Harbour
Lord Howe Island
SYDNEY
ADELAIDE
MELBOURNE
Warrnambool
HOBART
Southern Right Whale
Described Area
Boundary
Maritime Boundary
Commonwealth Waters
Biologically Important Areas
Connecting Habitat
Distribution
Aggregation
Migration
SOUTH EASTERN AUSTRALIA
BIOLOGICALLY IMPORTANT AREAS
Kilometers
SOUTHERN RIGHT WHALE
Biologically Important Areas


Coffs Harbour
Lord Howe Island
SYDNEY
ADELAIDE
MELBOURNE
Warrnambool
HOBART
Pygmy Blue Whale
Described Area
Boundary
Maritime Boundary
Commonwealth Waters
Biologically Important Areas
Distribution
Foraging
SOUTH EASTERN AUSTRALIA
BIOLOGICALLY IMPORTANT AREAS
Kilometers
PYGMY BLUE WHALE
Biologically Important Areas

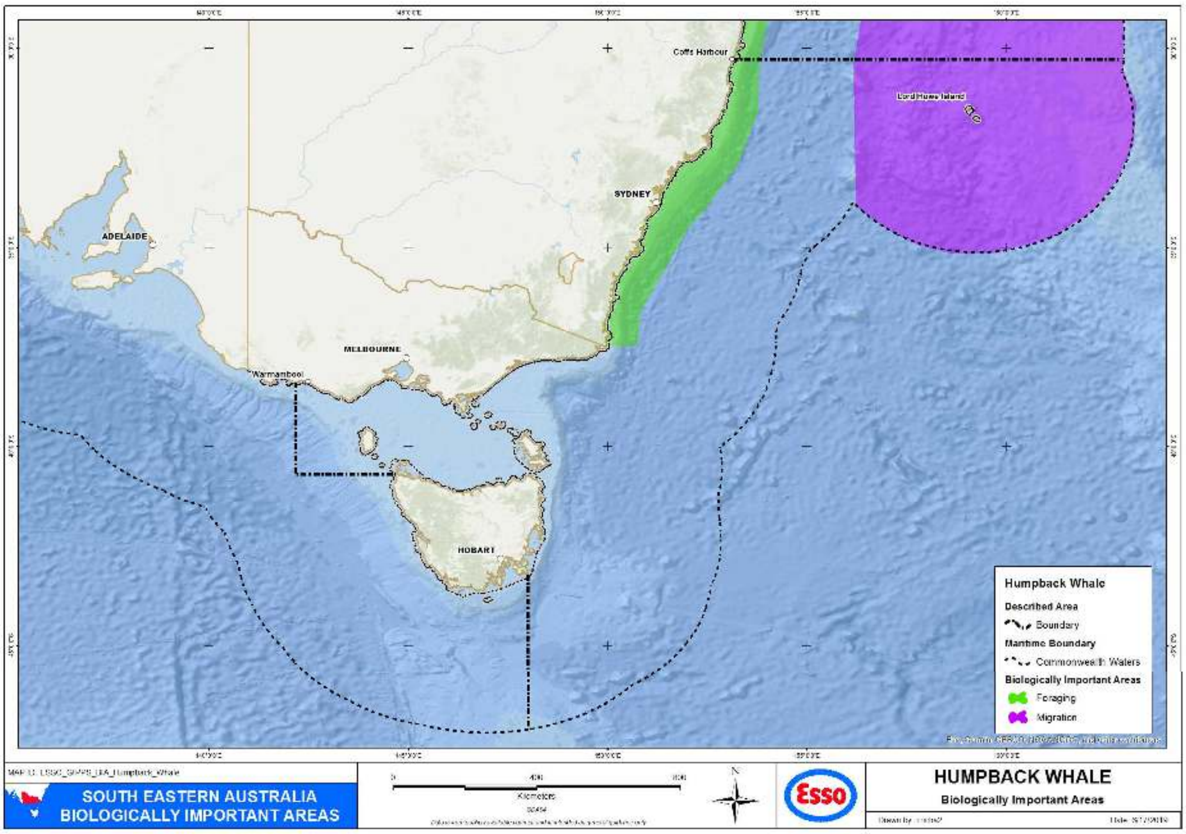


Figure 2-31 Biologically Important Areas for whale species

Dolphins

The Indian Ocean Bottlenose Dolphin is distributed continuously around Australia (DoEE, 2017u). The Indian Ocean Bottlenose Dolphin occurs mainly in riverine and shallow coastal waters (on the shelf or around oceanic islands) (DSEWPaC, 2012e). Known populations include: Jervis Bay, Twofold Bay, and Port Phillip Bay (New South Wales) (DSEWPaC, 2012e). Calving peaks occur in spring and summer or spring and autumn (DoEE, 2017u). Gestation lasts approximately 12 months, so peak mating period coincides with peak calving period in each location (DoEE, 2017u). A BIA for breeding for the Indian Ocean Bottlenose Dolphin has been identified within New South Wales coastal waters (Figure 2-32) (DoEE, 2015h).

The Indo-Pacific Humpback dolphin (*Sousa chenisis*) has similar habitat type as the Indian Ocean Bottlenose and occurs in tropical/subtropical waters from approximately the Queensland–New South Wales border to western Shark Bay, Western Australia. Humpback dolphins have been observed feeding mainly in near-shore habitats and in a wide range of inshore-estuarine coastal habitats including rivers and creeks, exposed banks, shallow flats, rock and coral reefs as well as over submerged reefs in waters at least up to 40 m deep. Although listed as a migratory species, they do not appear to undergo large scale seasonal migrations (DoEE, 2019y). BIA for this species occur in northern Queensland, outside of this DA (NCVA, 2019).

The Bottle-nosed dolphin (*Tursiops truncates*) and the Common dolphin (Delphinus delphis) are commonly sighted in near-shore Victorian waters.

Dusky dolphins are listed as a migratory marine species likely to be present in the vicinity of the EGBPA. Although they have been sighted off Tasmania, there is no known calving locality for this species in Australian waters (Gill et al. 2000).

There are four species of pelagic dolphins that may occur in the DA. They are all listed as cetaceans under the EPBC Act. The population size is not known however none are considered to be rare. No specific conservation or listing advice exists for these species and their distribution has not been specifically defined. All species feed on pelagic fish, squids, octopus, shrimps and other marine fauna taken at depths exceeding 250 m. The extent of occurrence is large in all cases, estimated to be greater than 20,000 km^2. All are tropical to subtropical species (occasionally temperate) with distribution varying depending on water temperature and flow of warm currents.

The Striped Dolphin (*Stenella coeruleoalba*) inhabits pelagic and oceanic waters. All sightings have been made in waters where the sea surface temperature exceeds 25 °C. Striped Dolphins may travel in large groups of several hundreds and even thousands, and are most frequently found in deep waters (deeper than 1000 m), preferring areas with large seasonal changes in surface temperature and thermocline depth and with seasonal upwelling (DoEE, 2019ac). Striped Dolphins do not co-occur with tuna as commonly as Spotted and Spinner Dolphins do, and so are less vulnerable to being entangled and caught in tuna purse seine nets.

The distribution of Spotted Dolphin (also called Pantropical Spotted Dolphins) (*Stenella attenuate)* has not been surveyed however there have been sightings recorded off the Northern Territory, Western Australia down south to Augusta, Queensland and NSW. This species inhabits both near-shore and oceanic habitats in tropical and warm temperate seas. They have also been found on the shelf and along the continental slope, indicating that they may use neritic (over the continental slope) habitat as well. The Pantropical Spotted Dolphin diet overlaps greatly with that of Yellowfin Tuna and a close association has been noted between these species and sea birds in the eastern tropical Pacific (DoEE, 2019ad).

Long-snouted Spinner Dolphins (*Stenella longirostris*) are primarily pelagic (occurring in open ocean) but they can be neritic (occurring over the continental shelf) in some regions. They occur in tropical, subtropical and occasionally temperate waters around the world. Long-snouted Spinner Dolphins associate with tuna. The lack of abundance and distribution data prohibits definitive assessment of the Australian populations of Long-snouted Spinner Dolphins however they are not considered rare (DoEE, 2019ab).

Similar to the other pelagic dolphin species described above, the Rough-toothed Dolphin (*Steno bredanensis)* has been recorded from Western Australia (Barrow Island), the Northern Territory, Queensland and southern New South Wales. They are regularly seen with Pilot Whales and Bottlenose Dolphins, and occasionally with Spotted and Spinner Dolphins. Specific information on the Rough-toothed Dolphin is also lacking. Their notoriety for stealing bait and fish off fishing lines makes them unpopular with many recreational and commercial fishers and may lead to both incidental captures and mortalities from fisher targeting. Additionally, their regular association with schools of Yellowfin and Skipjack Tuna, plus Dorado (Dolphinfish/Mahi Mahi), may make them susceptible to entanglement in purse-seine nets set for these fish species (DoEEa, 2019ae).

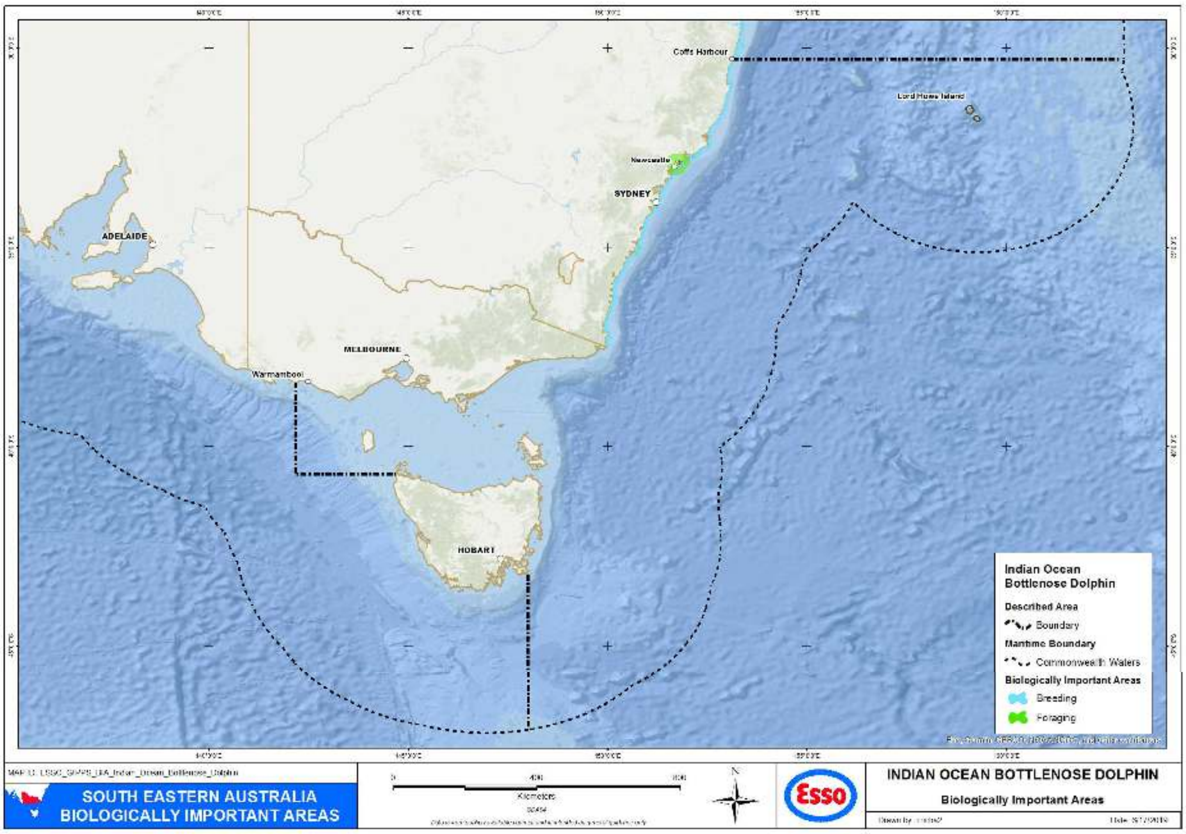


Figure 2-32 Biologically Important Areas for Indian Ocean Bottlenose Dolphin

Table 2-33 Marine mammal (cetacean) species or species habitat that may occur within the DA (DoEE, 2019b, DoEE, 2019l, DoEE, 2019m)

Scientific Name	Common Name	Threatened Species	Migratory Species	Listed Marine Species	BIA	Type of Presence
Whales						
Balaenoptera acutorostrata	Minke Whale					MO
Balaenoptera bonaerensis	Antartic Minke Whale		✓			LO
Balaenoptera borealis	Sie Whale	V	✓			FLO
Balaenoptera edeni	Bryde's Whale		✓			LO
Balaenoptera musculus	Blue Whale	E	✓		f	LO
Balaenoptera physalus	Fin Whale	V	✓			FLO
Berardius arnuxii	Arnoux's Beaked Whale					MO
Caperea marginata	Pygmy Right Whale		✓			FLO
Eubalaena australis	Southern Right Whale	E	✓		m	KO
Globicephala macrorhynchus	Short-finned Pilot Whale					MO

Scientific Name	Common Name	Threatened Species	Migratory Species	Listed Marine Species	BIA	Type of Presence
Globicephala melas	Long-finned Pilot Whale					MO
Hyperoodon planifrons	Southern Bottlenose Whale					MO
Kogia breviceps	Pygmy Sperm Whale					MO
Kogia simus	Dwarf Sperm Whale					MO
Megaptera novaeangliae	Humpback Whale	V	✓		m	FKO
Mesoplodon bowdoini	Andrew's Beaked Whale					MO
Mesoplodon densirostris	Blainville's Beaked Whale					MO
Mesoplodon ginkgodens	Gingko-toothed Beaked Whale					MO
Mesoplodon grayi	Gray's Beaked Whale					MO
Mesoplodon hectori	Hector's Beaked Whale					MO
Mesoplodon layardii	Strap-toothed Beaked Whale					MO
Mesoplodon mirus	True's Beaked Whale					MO
Physeter microcephalus	Sperm Whale		✓			MO
Tasmacetus shepherdi	Shepherd's Beaked Whale					MO
Ziphius cavirostris	Cuvier's Beaked Whale					MO
Dolphins						
Delphinus delphis	Common Dolphin					MO
Feresa attenuata	Pygmy Killer Whale					MO
Grampus griseus	Risso's Dolphin					MO
Lagenorhynchus obscurus	Dusky Dolphin		✓			LO
Lissodelphiss peronii	Southern Right Whale Dolphin					MO
Orcinus orca	Killer Whale		✓			LO
Pseudorca crassidens	False Killer Whale					MO
Sousa chinensis	Indo-Pacific Humpback Dolphin		✓			LO
Stenalla attenuata	Spotted Dolphin					MO
Stenalla coeruleoalba	Striped Dolphin					MO
Stenalla logirostris	Long-snouted Spinner Dolphin					MO
Steno bredanensis	Rough-toothed Dolphin					MO

Scientific Name	Common Name	Threatened Species	Migratory Species	Listed Marine Species	BIA	Type of Presence
Tursiops aduncus	Indian Ocean Bottlenose Dolphin				bc	LO
Tursiops truncatus s. str.	Bottlenose Dolphin					MO
Porpoise						
Phocoena dioptrica	Spectacled Porpoise		✓			MO
Threatened Species: *V Vulnerable* *E Endangered* *Biologically Important Areas*: *bc Breeding, calving* *f Foraging* *m Migration*	*Type of Presence*: *MO Species or species habitat may occur within the area* *LO Species or species habitat likely to occur within the area* *KO Species or species habitat known to occur within the area* *FLO Foraging, feeding or related behaviour likely to occur within the area* *FKO Foraging, feeding or related behaviour known to occur within the area* *BKO Breeding known to occur within the area*					

Table 2-34 Key threats and management actions for threatened marine mammal (cetacean) species or species habitat that may occur within the DA

Common Name	Conservation Advice or Recovery Plan	Key Threats (relevant to petroleum activities)
Sei Whale	Approved Conservation Advice for *Balaenoptera borealis* (Sei Whale)	Anthropogenic noise and acoustic disturbance Habitat degradation including pollution Pollution (persistent toxic pollutants) Vessel strike
Blue Whale	Conservation Management Plan for the Blue Whale, 2015-2025	Noise interference Habitat modification from marine debris or chemical discharge Vessel strike
Fin Whale	Approved Conservation Advice for *Balaenoptera physalus* (Fin Whale)	Anthropogenic noise and acoustic disturbance Pollution (persistent toxic pollutants) Vessel strike
Southern Right Whale	Conservation Management Plan for the Southern Right Whale, 2011-2021	Entanglement Vessel strike Noise Interference Habitat modification
Humpback Whale	Approved Conservation Advice for *Megaptera novaeangliae* (Humpback Whale)	Noise interference Habitat degradation Entanglement Vessel disturbance and strike

2.3.1.3.1 Pinnipeds

Pinnipeds are a widely distributed and diverse group or carnivorous, fin-footed, semiaquatic marine mammals. They comprise the families Odobenidae (i.e. walrus), Otariidae (i.e. the eared seals, such as sea lions and fur seals), and Phocidae (i.e. the earless or true seals).

There are three pinniped species (or species habitat) that may occur within the DA; this includes species classified as threatened and migratory. The type of presence varies between species, and includes important behaviours (e.g. breeding) for some species (Table 2-35) (DoEE, 2019b, DoEE, 2019l, DoEE, 2019m).

There are 10 established breeding colonies of the Australian fur seal, which are restricted to islands in the Bass Strait; six occurring off the coast of Victoria and four off the coast of Tasmania (Kirkwood et al., 2010; Pemberton & Kirkwood 1994; Warneke, 1995). Australian fur seals breed during the summer months, with pups born from late October to late December. The closest colonies of the Australian fur seal are located at Gabo Island, Kanowna Island (off Wilson's Promontory) and The Skerries, which is home to a major Australian fur seal breeding colony with an estimated population of 11,500, representing approximately 12% of the national population. Between feeding trips seals return to land to rest, for example at the resting site at Cape Conran.

Satellite tracking of seals from both Kanowna Island and The Skerries, and reports from offshore facilities within the Gippsland Basin Exclusion Zone near the shore show that Australian fur seals commonly occur in the vicinity of these facilities (Arnould & Kirkwood, 2008) and commonly rest on these structures.

The New Zealand Fur-seal (long-nosed Fur seal) and the Australian Fur-seal have the widest range of the pinnipeds, occurring in coastal regions from South Australia through to New South Wales. While breeding for the New Zealand Fur-seal does occur along the coasts of Victoria and southern Tasmania (Figure 2-34), the main breeding sites (accounting for over 80% of the national population) are located further east in Western and South Australia (TSSC, 2017; Kirkwood et al., 2009; DSEWPaC, 2012c). Conversely, the main breeding locations for the Australian Fur-seal are typically on islands within Bass Strait (Figure 2-33) (DoEE, 2017n; Kirkwood et al., 2010). New Zealand Fur-seal breeding colonies are typically found in rocky habitat with jumbled boulders; Australian Fur-seal prefer flatter rocky shelves (Shaughnessy, 1999). Colonies for both species are typically occupied year-round, with greater activity during breeding seasons (Shaughnessy, 1999; DoEE, 2017n). Numbers of Australian Fur-seals on Montague Island (New South Wales), fluctuate through the year, with peak numbers occurring in September and October; this reflects the northward migration over the winter, and the subsequent return to the breeding colonies of the Bass Strait in late spring (DoEE, 2017n). The Australian and New Zealand Fur-seals have been recorded using Beware Reef as a haul-out site (Parks Victoria, 2017b).

The Australian Sealion (*Neophoca cineria*) is a listed vulnerable species which is endemic to South Australia, and is found from Kangaroo Island, South Australia, to the Houtman Abrolhos Islands in Western Australia. Breeding colonies occur on islands or remote sections of coastline and biologically important areas occur outside the bounds of the DA (refer Figure 2-35). Lone or small numbers of animals will regularly visit known haul-out sites and occasionally visit other locations. The species has been sighted at over 200 locations and is known to occur within the DA (DoEE, 2019z). The Australian sea-lion uses a variety of habitats when onshore, including exposed islands and reefs, rocky terrain, sandy beaches and vegetated fore dunes and swales. They also use caves and deep cliff overhangs as haul-out sites or breeding habitat. Australian sea-lions are benthic foragers feeding on a wide variety of prey including fish, cephalopods and crustaceans (Gales, 2008). Females forage on the continental shelf, with the majority of diving occurring at 40–80 metres. Young sealions (as young as 7 months old) have been observed foraging at depths of 60m, up to 10km from birth colony (TSSC, 2010).

Table 2-35 Marine mammal (pinniped) species or species habitat that may occur within the DA (DoEE, 2019b, DoEE, 2019l, DoEE, 2019m)

Scientific Name	Common Name	Threatened Species	Migratory Species	Listed Marine Species	BIA	Type of Presence
Arctocephalus forsteri	New Zealand Fur-seal			✓		MO
Arctocephalus pusillus	Australian Fur-seal			✓		BKO
Neophoca cinerea	Australian Sealion	V		✓		KO
Threatened Species: V - Vulnerable *Biologically*	*Type of Presence*: *MO* *Species or species habitat may occur within the area* *BKO* *Breeding known to occur within the area*					

Important Areas:	*KO* *Species or species habitat known to occur within the area*

Table 2-36 Key threats and management actions for threatened marine mammal (pinniped) species or species habitat that may occur within the DA

Common Name	Conservation Advice or Recovery Plan	Key Threats (relevant to petroleum activities)
Australian Sealion	Commonwealth Listing Advice on Neophoca cinerea (Australian Sea-lion)	Habitat degradation including oil spills, pollution and toxins

Figure 2-33 Known breeding colonies for the Australian Fur-seal (PINP, 2019)

Figure 2-34 Historic (square icon) and current (circle icon) breeding colonies for the New Zealand Fur-seal (*Kirkwood et al., 2009*)

Figure 2-35 Biologically important areas for Australian Sealion (NCVA, 2019)

2.3.1.3.1 Sirenia

The dugong is the only species in the Family Dugongidae and one of four species in the Order Sirenia. It is most closely related to Steller's Sea Cow (Hydrodamalis gigas), which is extinct (Marsh et al. 2002).

The dugong or its habitat may occur in the north- eastern region of the DA (Table 2-37) (DoEE, 2019b, DoEE, 2019l, DoEE, 2019m). Biologically important areas for the dugong are in the north-west of Australia and do not occur in the DA. Dugongs occur in coastal and inland waters from Shark Bay in Western Australia (25° S) across the northern coastline to Moreton Bay in Queensland (27° S) (Marsh et al. 2002, 2011a). The winter range includes about 24 000 km of Australia's coast, which represents about 19% of the global extent of occurrence along coastline habitats (Marsh et al. 2011a). Stranded dugongs have been recorded as far south as ~36.5° S on the east coast, with occasional sightings south to 32–33.5° S (Newcastle region) in summer. In NSW the dugongs were sighted in coastal and estuarine waters around Wallis Lake, Port Stephens, Lake Macquarie and Brisbane Water in the summer of 2002/2003 (Allen et al., 2004). These areas are associated with some of the largest seagrass beds in New South Wales, some of which contain the Halophila seagrass species. The presence of dugongs in these areas at this time coincided with warm water temperatures (>18 °C).

Table 2-37 Marine mammal (sirenia) species or species habitat that may occur within the DA (DoEE, 2019b, DoEE, 2019l, DoEE, 2019m)

Scientific Name	Common Name	Threatened Species	Migratory Species	Listed Marine Species	BIA	Type of Presence
Dugong dugon	Dugong		✓	✓		MO
Threatened Species: *Biologically Important Areas:*	*Type of Presence:* *MO Species or species habitat may occur within the area*					

2.3.1.4 Marine Reptiles - Turtles

Adult marine turtles spend the majority of their lives in the ocean, typically only coming onshore to nest. Females can lay (on average) between two and six clutches per season (DoEE, 2017g); with the period between clutches known as the internesting period. Female turtles typically remain close to the same nesting site during an internesting period. Egg incubation varies between species, but is typically approximately two months (DoEE, 2017g). Hatchlings disperse into oceanic currents, and the juveniles will stay in pelagic waters until large enough to settle into coastal feeding habitats. Leatherback Turtles are an exception to these general patterns, often exhibiting larger internesting zones, and travelling vast distances to forage rather than settling in a coastal habitat (DoEE, 2017g). Flatback Turtles also lack an oceanic phase and remain in the surface waters of the continental shelf.

There are five marine turtle species (or species habitat) that may occur within the DA; this includes species classified as threatened and migratory (Table 2-38) (DoEE, 2019b, DoEE, 2019l, DoEE, 2019m). A list of the conservation advice and/or recovery plans, with relevant management actions, is shown in

Table 2-39. The type of presence varies between species, and includes important behaviours (e.g. foraging, breeding) for some species.

The Loggerhead Turtle has a global distribution throughout tropical, sub-tropical and temperate waters; and in Australia typically occurs in the waters of coral and rocky reefs, seagrass beds, or muddy bays throughout eastern, northern and western Australia (DoEE, 2017i). Loggerhead Turtles are carnivorous, feeding primarily on benthic invertebrates. While the species has a broad foraging range throughout Australian waters, nesting is known to occur (from two different genetic stocks) on sandy beaches on the central western and eastern coasts (Figure 2-36) (DoEE, 2017i). The eastern Australian population is smaller than the western Australian population; and has also undergone a decline from approximately 3,500 nesting females in 1977, to approximately 500 nesting females in 2000 (DoEE, 2017i). No nesting or internesting critical habitat, or BIAs, have been identified for the Loggerhead Turtle within the DA.

Green Turtles are found in tropical and subtropical waters throughout the world; usually occurring within the 20°C isotherms, although individuals can stray into temperate waters (DoEE, 2017j). Within Australia, Green Turtles typically nest, forage and migrate across tropical northern Australia (Figure 2-36) (DoEE, 2017j). No nesting or internesting critical habitat, or BIAs, have been identified for the Green Turtle within the EGBPA. The total Australian population of Green Turtles is approximately 70,000 individuals, with approximately 8,000 of these found in the Southern Great Barrier Reef area. Adult Green Turtles consume mainly seagrass and algae, although they will occasionally eat mangroves, fish-egg cases, jellyfish, and sponges; juvenile Green Turtles are typically more carnivorous, and will also consume plankton during their pelagic stage (DoEE, 2017j).

The Leatherback Turtle has the widest distribution of any marine turtle, occurring in tropical to sub-polar oceans (TSSC, 2008). In Australia, the Leatherback Turtle has been recorded foraging in all Australian states, but no large nesting populations have been recorded (Figure 2-36) (TSSC, 2008). The Leatherback Turtle is a highly pelagic species, venturing close to shore mainly during the nesting season (DoEE, 2017k). Adults feed mainly on pelagic soft-bodied creatures such as jellyfish, tunicates, salps, squid (DoEE, 2017k). No nesting or internesting critical habitat, or BIAs, have been identified for the Leatherback Turtle within the DA.

The Flatback Turtle is found in tropical waters of northern Australia, and is one of only two species of sea turtle without a global distribution (DoEE, 2017l). All known nesting locations for this species are within Australia (Figure 2-36) (DoEE, 2017l). No nesting or internesting critical habitat, or BIAs, have been identified for the Flatback Turtle within the DA. Flatback Turtles are primarily carnivorous, feeding on soft-bodied invertebrates; juveniles eat gastropod molluscs, squid, siphonophores. Limited data also indicate that cuttlefish, hydroids, soft corals, crinoids, molluscs and jellyfish may also form part of their diet (DoEE, 2017l).

The Hawksbill Turtle is found in tropical, subtropical and temperate waters all around the world (DoEE, 2017m). No nesting or internesting critical habitat, or BIAs, have been identified for the Hawksbill Turtle within the DA. Hawksbill Turtles are omnivorous, feeding on sponges, hydroids, cephalopods (octopus and squid), gastropods (marine snails), cnidarians (jellyfish), seagrass and algae (DoEE, 2017g, 2017m). During their pelagic phase (while drifting on ocean currents), young Hawksbill Turtles will feed on plankton. Hawksbill Turtles that forage on the Great Barrier Reef migrate to neighbouring countries including Papua New Guinea, Vanuatu, and the Solomon Islands; it is not known from which stock Hawksbill Turtles foraging in New South Wales originate (DoEE, 2017g).

Table 2-38 Marine Reptile turtle species or species habitat that may occur within the DA (DoEE, 2019b, DoEE, 2019l, DoEE, 2019m)

Scientific Name	Common Name	Threatened Species	Migratory Species	Listed Marine Species	BIA	Type of Presence
Turtles						
Caretta caretta	Loggerhead Turtle	E	✓	✓		BLO
Chelonia mydas	Green Turtle	V	✓	✓		FKO
Dermochelys coriacea	Leatherback Turtle	E	✓	✓		FKO
Eretmochelys imbricata	Hawksbill Turtle	V	✓	✓		FKO
Natator depressus	Flatback Turtle	V	✓	✓		FKO
Threatened Species: *V Vulnerable* *E Endangered*	*Type of Presence:* *FKO Foraging, feeding or related behaviour known to occur within the area* *BLO Breeding likely to occur within the area*					

Table 2-39 Key threats and management actions for threatened marine reptile species or species habitat that may occur within the DA

Common Name	Conservation Advice or Recovery Plan	Key Threats (relevant to petroleum activities)
Loggerhead Turtle	Recovery Plan for Marine Turtles in Australia, 2017-2027	Marine debris Chemical discharge Light pollution Habitat modification Vessel disturbance Noise interference
Green Turtle		
Hawksbill Turtle		
Flatback Turtle		
Leatherback Turtle	Recovery Plan for Marine Turtles in Australia, 2017-2027 Approved Conservation Advice for *Dermochelys coriacea* (Leatherback Turtle)	As above

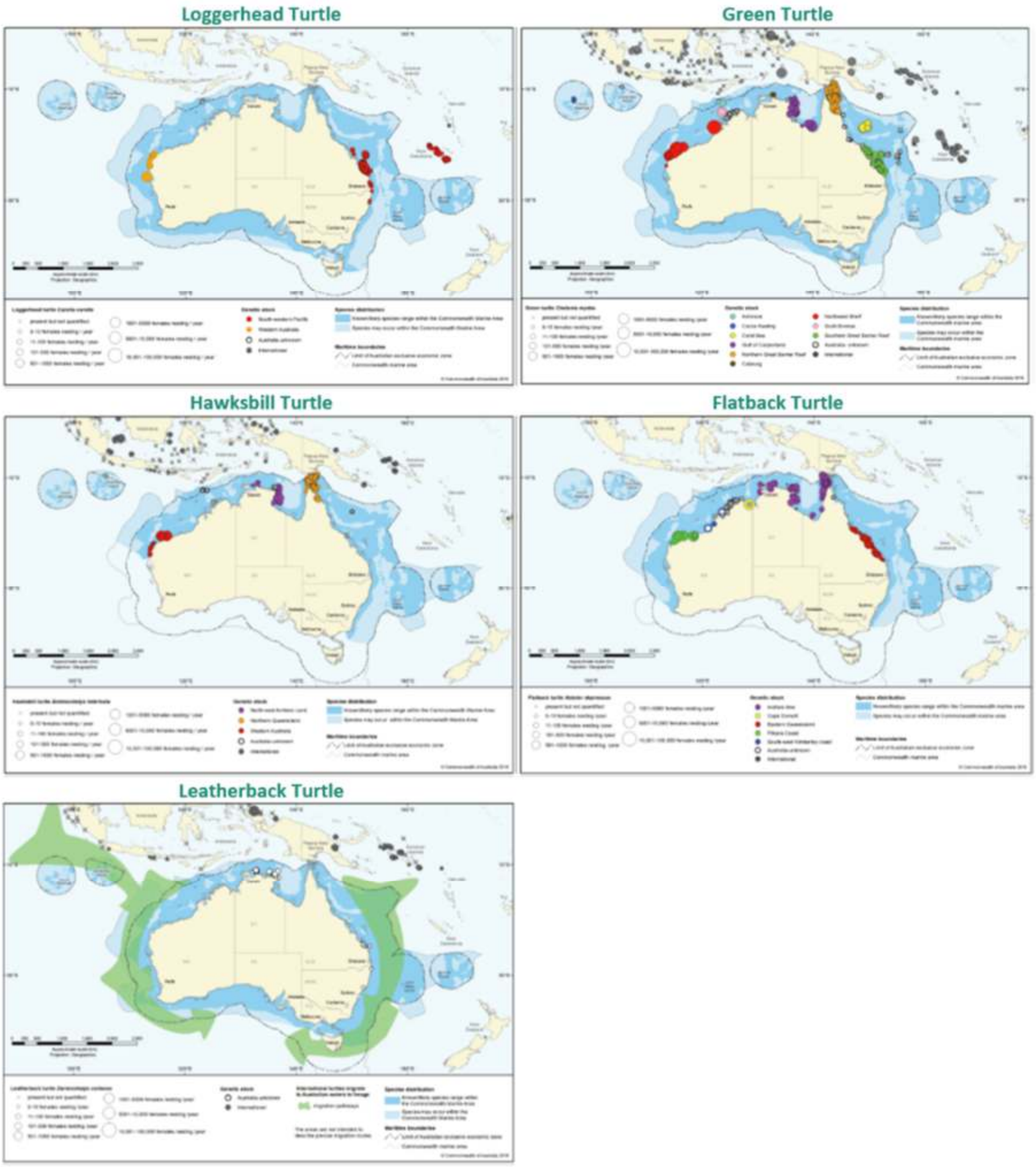


Figure 2-36 Marine turtle species distribution and nesting sites

2.3.1.5 Marine Reptiles - Snakes

The Elegant Seasnake is widespread in tropical Australia. This includes Queensland, Western Australia and the Northern Territory (Dell & Fry 2003) and it may occur in the DA (DoEE, 2019b, DoEE, 2019l, DoEE, 2019m). Its distribution extends from Shark Bay in Western Australia to Moreton Bay in Queensland. Sea snakes are air breathing reptiles and must come to the surface to breathe, however they can spend from 30 minutes to two hours diving between breaths. They also carry out cutaneous respiration whereby oxygen diffuses from sea water across the snake's skin into the blood. The waste product, carbon dioxide, is then diffused out of the snake's body, via the skin. The Elegant Seasnake uses a variety of marine and estuarine habitats, including sandy substrates in less than two metres of water to depths of approximately 80 m but is also sometimes found in freshwater habitats. They feed on benthic (bottom-dwelling) fish such as Catfish, burrowing eels, Whiting, Gobies and Squid. Their main threat is bycatch from trawling, no specific conservation or listing advice exists for the species (DoEE, 2019z).

The Yellow-bellied sea snake is the most widely distributed of all sea snake species in Australia, while there have not been any recent surveys, it is found in most waters except for the colder southern coastline. The population living near the central coast of New South Wales was thought to be permanent and breeding at the time of the survey in 1975. It is the most pelagic of all known sea snakes, occurring in the open waters well away from coasts and reefs. Fish are attracted to it as it rests motionless on the surface of the sea (like an inanimate object) and are subsequently caught with a sudden lunge. The main threat to the species is through bycatch from trawling. No specific conservation or listing advice exists for the species (DoEE, 2019aa). This snake species may occur in the DA.

Table 2-40 Marine Reptile snake species or species habitat that may occur within the DA (DoEE, 2019b, DoEE, 2019l, DoEE, 2019m)

Scientific Name	Common Name	Threatened Species	Migratory Species	Listed Marine Species	BIA	Type of Presence
Hydrophis elegans	Elegant Seasnake			✓		MO
Pelamis platurus	Yellow-bellied Seasnake			✓		MO
Threatened Species: *Biologically Important Areas*:	*Type of Presence*: *MO Species or species habitat may occur within the area*					

2.3.2 Plankton Species

Plankton species, including both phytoplankton and zooplankton, are a key component in oceanic food chains.

Phytoplankton are autotrophic planktonic organisms living within the photic zone that spend either part or all of their lifecycle drifting with the ocean currents. They and are the start of the food chain in the ocean (McClatchie et al., 2006). Phytoplankton communities are largely comprised of protists, including green algae, diatoms, and dinoflagellates (McClatchie et al. 2006). Phytoplankton communities are largely comprised of protists, including green algae, diatoms, and dinoflagellates (McClatchie et al. 2006). There are three size classes of phytoplankton: microplankton (20-200 µm), nanoplankton (2-20 µm) and picoplankton (0.2-2 µm). Diatoms and dinoflagellates are the most abundant of the micro and nanoplankton size classes, and are generally responsible for the majority of oceanic primary production (McClatchie et al. 2006). Phytoplankton are dependent on oceanographic processes (e.g. currents and vertical mixing), that supply nutrients needed for photosynthesis. Thus, phytoplankton biomass is typically variable (spatially and temporally), but greatest in areas of upwelling, or in shallow waters where nutrient levels are high. Seasonal variation in phytoplankton (via chlorophyll-a concentrations) has been demonstrated in Australian waters from the analysis for MODIS-Aqua sensor imagery (Figure 2-37).

Phytoplankton biomass ranges across Bass Strait (integrated over 0-100m depth), from about 1.6 µg chlorophyll *a*/L from shallow to 0.1µg/L in deeper waters (Gibbs *et al*. 1991). Phytoplankton biomass rapidly drops off with water depth, to about 0.1 µg/L below 100m, due to diminishing light penetration.

Zooplankton is the faunal component of plankton, comprised of small protozoa, crustaceans (such as krill) and the eggs and larvae from larger animals. More than 170 species of zooplankton have been recorded in eastern and central Bass Strait, but it has been found that seven dominant species make up 80% of individuals (Esso, 2009). Zooplankton biomass is higher in shallow waters of Bass Strait (16.1 mg/m^3 dry weight off Mallacoota and 15.5 mg/m^3 off Seaspray), dropping to between 1.2 – -2.1 mg/m^3 further offshore (integrated over the top 50 m of the water column), near the deepest regions of the EGBPA (Gibbs *et al*. 1991). As with phytoplankton, zooplankton biomass appears to be higher in the shallow waters of the shelf. Copepods dominate the species encountered (Watson & Chaloupka, 1982).

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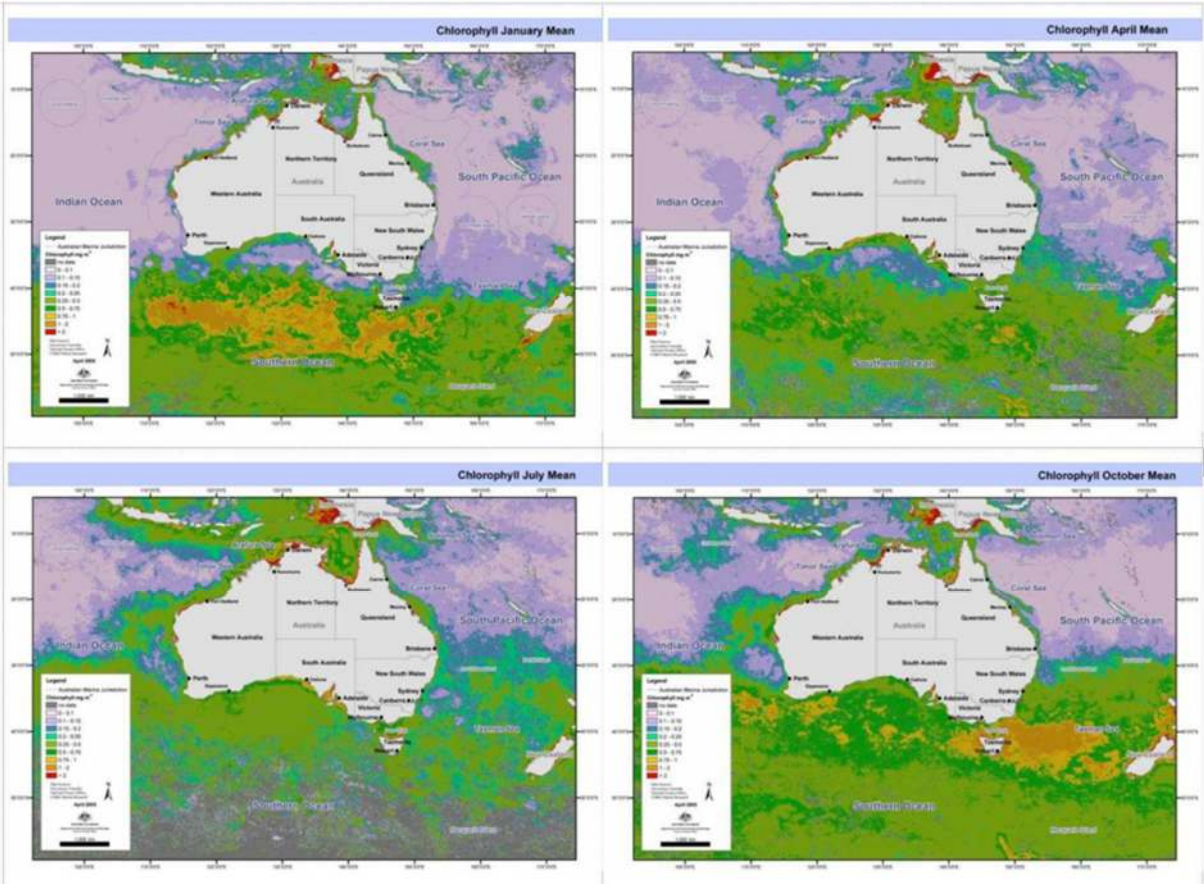


Figure 2-37 Seasonal phytoplankton growth from MODIS ocean colour composites (McClatchie et al. 2006)

2.3.3 Benthic Habitat

2.3.3.1 Bare Substrate

Unvegetated bare substrate is a widespread habitat in both intertidal and subtidal areas, particularly in areas beyond the photic zone. The biodiversity and productivity can vary depending upon depth, light, temperature and the type of sediment present.

In the Gippsland Basin, seabed material is predominantly calcium carbonate comprised of calcarenite marls and marine shales (Esso, 2009). Folk sediment classification of the samples taken at the West Kingfish and Tuna platforms describe the sediments as ranging between slightly muddy, gravelly ((m)/g/S) and muddy, gravelly sand (m/g/S) with two locations at Tuna being classed as gravelly sand (g/S) (Cardno, 2019). Similarly, the West Barracouta geophysical survey classified the seabed as featureless with consistently medium to high variable reflectivity, with backscatter characteristics indicative of fine to coarse calcerous sand with shells (DWSS, 2018). The 2009 Snapper study found that the seabed surrounding the platform is entirely comprised of soft sediments with no areas of hard substrate of rocky reef (Coffey, 2009). Generalised cross section taken from the Blackback Site survey report and accompanying representative sediment photographs indicate that the seabed sediments at the Blackback region are dense fine to medium grained siliceous carbonate sand (carbonate content ~80%) with some silt and shell debris. The samples from the canyon areas had a higher proportion of gravel and shell fragments relative to the slope and ridge samples.

The Gippsland Basin is composed of a series of massive sediment flats, interspersed with small patches of reef, bedrock and consolidated sediment. The sandy plains are only occasionally broken by low ribbons of reef; however, these reefs do not support the large brown seaweeds characteristic of many Victorian reefs, but instead are inhabited by resilient red seaweeds and encrusting animals that can survive the sandy environment (Esso, 2009).

The benthic fauna present on the soft sediment can be broadly divided into two groupings:

- The epibenthos which includes sessile species such as sponges and bryozoans, hydroids, ascidians, poriferans and mobile fauna including hermit crabs, sea stars and octopus;
- The infauna which includes a diverse range of species such as amphipods, shrimps, bivalves, tubeworms, small crustaceans, nematodes, nemerteans, seapens, polychaetes and molluscs (Parry et al. 1990).

Many of these species are burrowing organisms that cause moderate bioturbation (Edgar, 2001).

Scientific surveys have shown that some shallow Victorian sandy environments have the highest levels of animal diversity in the sea ever recorded (ParksVic, 2016). In the area around the Ninety Mile Beach Gippsland more than 600 different marine animal species, many of them very small, have been found within an area of 10 m2 (ParksVic, 2016). This high species richness was a major factor in the creation of a Marine National Park on the Ninety Mile Beach (ParksVic, 2017c). The subtidal sand invertebrate fauna are dominated by small animals, mostly crustaceans, molluscs, echinoderms and polychaetes (Plummer et al. 2003, Bax and Williams, 2001).

Parry et al. (1990) found high diversity and patchiness of benthos sampled off Lakes Entrance, where a total of 353 species of infauna was recorded. Crustaceans (53%), polychaetes (32%) and molluscs (9%) dominated sample results. A significant site for the listed opistobranch mollusc (seaslug) Platydoris galbana is located off Delray Beach, 2 km south-west of Golden Beach on the shoreline (O'Hara & Barmby, 2000). An ROV seabed survey was conducted following drilling at the Snapper operational area in 2009 (Coffey 2010) and a seabed monitoring program conducted near West Tuna in 1999 (URS, 2000) confirmed that polychaetes and crustaceans were the most abundant infaunal taxa present in the seabed sediments.

This results were further supported by two studies conducted in 2018 for Esso. The first, an in-situ sediment quality and infauna sampling program conducted at West Kingfish and Tuna (including reference locations), confirmed that polychaetes, crustaceans and molluscs were the most abundant groups of taxa at all the sampled locations. The dominance (in terms of abundance) of particular taxa varied among zones and reference locations at each platform and between platforms. The benthic infauna assemblages were diverse with a range of taxa having a substantial contribution to the overall assemblage structure. The study investigated the drivers for potential influence on the entire assemblage of benthic infauna and found that it was the proportion of gravel (> 2.00 mm) particles in the sediment that was the most significant influencing factor. Figure 2-38 shows the proportion of the assemblage represented by the Crustacea, Polychaeta, Mollusca, Echinodermata and the Order groups for ‘Other Worm Phlya’ and ‘Other Phyla’ for the West Kingfish sampling and Figure 2-39 shows the proportion of the those assemblages for the sampling conducted at Tuna. The graphs show that the proportions of these assemblages were generally consistent between locations at the West Kingfish platform, however there were significant differences in the benthic infauna assemblages between locations at Tuna platform. Analysis indicated these differences were driven by changes in the physical characteristics of the environment, for example grain size and hydrodynamic differences between locations (Cardno, 2019).

The second 2018 Esso baseline study for the West Barracouta project found similarities in the dominant taxa throughout the survey locations which included annelids (polychaetes), crustaceans (amphipoda, isopoda and decapoda) and molluscs (gastropods and bivalves). This study also found that there was dissimilarity between infauna groups and these were variable throughout the survey area, likely reflecting the heterogenous nature of the survey area (MST, 2018). Figure 2-40 shows the taxa-classed abundance of infauna at each of the monitoring sites at West Barracouta[3].

[3] The variation in abundance seen between the West Kingfish/Tuna studies and the West Barracouta study is due to the sample sizes taken. West Kingfish/Tuna sample size averaged 2.3L. West Barracouta sample size was 0.66m^2

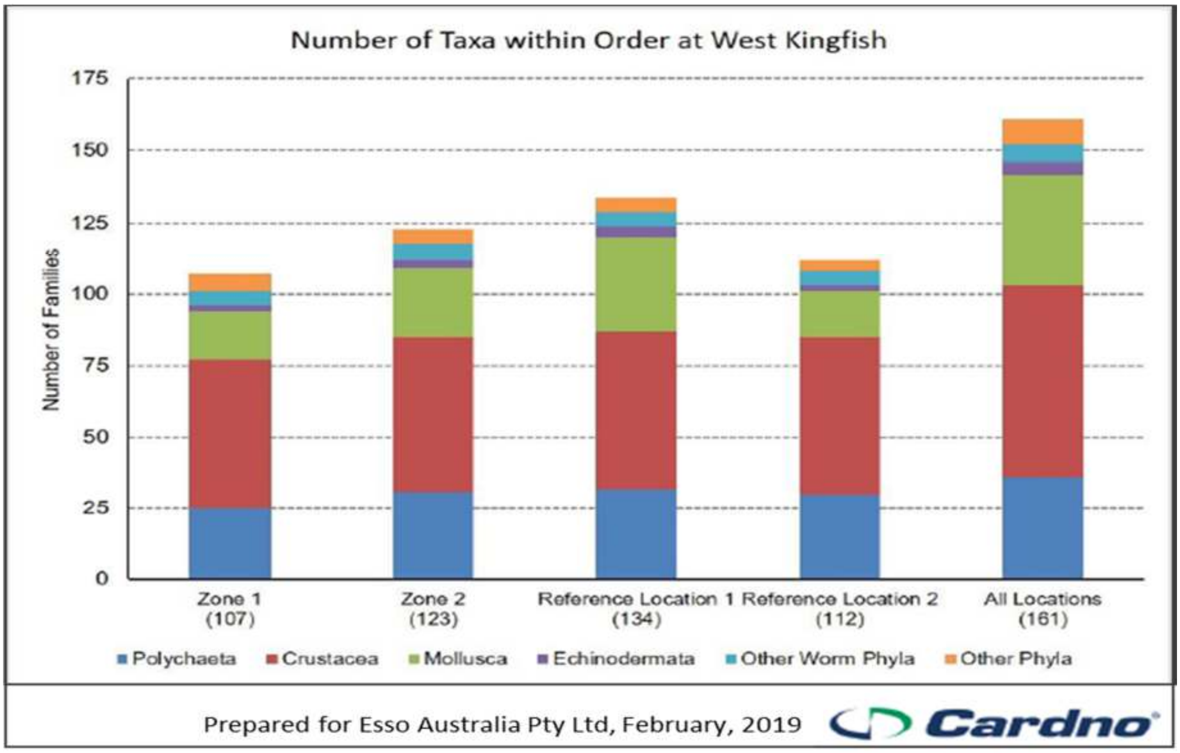


Figure 2-38 Number of taxa sampled at West Kingfish platform (Zones 1 and 2) and reference locations (Locations 1 and 2). Values in parentheses indicate the total number of taxa sampled.

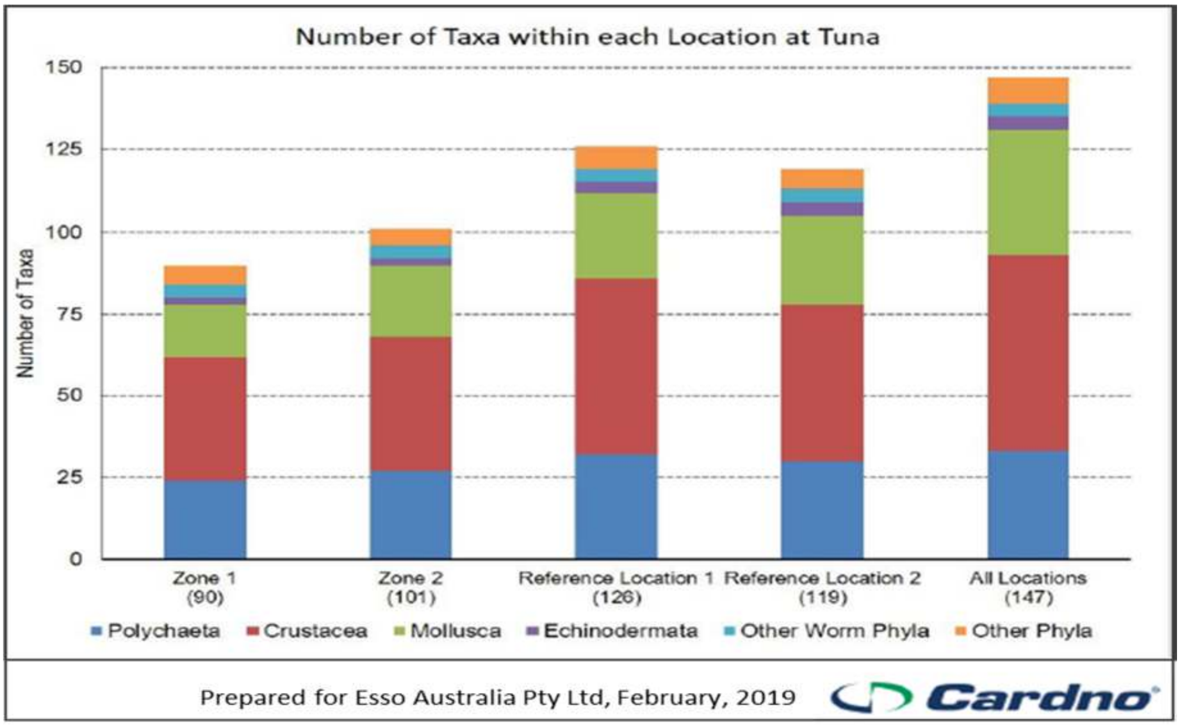


Figure 2-39 Number of taxa sampled at Tuna platform (Zones 1 and 2) and reference locations (Locations 1 and 2). Values in parentheses indicate the total number of taxa sampled.

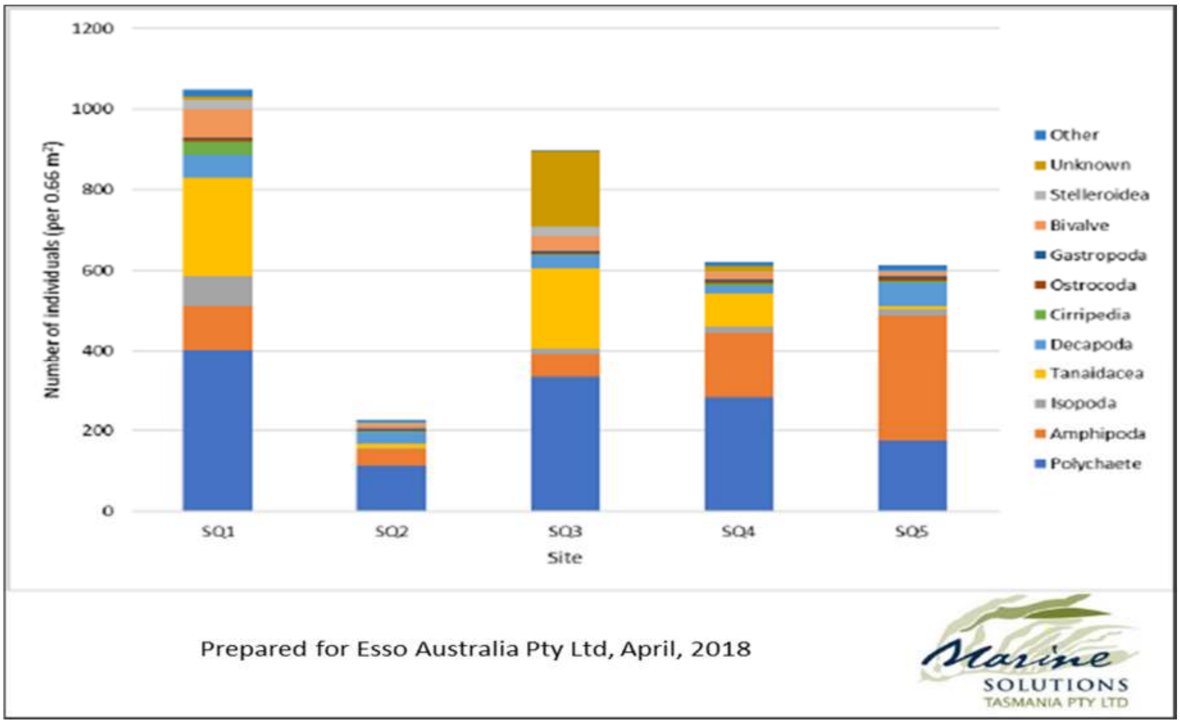


Figure 2-40 Taxa classed abundance of infauna at West Barracouta monitoring

The studies above suggest there is a consistent variation in the types and abundance of benthic infaunal species forming assemblages across the across Bass Strait. Though the benthic infauna taxa collected during this study are similar to those previously recorded, the contribution of each one to the overall assemblage was different in the majority of cases. The differences in the contribution of individual taxa to the overall assemblage between studies could have resulted from a number of natural factors including habitat heterogeneity (mirco and macro-scale), depth and sediment characteristics (URS 2000, Marine Solutions 2018) and temporal differences between sampling periods (Cardno, 2017). This is consistent with the 2004 study of Sediments and Benthic Biota of Bass Strait (GA, 2004), which concluded that it is not possible to classify the biological assemblages into a scheme that can be mapped across Bass Strait. The study emphasized that assemblages can have different distribution patterns to species and that environmental gradients rather than discrete bioregions or habitats better explain the biotic patterns observed in the sea bed of Bass Strait. Analysis of physical variables, derived from data collected on previous surveys by Geoscience Australia and supplemented by more recent data, show that longitude and depth are also important factors in explaining the biological diversity (GA, 2004).

The introduced New Zealand screw shell (Maoricolpus roseus) is present in eastern Bass Strait and is known to form extensive and dense beds on the sandy seafloor spreading to the 80 m isobath off eastern Victoria and NSW (Patil et al. 2004).

Larger animals found in these soft sediment environments in Victoria have included Smooth Stingray (Dasyatis brevicaudata), Pipi (Plebidonax deltoids), Dumpling Squid (Euprymna tasmanica), Common Stargazer (Kathetostoma leave) and Heart Urchin (Echinocardium cordatum) (Parks Victoria, 2016).

Soft sediment habitat is the dominant habitat within the EGBPA.

2.3.3.2 Seagrass

Seagrasses are marine flowering plants, with about 30 species found in Australian waters (Huisman 2000). There is a distinction between tropical and temperate seagrasses, and the approximate latitude for the change occurs at Moreton Bay (southern Queensland). The dominant temperate species in the DA are Amphibolis antarctica, Halophila australis, Heterozostera tasmanica, Posidonia australis, Posidonia angustifolia and Zostera muelleri (Kirkham 1997). Seagrasses generally grow in sediments in intertidal and shallow subtidal waters where there is sufficient light, and are common in sheltered coastal areas such as bays, lees of island and fringing coastal reefs (DEWR, 2006; McLeay et al., 2003; Rogers et al., 2013; McClatchie et al. 2006).

Seagrass meadows are important in trapping and stabilising sediments, as seagrass leaves baffle wave action and reduce water movement to the extent that fine suspended particles settle out and are trapped (Edyvane, 1999). Seagrass meadows also provide habitat and nursery grounds for juvenile fish and invertebrates, enhance biodiversity and promote primary production (Huisman 2000; Rogers et al. 2013; Kirkman 1997).

Known areas of seagrass within the DA include Corner Inet and Lakes Entrance in Victoria, and numerous inlets and estuaries along the NSW coast (Figure 2-41) (Lucieer et al., 2017). While seagrass meadows are present throughout this region, the proportion of seagrass habitat is not high compared to the rest of Australia, in particular with parts of South Australia and Western Australia) (Kirkham, 1997).

Seagrasses are highly productive habitats that occur on intertidal flats and in shallow coastal waters worldwide from arctic to tropical climates. Water temperature, light penetration, sediment type, salinity, and wave or current energy control seagrass distribution. Seagrasses provide breeding and nursery grounds for fish and wildlife. Seagrasses are used by fish and shellfish as nursery areas.

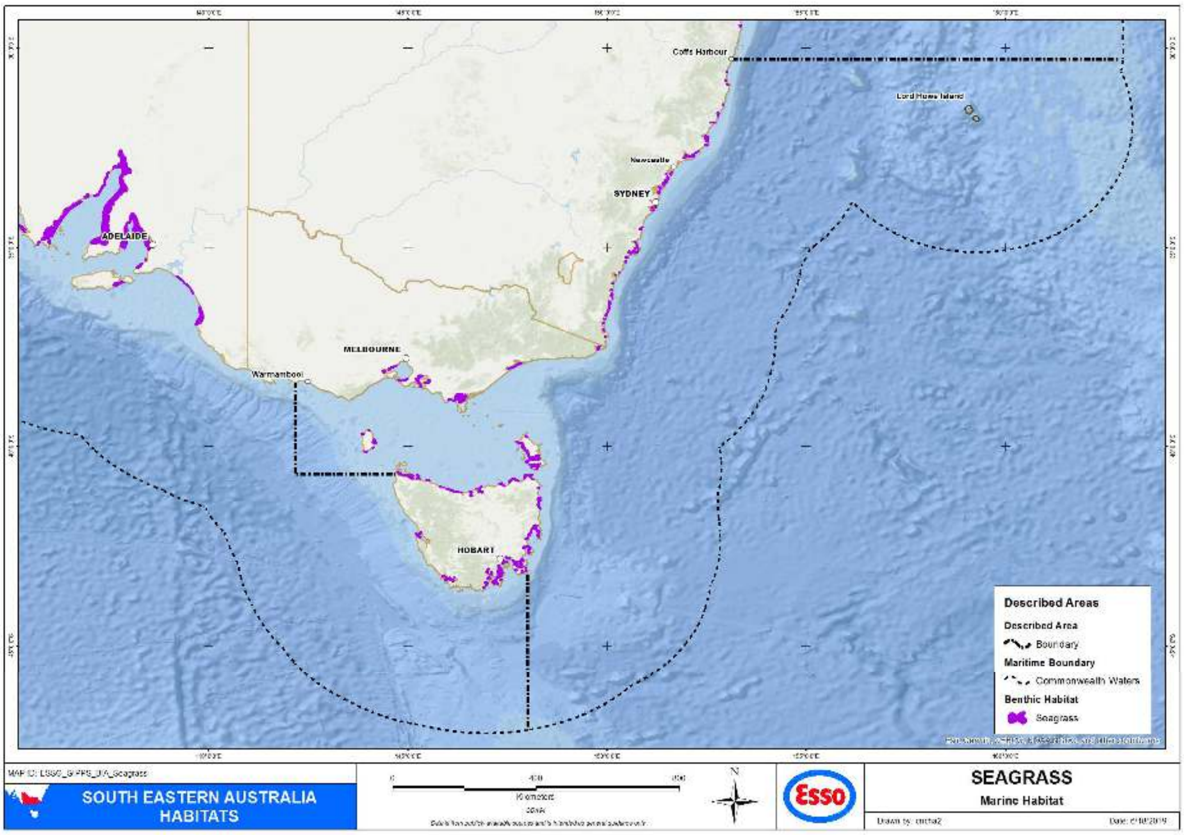


Figure 2-41 Seagrass dominated nearshore habitat within the DA

2.3.3.3 Subtidal Rocky Reefs

This habitat occurs either as extensions of intertidal rocky shores or as isolated offshore reefs and are always submerged. The rocky reefs of southern Australia support a highly endemic marine flora and fauna.

This habitat consists of subtidal substrates composed of rock, boulders, or cobbles, though there can be patches of sand veneer covering a hard bottom. This habitat supports rich, diverse communities of attached and associated algae and animals; often there is little open space. Some of these habitats form a relief (reef or bank) several metres high that attracts a diversity of fish (NOAA 2010). Subtidal rocky reefs provide food and shelter for a wide range of fish and invertebrate species.

Subtidal rocky reefs are scattered along the Gippsland shore, including; Bastion Point, Quarry Beach, Little Rame Head, Long Reef, Wingan Point, The Skerries Special Management Area, Rame Head, Petrel Point, Thurra River, Point Hicks Marine National Park, Pearl Point, Yeerung River Estuary (Intermittently open), Cape Conran (East Cape, Cowrie Bay, Flat Rocks), Beware Reef, Point Ricardo, Ricardo Beach, New Zealand Star Bank.

2.3.3.4 Macroalgae

Macroalgae are multicellular, marine algae, commonly known as seaweed. Macroalgae communities are generally found on intertidal and shallow subtidal rocky substrates as they require a surface to attach themselves to, and can occur throughout Australian nearshore waters. 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). Macroalgae assemblages vary, but Ecklonia radiata and Sargassum sp. are typically common in deeper areas. The principal physical factors affecting the presence and growth of macroalgae include temperature, nutrients, water motion, light, salinity, substratum, sedimentation and pollution (Sanderson, 1997). 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).

Kelps are very large brown algae that grow on hard sub tidal substrates in cold temperate regions. Kelps have a holdfast that attaches to the substrate, a stem-like or trunk-like stipe, and large, flattened, leaf-like blades called fronds. The Giant Kelp Marine Forests are classed as threatened ecological communities. Refer to section 2.2.4.1 for information on giant kelp marine forests.

Macroalgae is not a common dominant habitat within the EGBPA, however known areas include around Gabo Island and within the Bemm River estuary (Figure 2-42) (Lucieer et al., 2017).

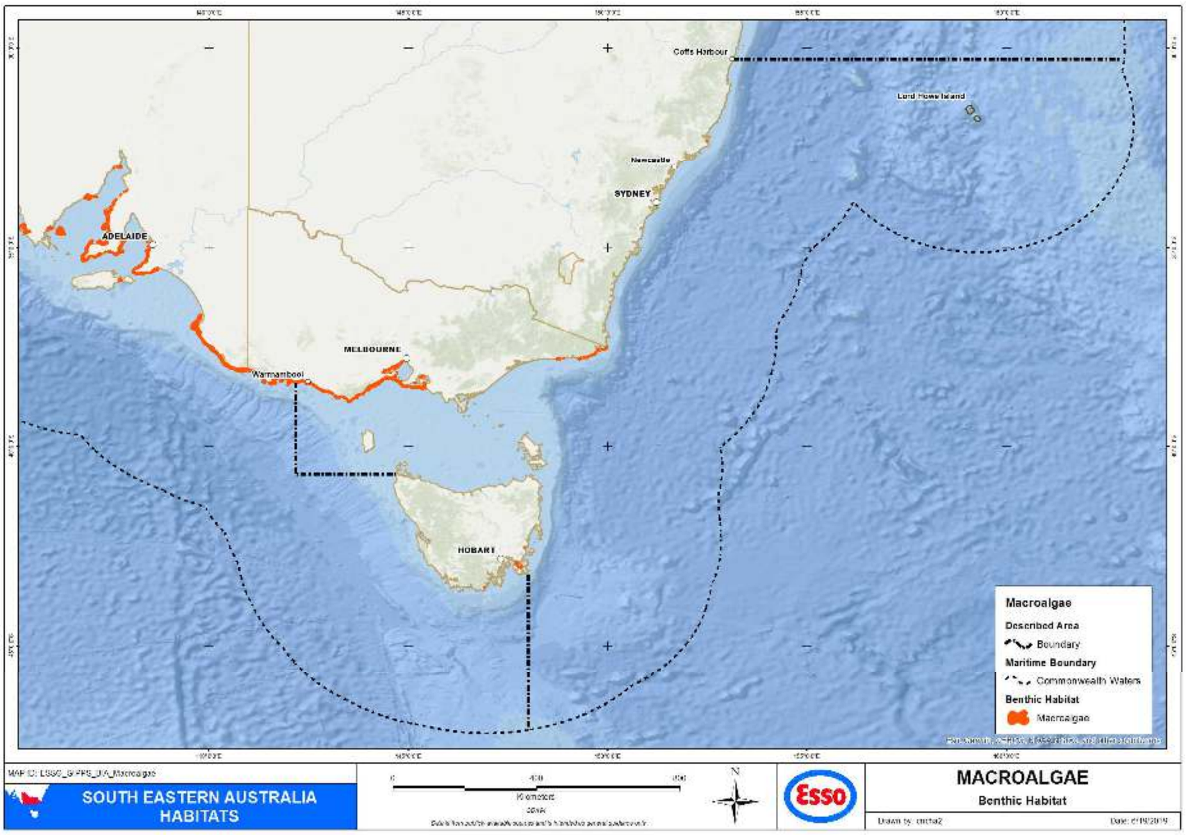


Figure 2-42 Macroalgae dominated nearshore habitat within the DA

2.3.3.5 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 soft corals are found at most depths, including in deeper waters throughout the continental shelf, slope and offslope regions, to well below the limit of light penetration.

There are three factors that appear to drive the spawning of warm water corals – a gradual rise in sea temperature (this triggers the gametes to mature), the lunar cycle, and the diurnal light cycle. As such, the timing of coral spawning events varies around Australia. Large spawning events for Great Barrier Reef corals typically occur four to five days after the full moon in October or November (and occasionally into December). Reproduction methods for cold water corals are not as well understood, 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).

While corals may not occur as a dominant habitat type within the Gippsland sector, their presence has been recorded within the region (e.g. Kent Group Marine Reserve, Freycinet Marine Park, and around Wilsons Promontory). Soft corals are typically present in deeper waters throughout the continental shelf, slope and offslope regions, to well below the limit of light penetration.

Subtidal rocky reefs located along the Gippsland shore include; Bastion Point, Quarry Beach, Little Rame Head, Long Reef, Wingan Point, The Skerries, Rame Head, Petrel Point, Thurra River, Point Hicks Marine National Park, Pearl Point, Yeerung River Estuary (Intermittently open), Cape Conran (East Cape, Cowrie Bay, Flat Rocks), Beware Reef, Point Ricardo and Ricardo Beach.

2.3.3.6 Submarine Canyons

Submarine canyons are abundant features along continental and oceanic island margins that connect continental shelves to deep ocean basins. Because of the physical complexity of canyon habitats, predictions concerning the effects of canyons on diversity are not straightforward since a variety environmental and physical characteristics interact in canyon habitats. The most important driver affecting biodiversity and biomass/abundance patterns in canyons is organic matter input and is mostly related to coastal detrital inputs or pelagic productivity regimes (De Leo et al., 2010).

Seafloor terrain and substrate heterogeneity account for the second most important driver of benthic biodiversity in submarine canyons. One of these factors, sediment grain size, can be considered as a ‘super-parameter’ (Etter and Grassle 1992) since it directly or indirectly reflects local physical energy and sedimentation patterns. At moderate rates of flow and sediment deposition, suspension- and deposit feeding, macrobenthos can be enhanced in abundance and/or diversity in canyons (Vetter and Dayton, 1998), whereas at high rates of flow and sediment accumulation, canyon fauna can become impoverished, yielding low species richness and high dominance by a few tolerant species (Rowe et al. 1982, Gage et al., 1995, Vetter and Dayton, 1998).

While some studies have reported levels of megafaunal biodiversity in canyons rivalling seamounts (Schlacher et al., 2007), in other cases high disturbance rates (Rowe et al., 1982) and absence of stable habitat heterogeneity lead to faunal impoverishment compared to adjacent slope environments (Vetter et al., 2010).

Bass Canyon System

The Bass Canyon is an 80 km long, narrow (10 km wide) and linear, southeast trending flat bottomed canyon located at 3,000–4,000 m depth in the Gippsland Basin (Figure 2-43) (Mitchell et al., 2007). Entering the head of the Bass Canyon at 3,000 m depth are five shelf-breaching tributary canyons and three slope-confined tributary canyons (Mitchell et al., 2007). The Bass Strait canyons are characterised by dense shelf water cascades (Godfrey et al. 1980).

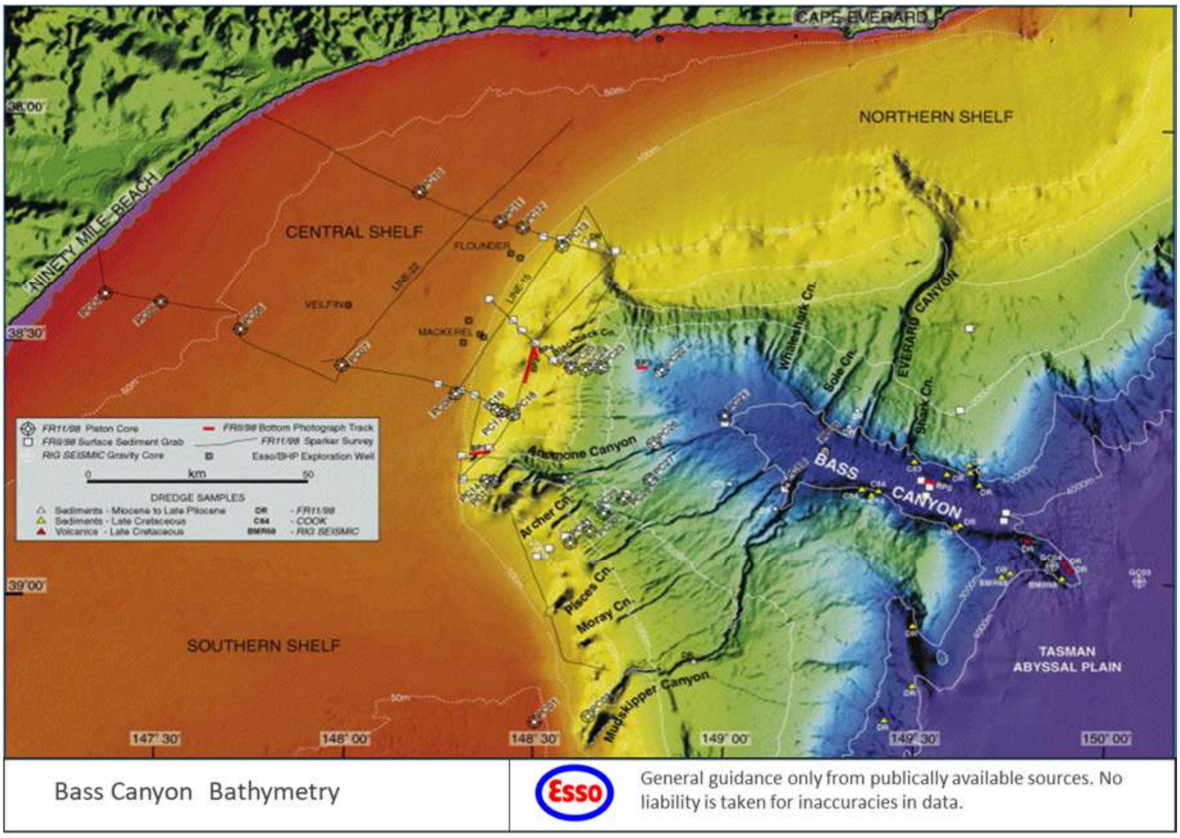


Figure 2-43 Bathymetry of the Bass Canyon

2.3.3.7 Seamounts

Seamounts are also classed as key ecological features. The Seamounts of South and East Tasmania occur in the DA, refer to section 2.2.7.5 for information on seamounts.

2.3.4 Coastal Habitat

A range of shoreline types are represented along the coastal areas within the DA. Figure 2-44 (Griffin et al., 2012) depicts the shorelines in the region and the characteristics of each habitat is described in the sections below.

The coastline, from Wilson’s Promontory in the west to Cape Howe in the east near the NSW border consists mainly of steep sandy beaches and rocky outcrops. The shoreline of the inland waters adjacent to the EGBPA which includes Corner Inlet, the Gippsland Lakes and Mallacoota Inlet consist of sandy beach, salt marsh, mangrove or mudflats (Boon et al., 2010).

The NSW coast consists primarily rocky outcrops with sections of sandy beaches and rocky cliffs. The offshore islands in Bass Strait are characterised by their steep cliffs and rocky shores. These shoreline types are also dominant along the north and east coast of Tasmania.

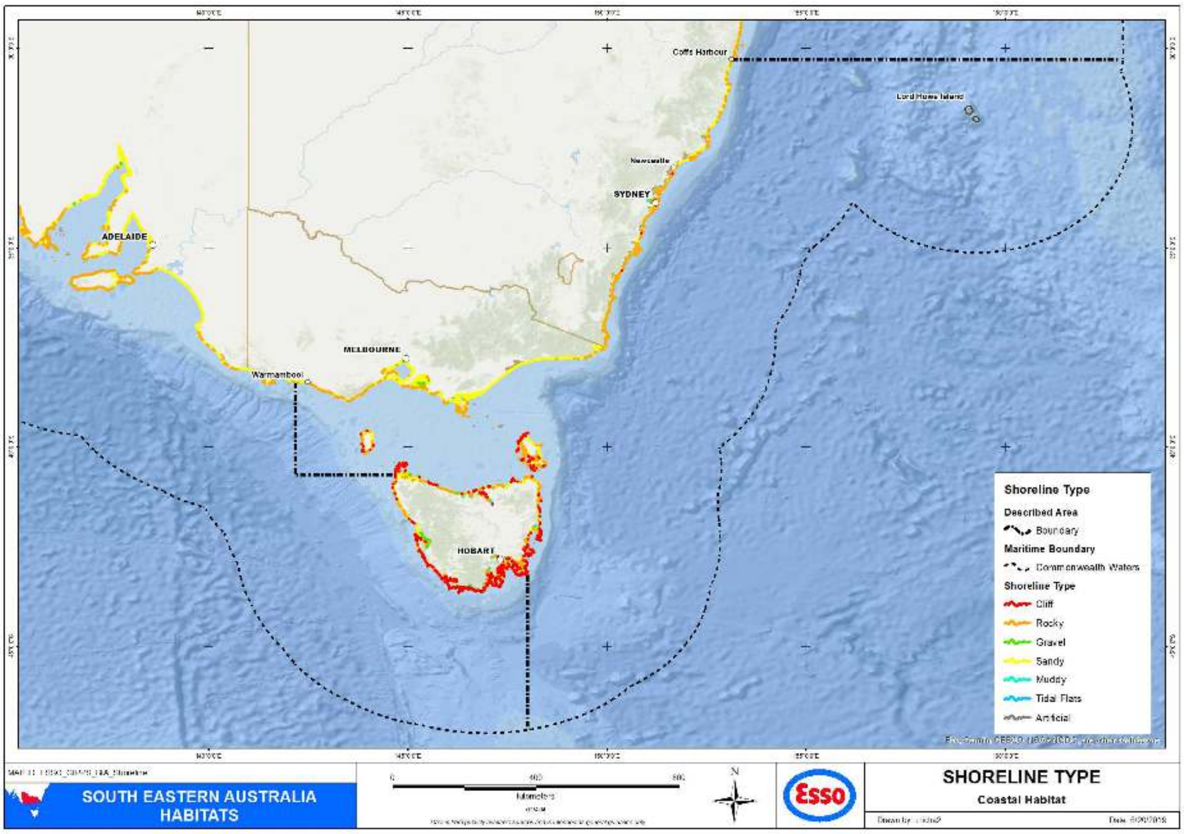


Figure 2-44 Shoreline types within the DA

2.3.4.1 Shoreline (Sandy)

This shoreline type has been defined as beaches dominated by sand-sized (0.063–2 mm) particles, and also includes mixed sandy beaches (i.e. sediments may include muds or gravel, but sand is the dominant particle size).

Sandy beaches are dynamic environments, naturally fluctuating in response to external forcing factors (e.g. waves, currents etc.). Sandy beaches can support a variety of infauna, and provide nesting and/or foraging habitat to shorebirds and seabirds and pinnipeds. Sand particles vary in size, structure and mineral content; this in turn affects the shape, colour and inhabitants, of the beach.

This shoreline type is the most common along the entire Victorian coast, including popular locations such as Ninety Mile Beach (East Gippsland, Victoria) and Squeaky Beach (Wilsons Promontory, Victoria).

2.3.4.2 Shoreline (Rocky)

Sheltered rocky shores are characterized by a rocky substrate that can vary widely in permeability. This shoreline type has been defined as hard and soft rocky shores, including bedrock outcrops, platforms, low cliffs (less than five metres in height), and scarps. Depending on exposure, rocky shores can be host to a diverse range of flora and fauna, including barnacles, mussels, tube building worms, sea squirts (cunjevoi), sea anemones, sponges, sea snails, starfish and algae. Australian fur-seals are also known to use rocky shores for haul-out and/or breeding. Most animals on the intertidal rocky shores are herbivorous molluscs, grazing algae off rock surfaces.

This is a common shoreline type along the southern NSW coast, the islands of Bass Strait, and for smaller areas of Victoria's coast (e.g. Wilsons Promontory). Intertidal rocky shores occur at Bastion Point, Quarry Beach, Shipwreck Creek, Seal Cove, Little Rame Head, Sandpatch Point, Petrel Point, Thurra River, Clinton Rocks, Cloke Rock, Tamboon Inlet and Shelley Beach.

2.3.4.3 Shoreline (Cliff)

The intertidal zone is steep (>30° slope) and narrow with very little width.

Sediment accumulations are uncommon because waves remove debris that has slumped from the eroding cliffs. There is strong vertical zonation of intertidal biological communities. Species density and diversity vary greatly, but barnacles, snails, mussels, polychaetes, and macroalgae can be abundant (NOAA, 2010).

This environment occurs behind Betka Beach and Secret Beach through to Little Rame Head, Sandpatch Point, Wingan Point, The Skerries, Rame Head, Petrel Point, Point Hicks, Clinton Rocks, Tamboon Inlet, Pearl Point, Cape Conran (Needle Rocks, Irvine Rocks, Quincy Rocks Salmon Rocks), and at Ricardo Point.

This is a common shoreline type for the Furneaux Island group in Bass Strait (e.g. Flinders Island, Clarke Island) (Figure 2-44).

2.3.4.4 Muddy- Sheltered Intertidal Flats and Bare Sediment

This shoreline type has been defined as areas with predominantly mud-sized (<0.063 mm) particles, and also includes mixed sediments (e.g. sands, shell or gravel), where the mud fraction is dominant. These areas are also exposed to high tidal variation, including tidal flats, and are often associated with mangrove or saltmarsh environments.

Sheltered intertidal flats are composed primarily of mud with minor amounts of sand and shell. They are usually present in calm-water habitats, sheltered from major wave activity, and frequently backed by marshes like estuaries or bays. The sediments are very soft and cannot support even light foot traffic in many areas. There can be large concentrations of bivalves, worms, and other invertebrates in the sediments. They are heavily used by birds for feeding (NOAA 2010).

Sheltered intertidal flats occur at Corner Inlet and Nooramunga Marine and Coastal Parks. Bare sediment occurs at Mallacoota Inlet, Wingan Inlet, Sydenham Inlet - Bemm River and Mud Lake.

Mangroves

Along the Gippsland coast, mangroves can be found in Corner Inlet and Nooramunga Marine and Coastal Park and more recently have also been found in Cunningham Arm at Lakes Entrance (Figure 2-45) (Lucieer et al., 2017).

The roots and trunks are intertidal, with only the lowest leaves inundated by high tide. The width of the forest can range from one tree, to many kilometres. The substrate can be sand, mud, leaf litter, or peat, often as a veneer over bedrock. They are highly productive, serve as nursery habitat, and support a great diversity and abundance of animal and plant species (NOAA, 2010).

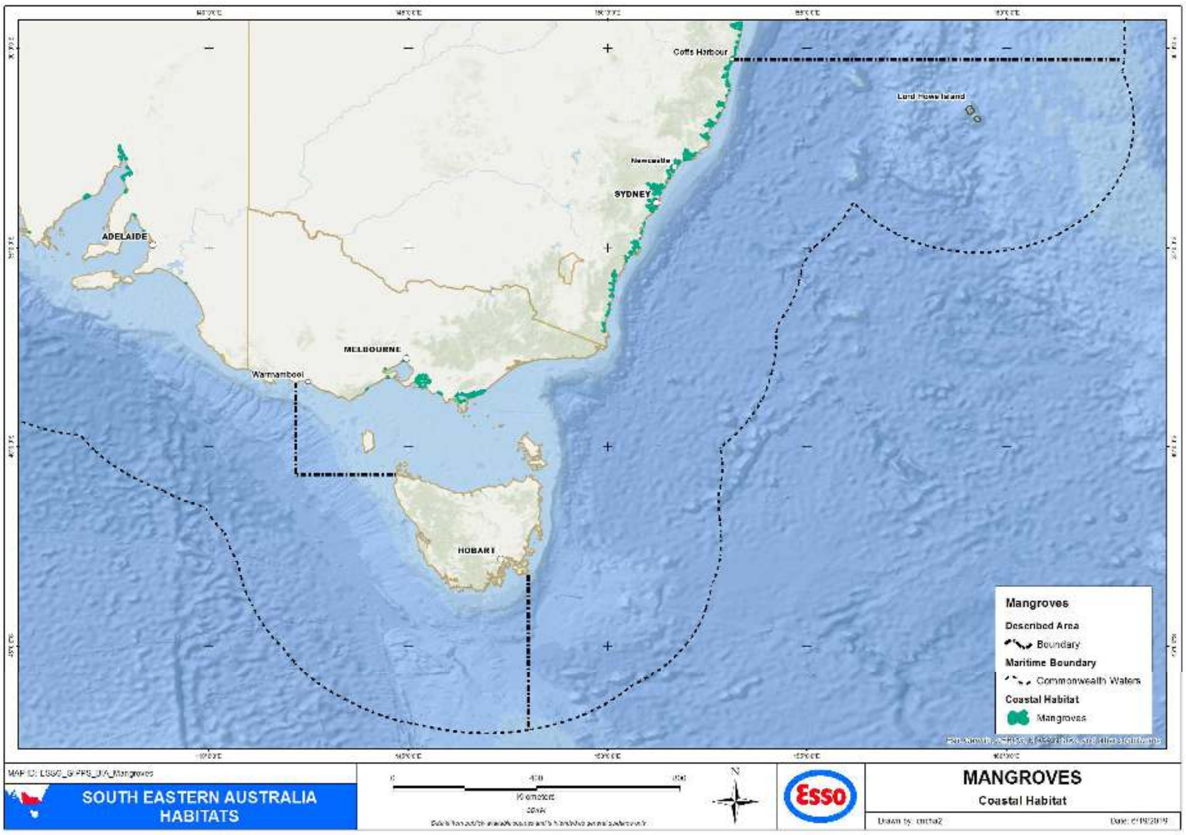


Figure 2-45 Distribution of Mangroves within DA

2.3.4.5 Saltmarsh

Saltmarshes are terrestrial halophytic (salt-adapted) ecosystems that mostly occur in the upper-intertidal zone, and are widespread along the coast. They are typically dominated by dense stands of halophytic plants such as herbs, grasses and low shrubs. Depending on location and inter-annual variations in rainfall and runoff, associated vegetation may include species tolerant or adapted to salt, brackish, or even tidal freshwater conditions. The diversity of saltmarsh plant species increases with increasing latitude (in contrast to mangroves). 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 (NOAA, 2010).

Saltmarsh is found along the coast throughout the DA (Figure 2-46), although is most extensive behind the sand dunes of Ninety Mile Beach in Gippsland (Boon et al., 2011).

Salt marshes can be found behind Mallacoota Entrance to Lake Barracouta, Wingan Inlet, inside Cann River Estuary, Tamboon Inlet, Sydenham Inlet (Bemm River Estuary and Mud Lake), Dock Inlet, inside Snowy River Estuary, Lake Tyers Estuary, and inside Lakes Entrance - Gippsland Lakes Ramsar Site. In southern NSW between Towradgi Creek about 40km north of the limits of the DA to the Victorian border there are approximately 12km2 of saltmarsh spread over 62 estuaries (NSW DPI, 2013). These include the areas of Shoalhaven River, Carama Creek, Clyde River, Tomaga River and Moruya River, Tuross Lake, Wapengo Lake, Bega River, Merimbula Lake and Wonboyn River (Creese et at., 2009).

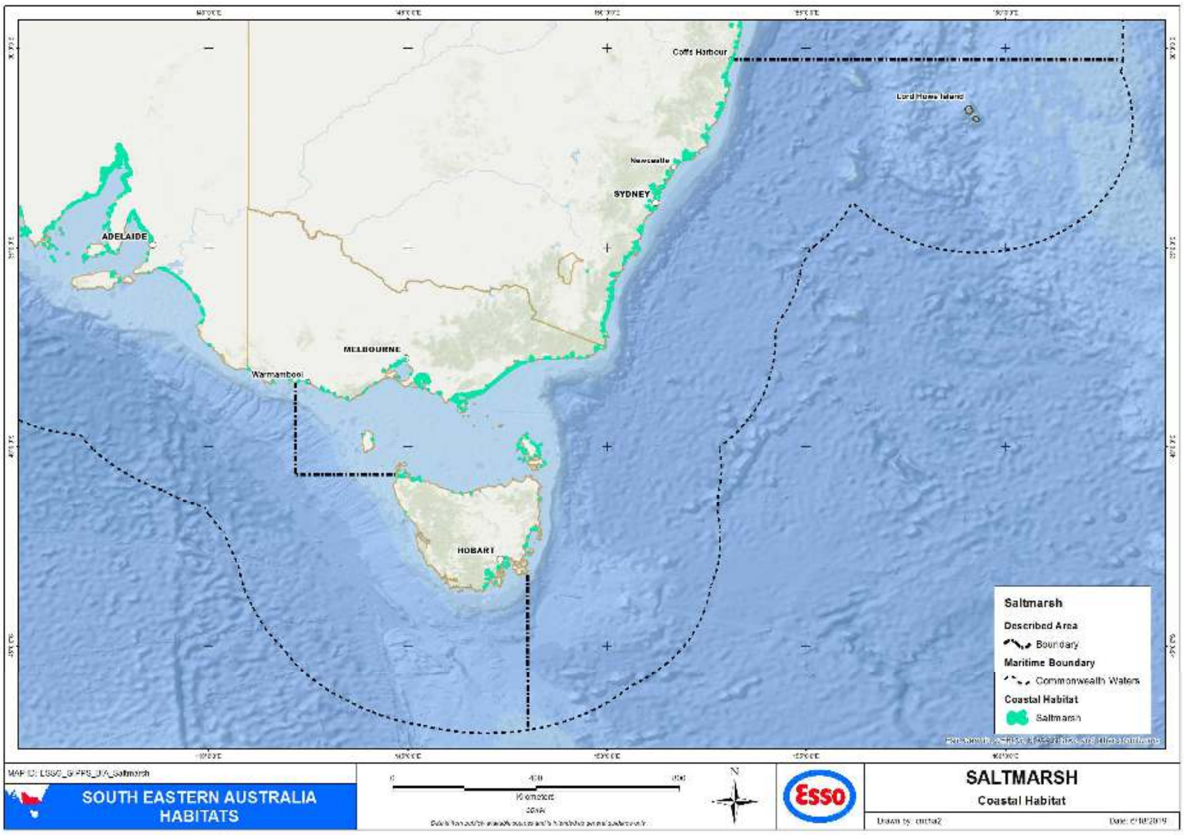


Figure 2-46 Saltmarsh dominated nearshore habitat within the DA

2.3.4.6 Coastal Vine Thicket

Coastal vine thickets are also classed as threatened ecological communities. These occur in the DA, refer to section 2.2.4.2 for information on coastal vine thickets.

2.4 Economic Environment

2.4.1 Fishing

2.4.1.1 Commercial Fishing

Commercial fishing in south-eastern Australia includes inshore coastal waters, mainly state administered fisheries, and areas along the continental slope, mainly Commonwealth fisheries. The majority of the commercial fishing (volume basis) occurs in Commonwealth waters along the continental shelf and the upper continental slope (see Figure 2-47).

The main commercial Commonwealth fisheries in the vicinity of the EGBPA are the Southern and Eastern Scalefish and Shark Fishery (SESSF) which includes ((AFMA, 2014a, 2016, ABARES, 2016 and 2017) :

- Commonwealth Trawl Sector (CTS); and
- Gillnet, Hook and Trap Sectors (GHTS)

Of these, Danish seiners and otter-board trawlers of the Commonwealth Trawl Sector are most likely to be encountered near the EGBPA.

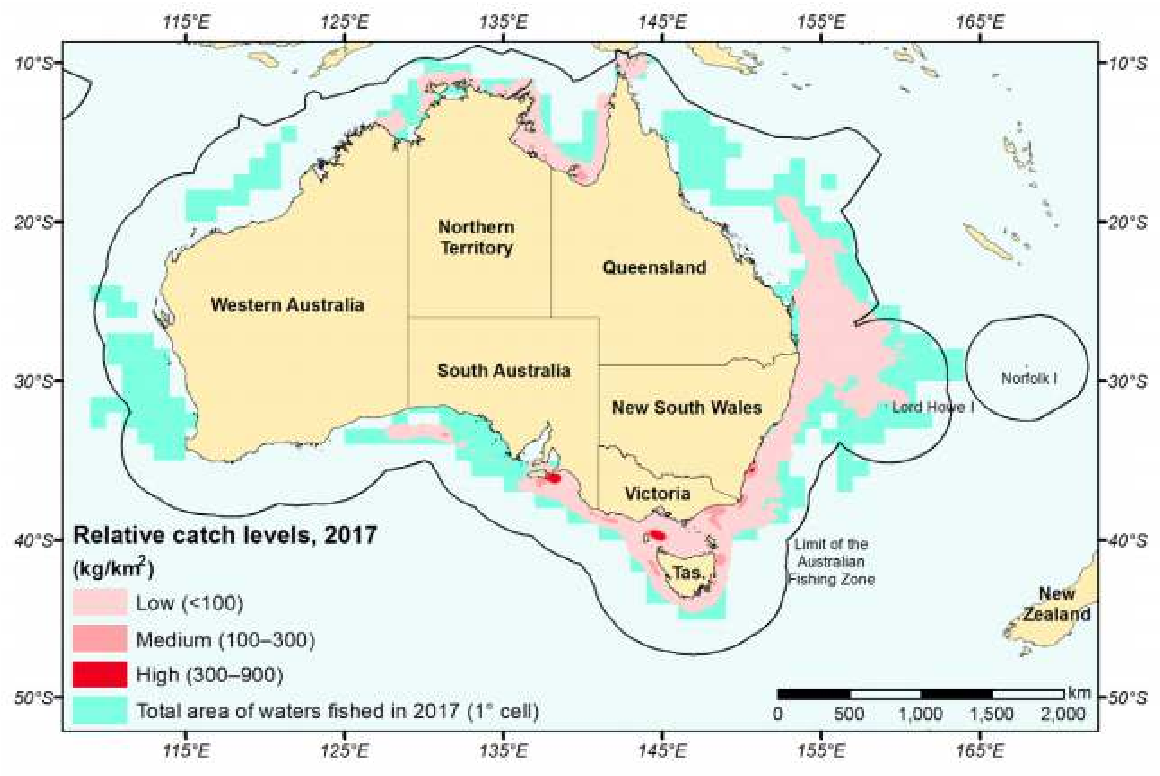


Figure 2-47 Relative catch levels of Commonwealth-managed fisheries, 2017 (ABARES, 2018)

2.4.1.2 Commercial Fishing – Commonwealth

Commonwealth fisheries are managed by the Australian Fisheries Management Authority (AFMA), with the fisheries typically operating within 3 nm to 200 nm offshore (i.e. to the extent of the Australian Fishing Zone). In 2016-2017 the Gross Value of Production (GVP) from Commonwealth fisheries was estimated at $403 million; contribution 23% of Australia's wild catch fisheries GVP (Figure 2-48) (Patterson et al., 2018).

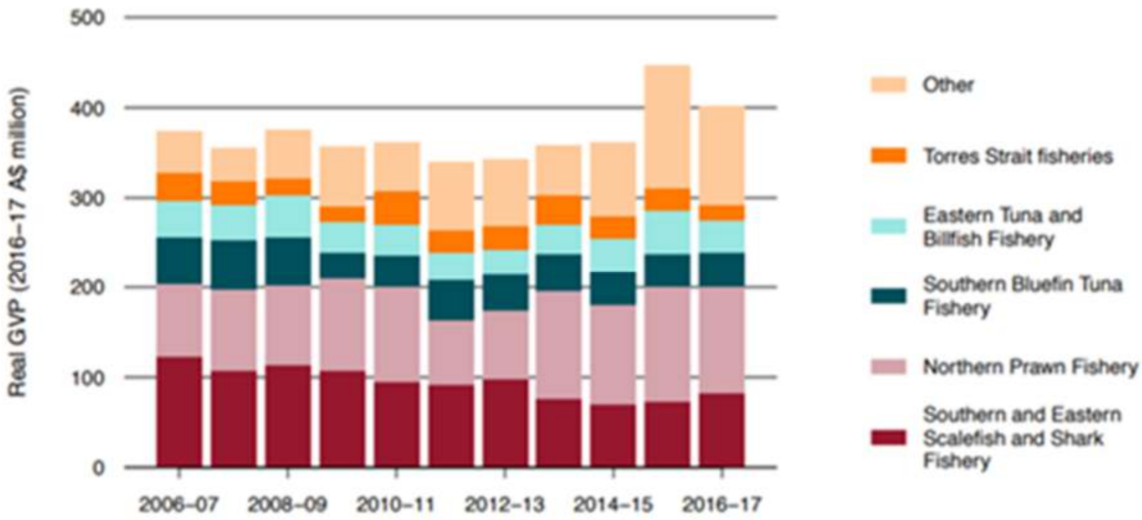


Figure 2-48 Gross Value of Production of Commonwealth Fisheries for 2016-2017 (Patterson et al., 2018).

There are six commonwealth-managed commercial fisheries with management areas that intersect with the DA:

- Bass Strait Central Zone Scallop;
- Eastern Tuna and Billfish Fishery;
- Small Pelagic Fishery;
- Southern and Eastern Scalefish and Shark Fishery;
- Southern Bluefin Tuna Fishery; and
- Southern Squid Jig Fishery

2.4.1.2.1 Bass Strait Central Zone Scallop Fishery

There are three zones of scallop fishing in Bass Strait and these are divided into state/commonwealth jurisdictions with the states zones extending out to 20nm from the high tide water mark. The current boundaries were settled in 1986 with an Offshore Constitutional Settlement agreed between the three jurisdictions. Figure 2-49 shows the jurisdictional allocation of the Bass Strait scallop fisheries. Refer to Section 2.4.1.3, Table 2-41 for information on the Victorian and Tasmanian scallop fisheries.

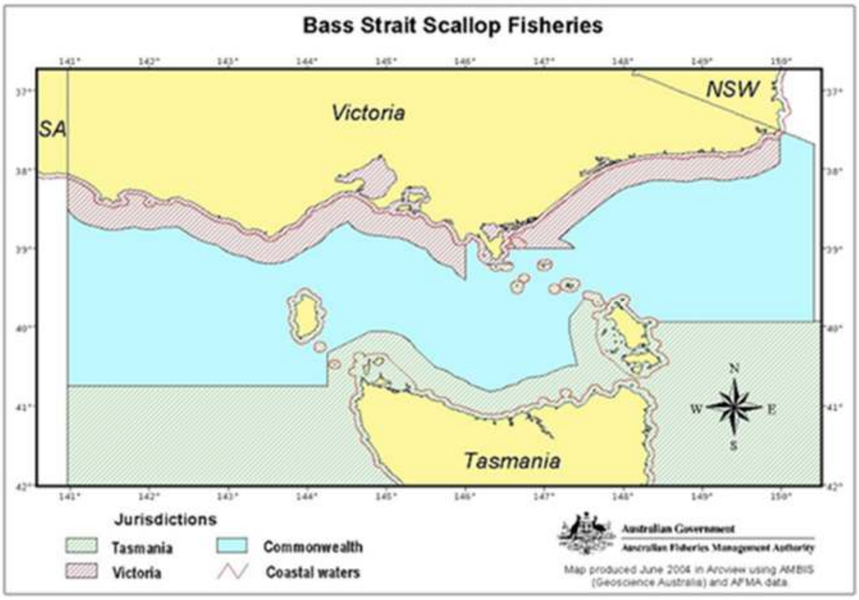


Figure 2-49 Bass Strait Scallop Fisheries (VFA, 2019)

The Bass Strait Central Zone Scallop Fishery operates in Commonwealth waters between Victoria and Tasmania (Figure 2-50). The default fishing season is 1 April to 31 December each year (note, the exact dates can vary each year) (DSEWPaC, 2013c); and the target species is Commercial Scallop (Pecten fumatus). The commercial scallop usually matures at about 12 to 18 months of age. Once maturity has been reached (fecundity increases with age), scallop spawning occurs from winter to spring (June to November); however, the timing is dependent on environmental conditions such as wind and water temperature (Sause et al., 1987). Scallop populations throughout the world fluctuate quite dramatically in response to variable environmental conditions. Relatively high populations occur in some years. These can be followed by relative scarcity, but populations can quickly rebound to large numbers provided enough adults remain for successful breeding and recruitment (VFA 2017b). Scallops are seldom found in commercial quantities in depths greater than 60-70 m.

Fishing method is via scallop dredge. Primary landing ports are Queenscliff and Apollo Bay (Victoria), and Stanley (Tasmania). The primary market for commercial scallops is domestic (Marton et al., 2012).

During 2017, fishing was concentrated on beds east of King Island (a similar area to that of 2014, 2015 and 2016) (Figure 2-50). The fishery experienced a peak in 2017, despite a reduction in dredge-hours (Patterson et al., 2018).The value of the fishery can vary markedly, with estimates for the 2014-2015 financial year of $2.8 million (Patterson et al., 2016) and 2016-2017 financial year of $6 million (30% increase) (Patterson et al., 2018).

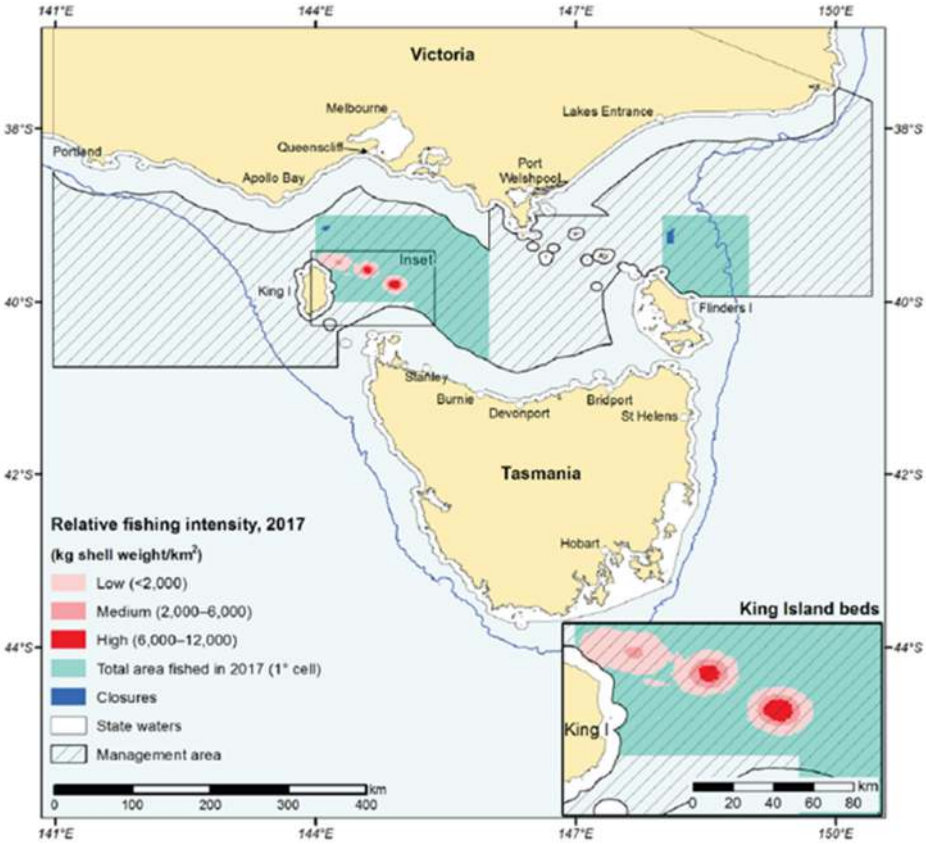


Figure 2-50 Bass Strait Central Zone Scallop Fishery Management Area and 2017 Relative Fishing Intensity (Patterson et al., 2018).

2.4.1.2.1 Eastern Tuna and Billfish Fishery

The Eastern Tuna and Billfish Fishery operates in Commonwealth waters from Cape York (Queensland) to the Victoria – South Australia border Figure 2-51 It is a 12-month fishing season, commencing 1 March each year. Primary target species are:

- Albacore Tuna (Thunnus alulunga);
- Bigeye Tuna (Thunnus obesus);
- Yellowfin Tuna (Thunnus albacares);
- Broadbill Swordfish (Xiphias gladius);
- Striped Marlin (Tetrapturus audux).

Primary landing ports for the Eastern Tuna and Billfish Fishery are Bermagui, Coffs Harbour, Ulladulla (New South Wales), and Cairns, Mooloolaba, Southport (Queensland). Fishing methods include pelagic longline, and minor line (trolling, rod and reel, handline).

During 2017, fishing was concentrated offshore of New South Wales and southern/central Queensland coasts (Figure 2-51). The number of active vessels in the fishery have decreased over the last decade from approximately 150 in 2002 to 39 in 2017 (Patterson et al., 2018). The value of the fishery during 2016-2017 financial year was $35.67 million (Patterson et al., 2018).

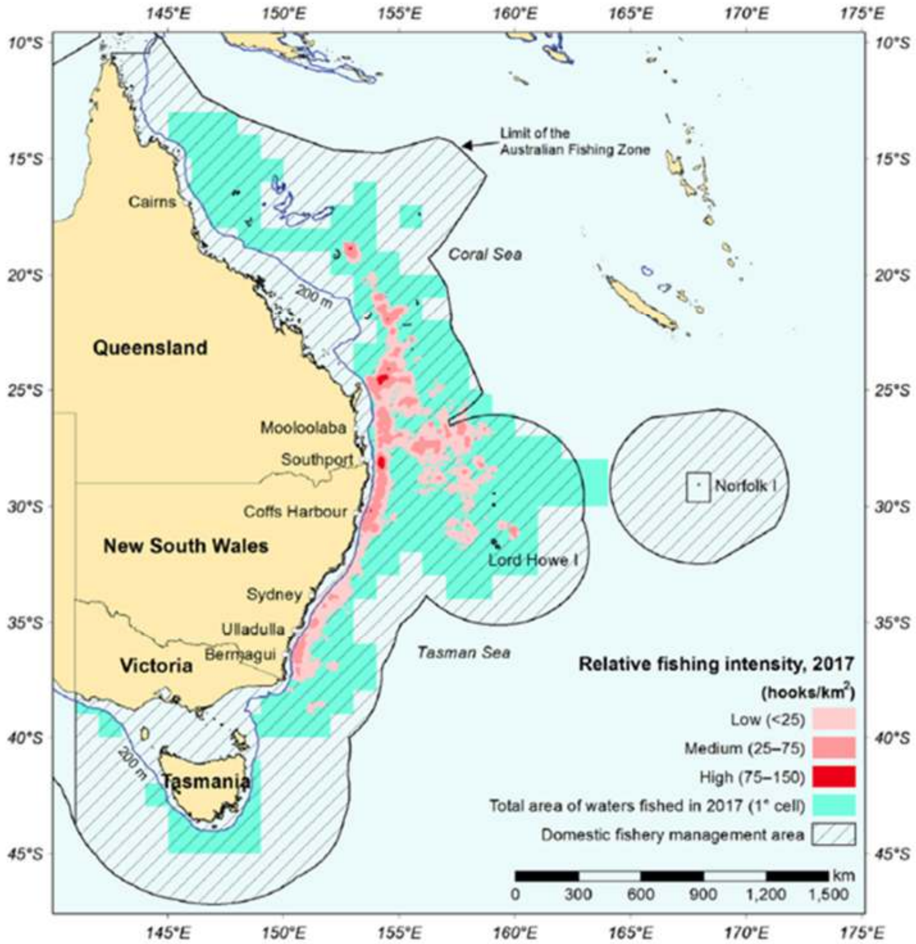


Figure 2-51 Eastern Tuna and Billfish Fishery Management Area and 2017 Relative Fishing Intensity (Patterson et al., 2018).

2.4.1.2.1 Small Pelagic Fishery

The Small Pelagic Fishery operates in Commonwealth waters from southern Queensland to southern Western Australia (Figure 2-51). Most historical fishing efforts has occurred of the east and west coasts of Tasmania. It is a 12-month fishing season, commencing 1 May each year. Primary target species are:

- Australian sardine (Sardinops sagax);
- Blue mackerel (Scomber australasicus);
- Jack mackerel (Trachurus declivis, T. murphyi);
- Redbait (Emmelichthys nitidus).

Primary landing ports within the DA are Eden and Iluka (New South Wales). Fishing methods include purse seine and midwater trawl; midwater trawl has been the main method since 2002. Commercial value of the fishery is confidential (Patterson et al., 2018).

Small pelagic fish are generally caught during targeted fishing for a single species. They are also caught in small quantities in other Commonwealth- and state-managed fisheries, including the Southern and Eastern Scalefish and Shark Fishery, the Eastern Tuna and Billfish Fishery, the Western Tuna and Billfish Fishery, and the New South Wales Ocean Hauling Fishery. There are no active small pelagic fisheries near the EGBPA.

Jack mackerel are found in continental shelf waters between 27 to 460 m, although generally in waters less than 300m deep. They live for 16 years, maturing at 3 to 4 years. Spawning occurs between December and March (ABARES, 2018).

Blue mackerel are found in continental shelf waters between 87 to 265 m. They live for about 7 years, maturing at 2 years. Spawning occurs between September and May (ABARES, 2018).

Redbait are found in continental shelf waters between 86 to 500 m. They live for about 21 years, maturing at 2 to 4 years. Spawning occurs between September and November (ABARES 2018).

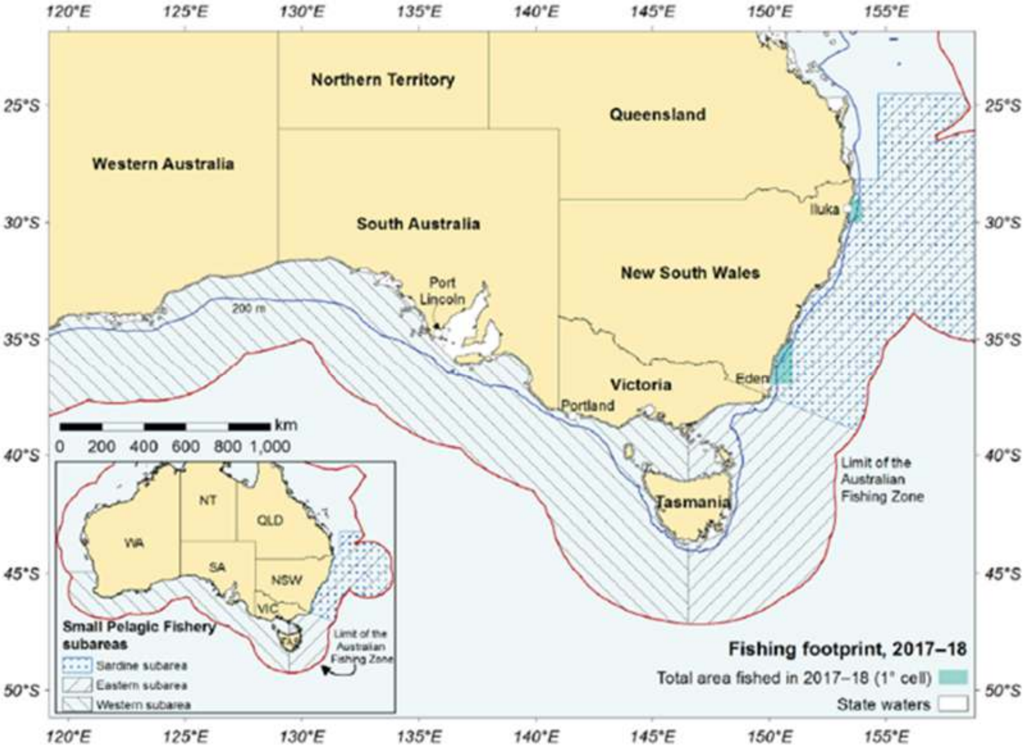


Figure 2-52 Small Pelagic Fishery Management Area and 2017-18 Fishing Footprint

(NB: Some effort data are not shown on this map for confidentiality reasons) (Patterson et al., 2018).

2.4.1.2.1 Southern and Eastern Scalefish and Shark Fishery

The Southern and Eastern Scalefish and Shark Fishery (SESFF) is a multisector, multigear and multispecies fishery, targeting a variety of fish, squid and shark stock (Figure 2-53). Primary target species include:

- Blue grenadier (Macruronus novaezelandiae);
- Tiger flathead (Neoplatycephalus richardsoni);
- Silver warehou (Seriolella punctata);
- Gummy shark (Mustelus antarcticus);
- Pink ling (Genypterus blacodes).

It is a 12-month fishing season, commencing 1 May each year. Primary ports include Eden (New South Wales), Lakes Entrance, Portland, Port Welshpool (Victoria), and Devonport and Hobart (Tasmania).

The SESSF incorporates the Commonwealth Trawl Sector (formerly the Southeast Trawl Sector), the Great Australian Bight Trawl Sector (GABTS), East Coast Deepwater Trawl Sector (ECDTS) and Gillnet, Hook and Trap Sector (GHTS; formerly the Southern Shark and Southeast Non-trawl Sectors) under a common set of management objectives. The SESSF extends from waters off southern Queensland, south around Tasmania and then west to Cape Leeuwin in Western Australia. Fishing intensity varied in location for each fishery, with no catch effort within the East Coast Deep Water Trawl

Sector for 2016-2017 (Figure 2-54). The value of the fishery in 2016-2017 was approximately $72.3 million ($47.01 million from the Commonwealth Trawland Scalefish Hook Sectors; $25.29 million from the Shark Gillnet and Shark Hook Sector) (Patterson et al., 2018).

Sharks are fished using predominantly demersal gillnets (Walker et al., 2001), with a small percentage caught by demersal longlines. The deepwater demersal sharks occur between 50 and 1,800m depth offshore and live up to 50 years, maturing between 25 and 30 years (ABARES, 2016c).

The trawl and scalefish-hook sectors of the fishery include over 100 species that are captured, but 16 species provide the bulk of trawl landings and are subject to quota management. Fishing is year round, varying according to availability, market price and progress with quotas.

The trawl sector includes otter trawl and Danish seine methods. Otter trawlers use larger boats, generally greater than 20 m long, while Danish seiners use smaller boats and operate in nearshore shelf areas often in more restricted areas unavailable to otter trawlers (Larcombe & Begg 2008). Board boats can stay out at sea for 5 -7 days, whilst Danish seiners usually fish for a maximum of three days. The range of Danish seiners, which target predominantly flathead, is limited to a 100 km radius from Lakes Entrance.

Otter board trawlers, operating out of Lakes Entrance, concentrate their fishing operations in deeper waters and consequently catch more morwong, ling, blue grenadier and other deep sea species. The net is towed by two wire ropes and fixed, between these ropes and the net, are paravanes (commonly known as boards or doors). Unlike the Danish seine net which closes and stops fishing after about two minutes of towing, the board trawl net remains open and may be towed for any length of time, although it is rare for tows to exceed four hours (Leftrade 2013). Distribution of the fishing effort shows a predominance of effort concentrated along the 100-250 m contour; ABARES 2017).

The SESSF includes several stocks that are classified as overfished. These overfished stocks are blue warehou (Seriolella brama), eastern gemfish (Rexea solandri), gulper sharks (Centrophorus harrissoni, C. moluccensis, C. zeehaani), school shark (Galeorhinus galeus), redfish (Centroberyx affinis) and orange roughy (Hoplostethus atlanticus) in two zones (southern and western) (ABARES, 2017).

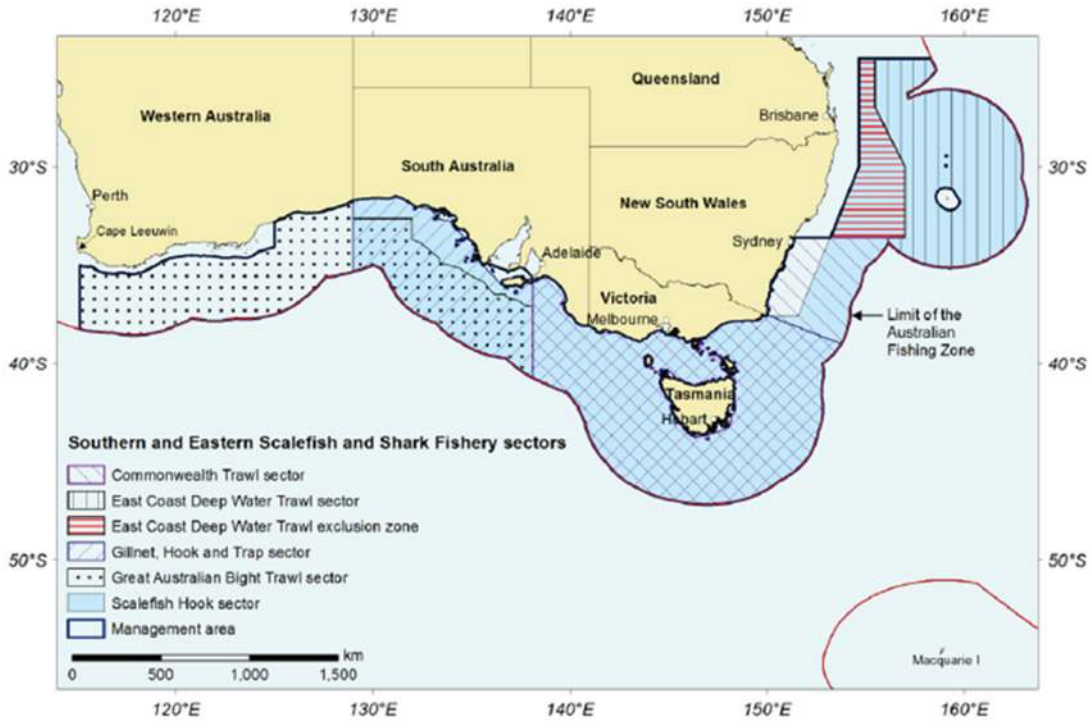
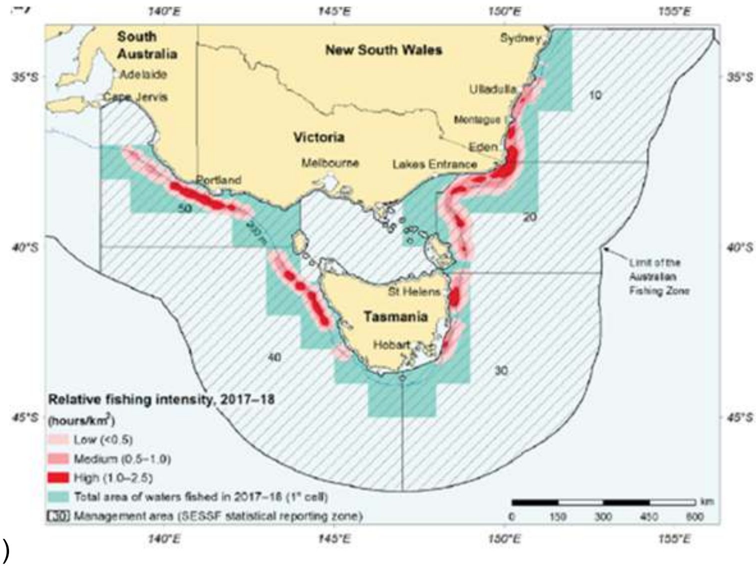
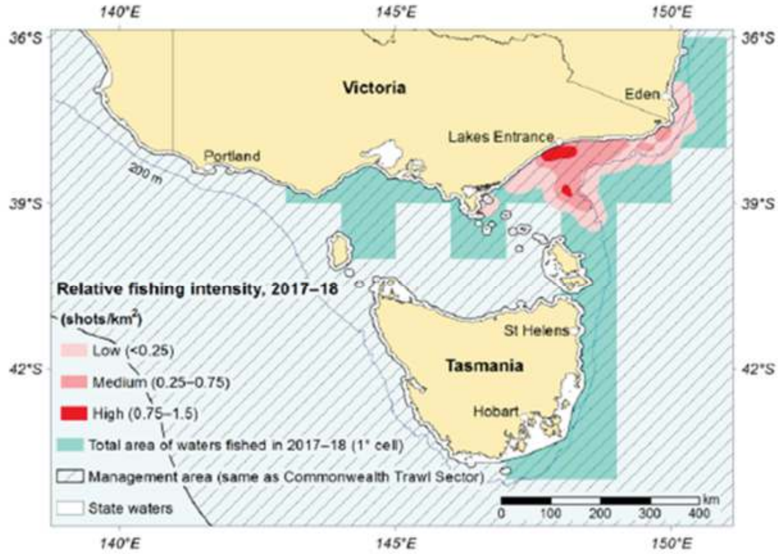


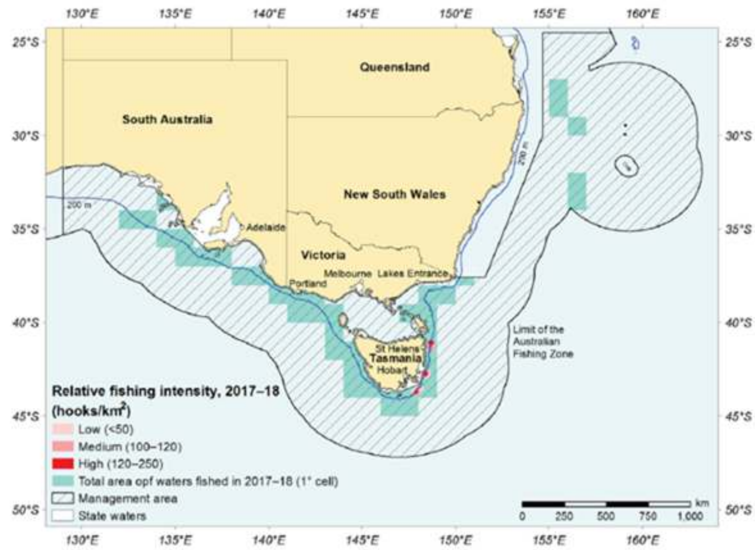
Figure 2-53 Southern and Eastern Scalefish and Shark Fishery Management Area (Patterson et al., 2018)


South Australia
New South Wales
Victoria
Tasmania
Adelaide
Cape Jervis
Sydney
Ulladulla
Montague I
Eden
Melbourne
Lakes Entrance
Portland
St Helens
Hobart
Limit of the Australian Fishing Zone
Relative fishing intensity, 2017–18 (hours/km²)
Low (<0.5)
Medium (0.5–1.0)
High (1.0–2.5)
Total area of waters fished in 2017–18 (1° cell)
Management area (SESSF statistical reporting zone)

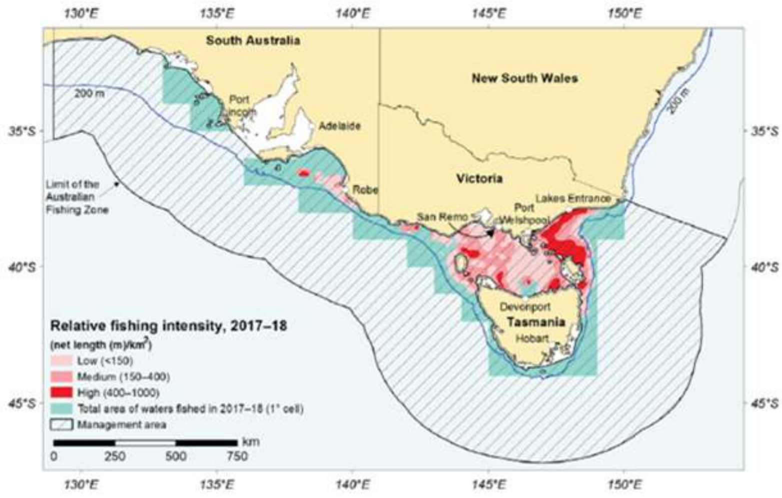
(a)


Victoria
Eden
Lakes Entrance
Portland
Tasmania
St Helens
Hobart
Relative fishing intensity, 2017–18 (shots/km²)
Low (<0.25)
Medium (0.25–0.75)
High (0.75–1.5)
Total area of waters fished in 2017–18 (1° cell)
Management area (same as Commonwealth Trawl Sector)
State waters

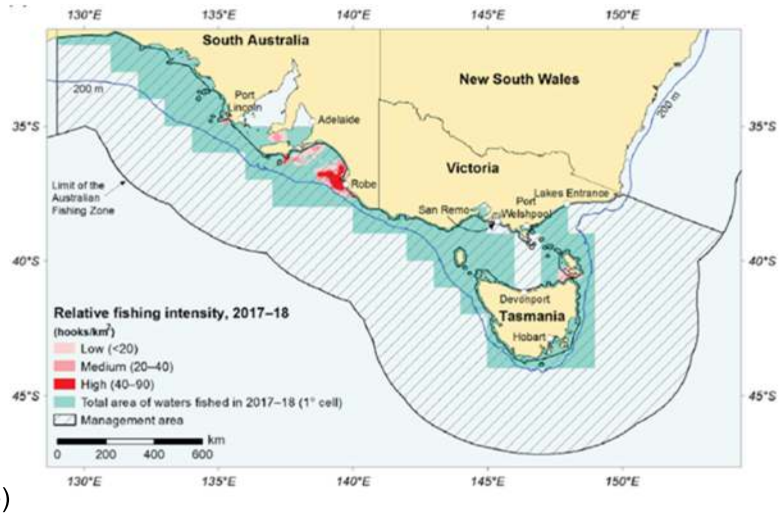
(b)


Queensland
South Australia
New South Wales
Victoria
Adelaide
Melbourne
Lakes Entrance
Portland
Tasmania
St Helens
Hobart
Limit of the Australian Fishing Zone
Relative fishing intensity, 2017–18 (hooks/km²)
Low (<50)
Medium (100–120)
High (120–250)
Total area opf waters fished in 2017–18 (1° cell)
Management area
State waters

(c)



(d)



(e)

Figure 2-54 2017-2018 Relative Fishing Intensity for (a) Commonwealth Trawl Sector (b) Commonwealth Trawl Sector: Danish-seine, (c) Scalefish Hook Sector, (d) Shark Gillnet Sector, and (e) Shark Hook Sector (Patterson et al., 2018)

2.4.1.2.1 Southern Bluefin Tuna Fishery

The Southern Bluefin Tuna Fishery operates within the Australian Fishing Zone. It is a 12-month fishing season, commencing 1 December each year. Primary target species is the Southern Bluefin Tuna (Thunnus maccoyii).

The majority of the catch is taken in the Great Australian Bight (i.e. outside of the Environment Sectors) by purse-seine vessels. Longline fishing is used off the east coast, and the number of vessels and fishing intensity is variable (Figure 2-55). The value of the fishery during 2016-2017 financial year was $38.54 million (Patterson et al., 2018).

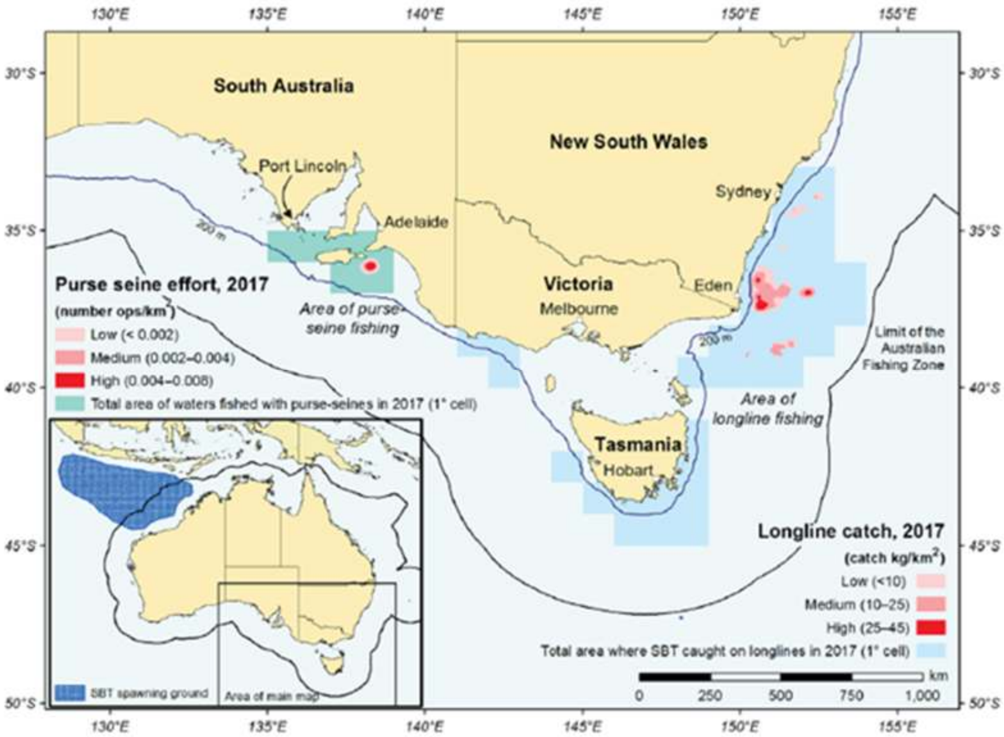


Figure 2-55 Southern Bluefin Tuna Management Area and 2017 Fishing Intensity (Patterson et al., 2018)

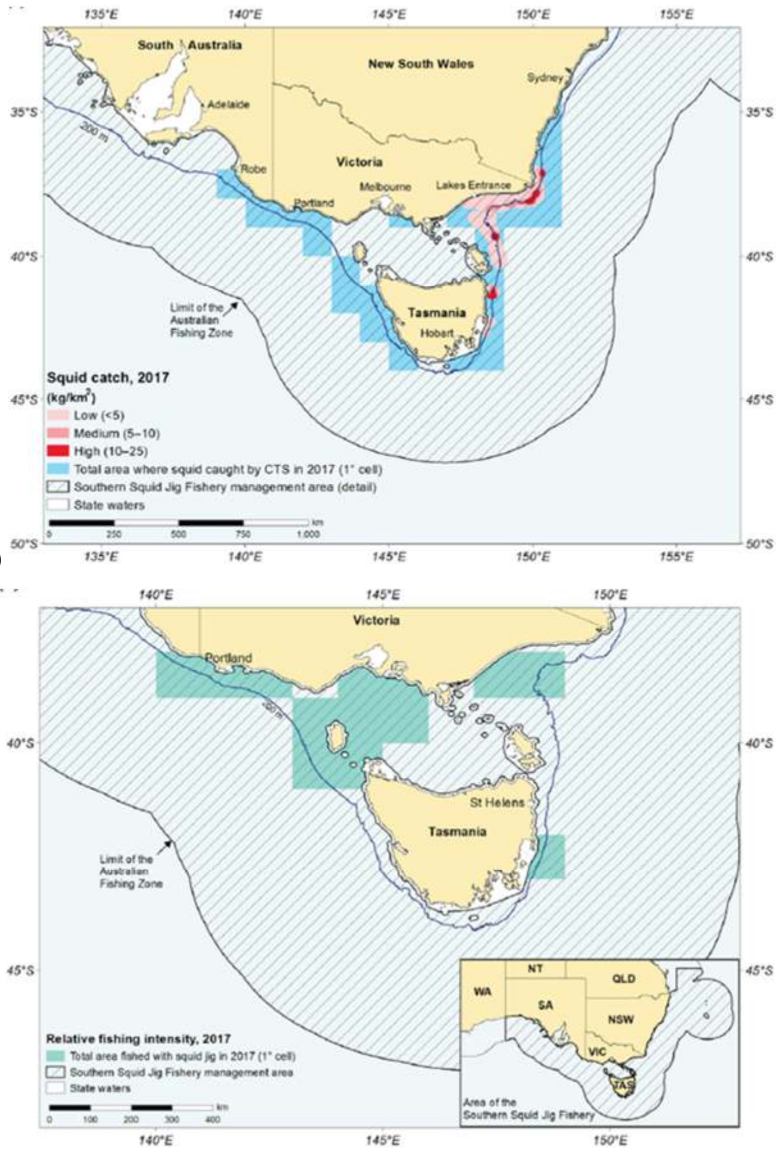
2.4.1.2.1 Southern Squid Jig Fishery

The Southern Squid Jig Fishery is located in waters off New South Wales, Victoria, Tasmania and South Australia, and in a small area off southern Queensland. The Southern Squid Jig Fishery is a single-method (jigging) fishery, primarily targeting the Gould's squid (Nototodarus gould). Vessels typically operate at night in continental shelf waters between 60–120 m water depths. Squid are also caught in the Commonwealth Trawl Sector and GAB Trawl Sector of the Southern and Eastern Scalefish and Shark Fishery.

It has a 12-month fishing season, commencing 1 January each year. Most direct fishing effort occurs off Lakes Entrance (Victoria) (Figure 2-56 (a) Squid Catch from the Commonwealth Trawl Sector 2017, and (b) 2017 Fishing Intensity in the Southern Squid Jig Fishery (Patterson et al., 2018)

(a)), however in recent years a greater catch has come from the Trawl Sectors (Figure 2-56 (a) Squid Catch from the Commonwealth Trawl Sector 2017, and (b) 2017 Fishing Intensity in the Southern Squid Jig Fishery (Patterson et al., 2018)

(b)). The value of the Southern Squid Jig Fishery during the 2016-2017 financial year is $2.24 million (Patterson et al., 2018).



(a)

(b)

Figure 2-56 (a) Squid Catch from the Commonwealth Trawl Sector 2017, and (b) 2017 Fishing Intensity in the Southern Squid Jig Fishery (Patterson et al., 2018)

2.4.1.3 Commercial Fishing - State

Each state operations under their own constitutional arrangement:

- Tasmanian fisheries are managed under the Living Marine Resources Management Act 1995;
- South Australian fisheries are managed under the Fisheries Management Act 2007;
- Victorian fisheries are managed under the Fisheries Act 1995;
- New South Wales fisheries are managed under the Fisheries Management Act 1994; and
- Queensland fisheries are managed under the Fisheries Act 1994.

The Offshore Constitutional Settlement (OCS) allows for individual fisheries to be managed under relevant State government, with fishing areas extending into both Commonwealth and State waters.

There are seven Victorian and eight New South Wales state-managed commercial fisheries with management areas that intersect with the DA (Table 2-41).

Table 2-41 State-managed commercial fisheries with management areas that intersect the DA.

Fishery	Description	Extends into Cth Waters	Target Species
Victoria			
Abalone Fishery	Abalone are caught along the majority of the Victorian coastline. Abalone diving activity typically occurs close to the shoreline (generally up to water depths of 30 m). The fishery is quota managed, with a total allowable commercial catch set annually based on the outcomes of a stock assessment process. There are three (Western, Central and Eastern) management zones. The blacklip abalone (Haliotis rubra) forms the basis of the abalone fisheries in NSW, Victoria and Tasmania, however greenlip abalone (Haliotis laevegata) are also targeted. Blacklip abalone are commonly found, mainly on rocky substrates, and are widely distributed along the southern half of Australia as far as Rottnest Island in the West to Coffs Harbour in the East. Abalone are sourced from the wild and from coastal farms. There are about 40 reefs from Iron Prince to Marlo Reef in Victoria. In NSW, most commercial abalone fishing takes place on the south coast, primarily from Jervis Bay to the Victorian border (DPI 2007). Victoria's abalone farms are situated primarily in Port Phillip Bay and southwest Victoria, however farms are also located off Tullaberga Island and Gabo Island.	Yes	Greenlip Abalone (*Haliotis laevigate*) Blacklip Abalone (*Haliotis rubra*)
Eel Fishery	Eel are harvested in Victorian coastal river basins south of the Great Dividing Range. Short-finned eels are found across the State, while long-finned eels are only found in eastern Victoria.	No	Short-finned eel (*Anguilla australis*) Long-finned eel (*Anguilla reinhardtii*)
Giant Crab Fishery	The commercial fishery has two management zones, the Western Zone and Eastern Zone, a division which reflects the zonal boundaries of the rock lobster fishery. The fishery is based in the Western Zone; at the time of writing there was no giant crab fishing in the Eastern Zone. Giant crabs inhabit the continental slope at approximately 200 m depth and are most abundant along the narrow band of the shelf edge.	Yes	Giant crab (*Pseudocarcinus gigas*)
Pipi Fishery	Pipi is the common name given to the small bivalve which is found on high-energy sandy beaches in the intertidal zone. The fishery covers the entire Victorian coastline, with the exception of Port Phillip Bay and Marine National Parks where shellfish cannot be harvested in the intertidal region. However, the fishery is only currently open at Discovery Bay (targeted primarily by commercial fishers) and Venus Bay (primarily a recreational fishery).	No	Pipi (*Donax deltoids*)

Fishery	Description	Extends into Cth Waters	Target Species
Rock Lobster Fishery	The fishery is divided into two separately managed zones: Eastern and Western. The Eastern Zone extends west from the New South Wales border to Apollo Bay; the Western Zone extends from Apollo Bay west to the border with South Australia. The main ports in the Eastern Zone are Queenscliff, San Remo and Lakes Entrance. The Victorian, the southern rock lobster (Jasus edwardsii). Rock lobster is Victoria's second most profitable fishery after abalone. Southern Rock Lobsters are found to depths of 150 m, with most of the catch coming from inshore waters less than 100 m deep. Eastern rock lobster (Jasus verreauxi) is the main species harvested by the NSW Lobster Fishery, but occasionally southern rock lobster, and tropical rock lobster are also caught. Rock lobster fishing grounds exist around Ulladulla and Bateman's Bay, the southern tip of Wilsons Promontory and around Bass Strait islands, such as the Hogan Group, Curtis Group, Kent Group islands and Flinders Island. Most fishing occurs between mid-November and March, outside the June to mid-November spawning season.	Yes	Southern rock lobster (*Jasus edwardsii*) Eastern rock lobster (Jasus verreauxi)
Scallop Fishery	The Victorian Scallop Fishery is one of three scallop zones in the Bass Strait, and extends out from the coastline to 20 nm excluding the bays and inlets along the coast where commercial fishing for scallops is prohibited. The same arrangement is in place for Tasmania. Historically, the majority of the fishing activity in the Victorian zone has occurred in the eastern waters of the State, with most vessels launching from the ports of Lakes Entrance and Welshpool. The Victorian Scallop Fishery is based on the species, Pecten Fumatus. Occasionally, incidental catches of doughboy scallops (Chlamys asperrimus) are taken as by-product, but are generally not in commercial quantities. Scallop abundance is naturally highly variable causing catches to fluctuate widely from season to season. When open, the fishery is managed using a quota management system of individual transferable quota. Annual consultation is undertaken to determine the total allowable catch (TAC) and is based on a combination of stock survey analysis and scientific and industry expertise. Fisheries Victoria, on behalf of the Minister for Agriculture and Food Security, sets the TAC via a Quota Notice which is distributed equally amongst the 91 maximum allowable licences.	No	Primary: Commercial scallop (*Pecten fumatus*) Other: Doughboy scallop (*Chlamys asperrimus*)
Wrasse Fishery	The commercial fishery extends along the entire length of the Victorian coastline and out to 20 nm offshore, except for marine reserves. Most wrasse is harvested by hook and line although commercial rock lobster fishers who also hold a commercial wrasse licences can keep those fish that they catch in their rock lobster pots.	No	Primary: Bluethroat Wrasse (*Notolabrus tetricus*) Purple Wrasse (*N. fucicola*)

Fishery	Description	Extends into Cth Waters	Target Species
			Other: Rosy Wrasse (*Pseudolabrus psittaculus*) Senator Wrasse (*Pictilabrus laticlavius*) Southern Maori Wrasse (*Ophthalmolepis lineolatus*)
Sea Urchin Fishery	The sea urchin fishery comprises four individual management zones. The central and eastern zones intersect the DA. The central zone covers Victorian waters from Hopkins River to Lakes Entrance. The eastern zone extends from Lakes Entrance to the NSW border. The target species are the White sea urchin (*Heliocidaris erythrogramma*) and the Black, long-spined sea urchin (*Centrostephanus rodgersii*). The sea urchin is usually collected by hand by divers. Currently, sea urchin will only be harvested in eastern Victoria, primarily out of Mallacoota, and in Port Phillip Bay (VFA 2017b).		White sea urchin (*Heliocidaris erythrogramma*) Black, long-spined sea urchin (*Centrostephanus rodgersii*)
Commercial Bay and Inlet Fisheries	The commercial bay and inlet fisheries of Victoria are a collection of complex multi-species, multi-gear fisheries which operate in environments that are ecologically distinct to those existing in waters of both their catchment tributaries and the nearby ocean. Although between 60 to 80 fish species have been recorded from commercial bay and inlet catches, only about a dozen or so key species, including King George whiting, black bream, snapper, flathead, mullet, garfish, flounder, anchovies and pilchards, are usually targeted by commercial fishers. Commercial fishing for fin fish occurs in Port Phillip Bay, Corner Inlet/Nooramunga and the Gippsland Lakes. All other Victorian bays, inlets and estuaries are closed to commercial fishing (other than for eels and bait). The main bay and inlet commercial fishing methods are seine nets and gillnets.	no	King George Whiting Black Bream Snapper Flathead Mullet Garfish Flounder Anchovies Pilchards
New South Wales			
Abalone Fishery	The blacklip abalone forms the basis of the abalone fishery in NSW. Abalone are commercially harvested from rocky reefs by divers typically using surface-supplied air or scuba. In practice, 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.	No	Blacklip abalone (*Haliotis rubra*)
Estuary General Fishery	The Estuary General Fishery is a diverse multi-species multi-method fishery that may operate in 76 of the NSW's estuarine systems. This fishery is a significant contributor to regional and state	No	Sea Mullet (*Mugil cephalus*)

Fishery	Description	Extends into Cth Waters	Target Species
	economies providing high quality seafood and bait to the community. The fishery includes all forms of commercial estuarine fishing (other than estuary prawn trawling) in addition to the gathering of pipis and beachworms from ocean beaches. The most frequently used fishing methods are mesh and haul netting. Other methods used include trapping, hand-lining and hand-gathering. Sea mullet, luderick, yellowfin bream, school prawn, blue swimmer crab, dusky flathead, sand whiting, pipi, mud crab and silver biddy make up over 80% of the catch (DPI 2014).		Luderick (*Girella tricuspidata*) Yellowfin bream (*Acanthopagrus australis*) School Prawn (*Metapenaeus macleayi*) Blue Swimmer Crab (*Portunus pelagicus*) Dusky Flathead (*Platycephalus fuscus*) Sand Whiting (*Sillago ciliata*) Pipi (*Donax deltoides*) Mud Crab (*Scylla serrata*) Silver Biddy (*Gerres subfasciatus*)
Estuary Prawn Trawl Fishery	The fishery uses otter trawl nets in three estuaries in NSW, (the Clarence, Hawkesbury and Hunter Rivers). With the exception of the Hawkesbury River, the fishery operates for defined seasons (generally October to May) and within each estuary is confined to specific times and areas. The majority of prawn catches are landed during the 'dark' of the moon (between the last and first quarter), on either run out or 'slack' tides.	No	School Prawns Eastern King Prawns
Lobster Fishery	The 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. It is characterised by inshore and offshore sectors. Inshore fishers use small beehive or square traps in waters up to 10 metres in depth, whilst offshore fishers use large rectangular traps.	Yes	Primary: Eastern rock lobster (*Sagmaraisus verreauxi*) Other: Southern Rock Lobster (*Jasus edwardsii*) Tropical Rock Lobster (*Panulirus longipes* and *P. ornatus*).

Fishery	Description	Extends into Cth Waters	Target Species
Ocean Hauling Fishery	The Ocean Hauling Fishery is broken up into seven regions along the NSW coast and 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 coast.	No	Pilchards (*Sardinops sagax*) Sea Mullet (*Mugil cephalus*) Australian Salmon (*Arripis trutta*) Blue Mackerel (*Scomber australasicus*) Yellowtail Scad (*Trachurus novaezelandiae*) Yellowfin Bream (*Acanthopagrus australis*)
Ocean Trap and Line Fishery	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. The Ocean Trap and Line Fishery is a share management fishery. This means that commercial fishers must hold sufficient shares to be eligible for an endorsement to operate in the fishery. An endorsement authorises the use of specific gear to take fish for sale from certain waters.	Yes	Primary: Snapper Yellowtail kingfish Leatherjackets Bonito Silver trevally Other: Rubberlip (grey) Morwong Blue-eye Trevalla Sharks Bar Cod Yellowfin Bream Spanner Crabs
Ocean Trawl Fishery	There are two sectors to the Ocean Trawl Fishery: the prawn trawl sector and the fish trawl sector. Both sectors use otter trawl nets. The fishery is a share management fishery; meaning commercial fishers must hold sufficient shares to be eligible for an endorsement to operate in the fishery. An endorsement authorises the	Yes	School whiting (comprising of stout whiting and red spot whiting) Eastern King, School and Royal Red prawns

Fishery	Description	Extends into Cth Waters	Target Species
	use of specific gear to take fish for sale from certain waters. Many of the fishers endorsed for fish trawling are also endorsed for prawn trawling.		Tiger Flathead Silver Trevally Various species of sharks and rays, squid, octopus and bugs
Sea Urchin and Turban Shell Restricted Fishery	The NSW Sea Urchin and Turban Shell restricted fishery is relatively small with few divers participating. The main constraint on development is high processing costs and limited domestic markets. Fishing for sea urchins is generally constrained to that part of the year when the roe is well developed. A number of the fishing sub-regions have been closed to commercial fishing since 1994.	No	Sea Urchin Turban Shell
Tasmania			
Shellfish Fishery	The commercial shellfish fishery includes clams (*Veneruptis largillierti*) for which there are three licences restricted to Georges Bay, native oyster (*Ostrea angasi*) for which there are two licences restricted to Georges Bay and cockles (*Katelysia scalarina*) for which there are four licences restricted to Ansons Bay and wild Pacific oyster (*Crassostrea gigas*) (DPIPWE 2017d). Temperate climate bivalves generally have two spawning periods within a year following spring and autumnal peaks in phytoplankton production.	no	clams (Veneruptis largillierti) native oyster (*Ostrea angasi*) cockles (*Katelysia scalarina*) wild Pacific oyster (*Crassostrea gigas*)
Abalone Fishery	The Tasmanian abalone fishery is the largest wild abalone fishery in the world and the fishery area surrounds the entire island of Tasmania extending northwards into Bass Strait to include Bass Strait islands such as the Furneaux Group. The Tasmanian wild harvest abalone fishery for Blacklip *(H. rubra*) and Greenlip *(H. laevigata*) produces 25% of the total annual global production of wild caught abalone and is harvested by divers. Annual catch limits are set by the government and the limits are spread across the fishing zones to manage resource sustainability. This system includes closures of some parts of the fishery as published by the Tasmanian regulator Department of Primary Industries, Parks, Water & Environment (DPIPWE, 2019a).	no	Blacklip (H. rubra) Greenlip (H. laevigata)
Rock Lobster Fishery	The rock lobster fishery is a major Tasmanian industry providing significant benefits from exports from the commercial fishery. The Southern rock lobster (*Jasus edwardsii*) commonly known as crayfish, lives in a variety of habitats ranging from shallow rocky inshore pools out to the	no	Southern rock lobster (Jasus edwardsii)

Fishery	Description	Extends into Cth Waters	Target Species
	continental shelf. Pots are used as the catch method and over 300 licences issued each year. The fishery is managed by quota management, supplemented by size limits, gear restrictions and seasonal closures (DPIPWE, 2019b).		
Giant Crab	The Giant Crab (*Pseudocarcinus gigas*) fishery is a comparatively small fishery with annual harvest set at 46.6 tonnes, but is of relatively high value, with the landed valued estimated to be around $2 million. The Tasmanian Giant Crab fishery is managed by limited entry, setting a total annual commercial catch and by an individual transferable quota management system. This regime is supplemented by size limits, gear restrictions and seasonal closures. The permitted gear types are pot (or trap) for the commercial fishery. (Ogier et al., 2018)	no	Giant Crab (*Pseudocarcinus gigas*)
Scalefish Fishery	The Tasmanian Scalefish Fishery is a multi-species and multi-gear fishery that is predominantly made up of small owner operated commercial businesses and a large and diverse recreational fishery. Some of the species commercially targeted include: banded morwong, southern calamari, octopus, tiger flathead, school whiting, southern garfish, wrasse, Gould's squid, bastard trumpeter, blue warehou, silver warehou, flounder, silver trevally and striped trumpeter. The main gear types include gillnet, hooks and seine nets, other fishing gears in use include traps, Danish seine, dip nets and spears. For many commercial operators, scalefish represent an adjunct to other activities, for instance rock lobster fishing (DPIPWE, 2019c)	yes	Wrasse Banded morwong (*Cheilodactylus spectabilis)* Southern calamari *(Sepioteuthis australis)*
Commercial Dive Fishery	The fishery primarily targets Purple Sea Urchin (*Heliocidaris erythrogramma*), Longspine Sea Urchin (*Centrostephanus rodgersii*), and Periwinkle (*Lunella undulata*). It operates entirely in state waters in five separate management zones (central eastern, south eastern, north eastern, northern and eastern) (DoEE, 2016).	no	Purple Sea Urchin (*Heliocidaris erythrogramma*) Longspine Sea Urchin (*Centrostephanus rodgersii*) Periwinkle (*Lunella undulata*)
Scallop	This fishery targets Commercial Scallop (*Pecten fumatus*) using a scallop harvester (dredge). Although commercial fishers can legally take the doughboy scallop and the queen scallop, these species have only minor commercial significance in Tasmania. Pre-season surveys are carried out to determine which areas meet predetermined criteria and can be opened for scallop fishing. The market for commercial harvested scallops is largely domestic. Scallops beds occur on the shelf in water deeper than 20 metres (Ogier et al., 2018).	no	Commercial Scallop (*Pecten fumatus*)

2.4.1.4 Commercial Aquaculture – State

The Sydney rock oyster (Saccostrea glomerata) is the main species grown in NSW. Commercial production in the State occurs in 41 estuaries between Eden in the south to the Tweed River in the north. Wallis Lake and the Hawkesbury River are the main producing areas.

The Sydney rock oyster industry in NSW is largely dependent on natural spawning. The first spawning of a Sydney rock oyster is usually as a male and subsequent spawnings as a female. During spawning, adult females disperse up to 20 million eggs and males hundreds of millions of sperms into the water when the tide and current are optimal for the widest distribution. Fertilisation takes place in the water column and development continues for up to 3 to 4 weeks as the larval stages of the oyster grow, with the 'spat' ultimately being caught on 'sticks'. Oysters are knocked off these sticks at 0.5 to 3 years of age for growing intertidally on trays until maturity in 3 to 4 years. Alternative growing systems such as baskets and tumblers are also being used, and some oysters are grown subtidally on rafts or on floating culture.

2.4.2 Oil and Gas

Statistics from 2014–2015 showed that oil (38%) and gas (24%) remained Australia's largest energy sources (APPEA, 2017). The industry also contributed approximately $34 billion to the Australian economy during the 2014–2015 financial year (APPEA, 2016).

Victoria's petroleum (oil and gas) exploration and production is concentrated in the offshore Commonwealth waters of the Otway and Gippsland basins; there are a number of current exploration and offshore production permit areas within both basins (Figure 2-57). Information on the Production licences, Exploration Permits and Retention Leases within Gippsland Basin at the time of writing are presented in Table 2-42.

From 1967–2015, the Gippsland Basin Joint Venture alone produced 54% of Australia's crude oil and gas (DIIS, 2017). Petroleum infrastructure in Gippsland Basin is well developed, with a network of pipelines transporting hydrocarbons produced offshore to onshore petroleum processing facilities at Longford and Orbost (Figure 2-58). Overall production of crude oil and condensate from the Gippsland Basin had been declining for over three decades, while gas production remained steady. However, in recent years, hydrocarbon production has remained relatively strong due to infill drilling in the developed fields and work-overs undertaken to renew down-hole equipment and to open new zones (DIIS, 2017). Total petroleum production from the Gippsland Basin was 74.8 MMboe (11.9 GL) in 2016, up from 61.4 MMboe (9.76 GL) in 2015 (DIIS, 2017).

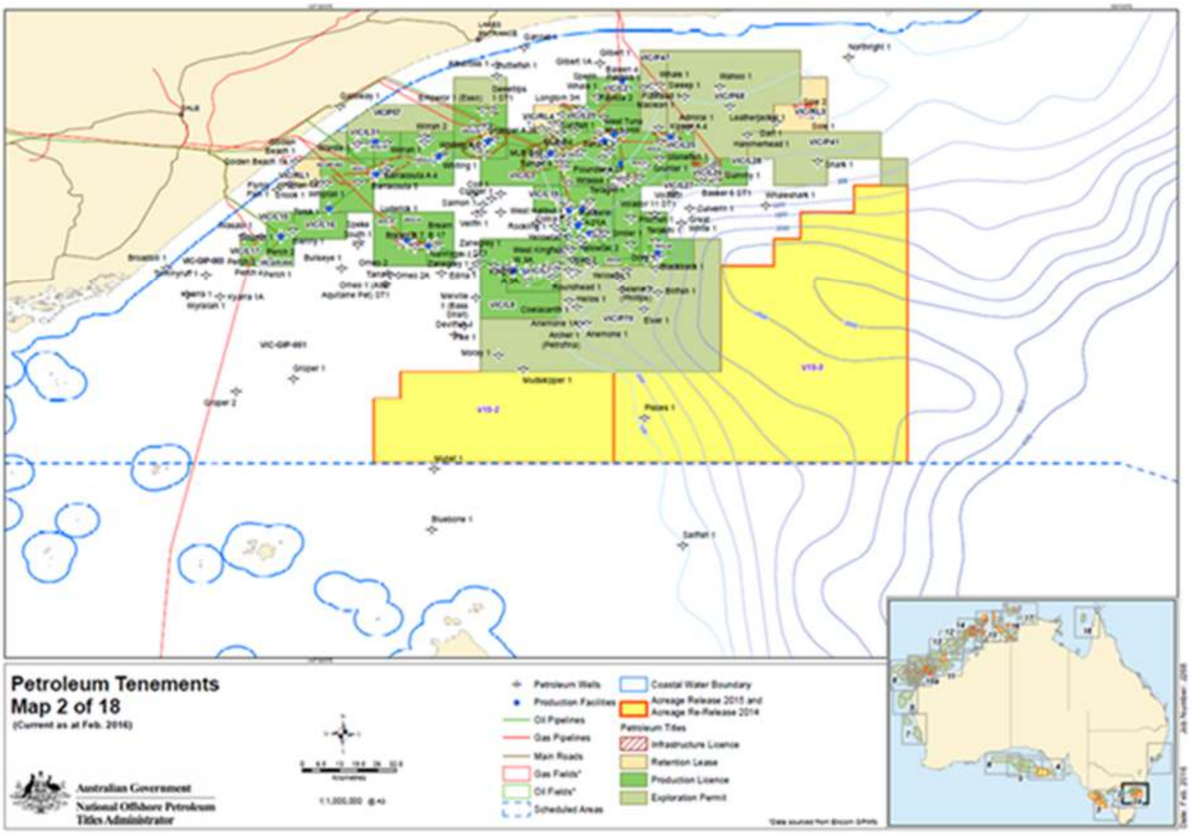


Figure 2-57 Gippsland Basin oil and gas fields (NOPTA, 2016)

Table 2-42 Production licenses, Exploration Permits and Retention Leases within Gippsland Basin

Title	Title Holder/s	Field
Production Licenses, Gippsland Basin		
VIC/L1	EARPL, BHPB	Barracouta/Tarwhine/ Whiptail
VIC/L10	EARPL, BHPB	Snapper
VIC/L11	EARPL, BHPB	Flounder
VIC/L13-14	EARPL, BHPB	Bream
VIC/L15	EARPL, BHPB	Dolphin
VIC/L16	EARPL, BHPB	Torsk
VIC/L17	EARPL, BHPB	Perch
VIC/L18	EARPL, BHPB	Seahorse
VIC/L19	EARPL, BHPB	West Fortescue
VIC/L2	EARPL, BHPB	Barracouta/Whiting/Wirrah
VIC/L20	EARPL, BHPB	Blackback
VIC/L21	Cooper Energy	Patricia Baleen
VIC/L25	EARPL, BHPB, MEPAU	Kipper
VIC/L29	SGH Energy	Longtom
VIC/L3	EARPL, BHPB	Marlin/Turrum/North Turrum
VIC/L32	Cooper Energy	Sole

VIC/L4	EARPL, BHPB	Marlin/Turrum/Tuna/Baldfish/Flounder
VIC/L5	EARPL, BHPB	Halibut/Fortescue/Cobia/ Mackerel
VIC/L6	EARPL, BHPB	Mackerel/Flounder
VIC/L7-8	EARPL, BHPB	Kingfish
VIC/L9	EARPL, BHPB	Tuna
VIC/L31	Carnarvon Hibiscus	West Seahorse (see VIC/P57)
Exploration Permits, Gippsland Basin		
VIC/P47	Emperor Energy / Shelf Energy	Judith/Moby
VIC/P57	Carnarvon Hibiscus	West Seahorse/Sea Lion (See VIC/L31)
VIC/P68	Bass Oil	Leatherjacket
VIC/P70	Esso Deepwater	Dory/Baldfish
VIC/P71	Llanberis Energy	-
VIC/P72	Cooper Energy	-
Retention Leases, Gippsland Basin		
VIC/RL1	EARPL, BHP (Pending Renewal)	Golden Beach
VIC/RL13 VIC/RL14 VIC/RL15	Cooper Energy	Basker, Manta, Gummy Field
VIC/RL4	EARPL, BHP (Pending Renewal)	Remora

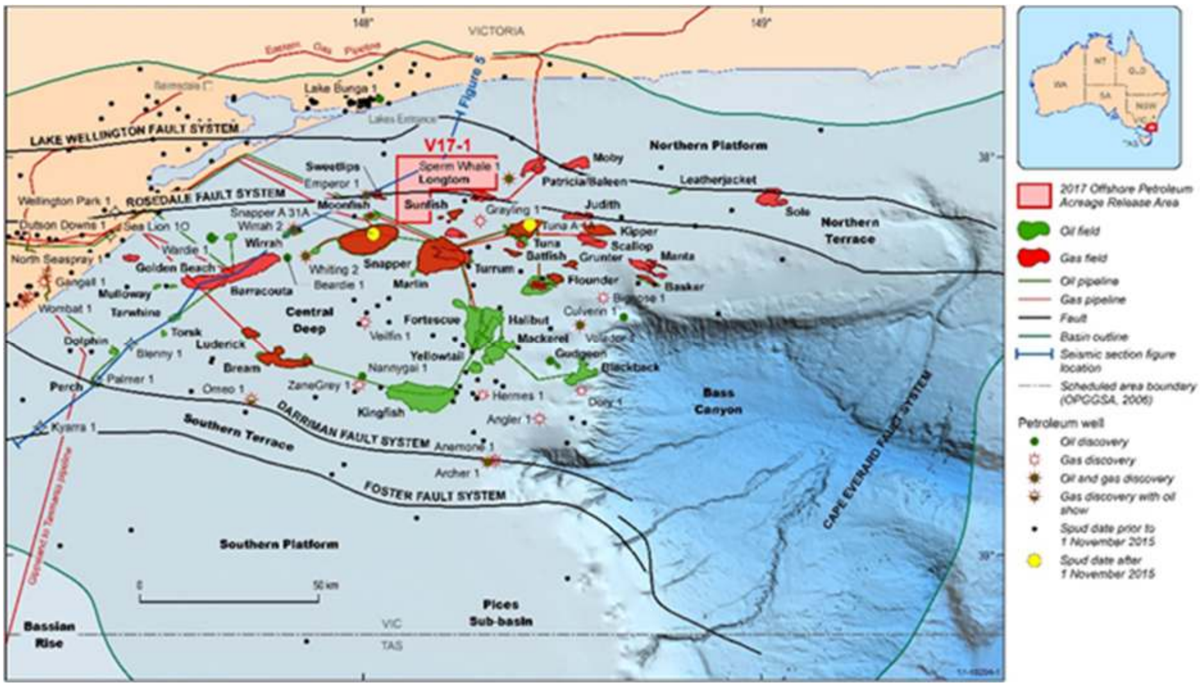


Figure 2-58 Gippsland Basin regional geology with petroleum fields and infrastructure (DIIS, 2017)

2.4.3 Shipping

The south-east and eastern coasts are some of Australia's busiest in terms of shipping activity and volumes. This traffic includes international and coastal cargo trade, and passenger and ferry services. Major ports include Melbourne, Geelong, Western Port, Sydney and Brisbane; with other minor ports important to commercial and recreational fishing, yachts and other pleasure craft. Bass Strait is one of Australia’s busiest shipping areas, with more than 3,000 vessels passing through Bass Strait each year (NOO 2002).

A shipping exclusion zone ('area to be avoided') exists around the operating oil and gas platforms in the Gippsland Basin, whereby unauthorised vessels larger than 200 gross tonnes are excluded from entry (Figure 2-59). Two traffic separation schemes have been implemented to enhance safety of navigation around the 'Area to be Avoided' by separating shipping into one-direction lanes for vessels heading north eastwards and those heading south westwards. One separation area is located south of Wilson's Promontory, and the other south of the Kingfish B platform.

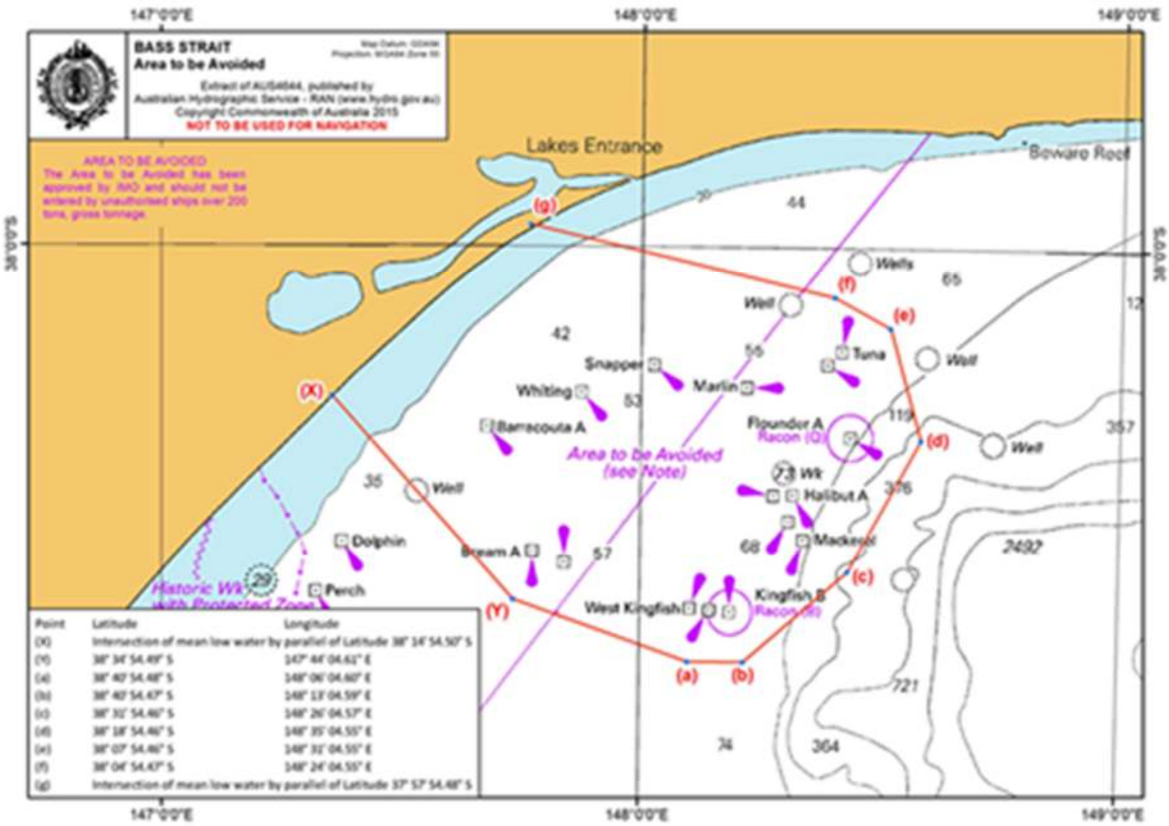


Figure 2-59 Shipping exclusion zones (Area to be Avoided) (ABF, 2017)

Figure 2-60 show real time vessel density maps around the area to be avoided as derived from the position of individual vessels, as broadcast by AIS (Automatic Identification System). Figure 2-61 shows similar time vessel density map for the DA.

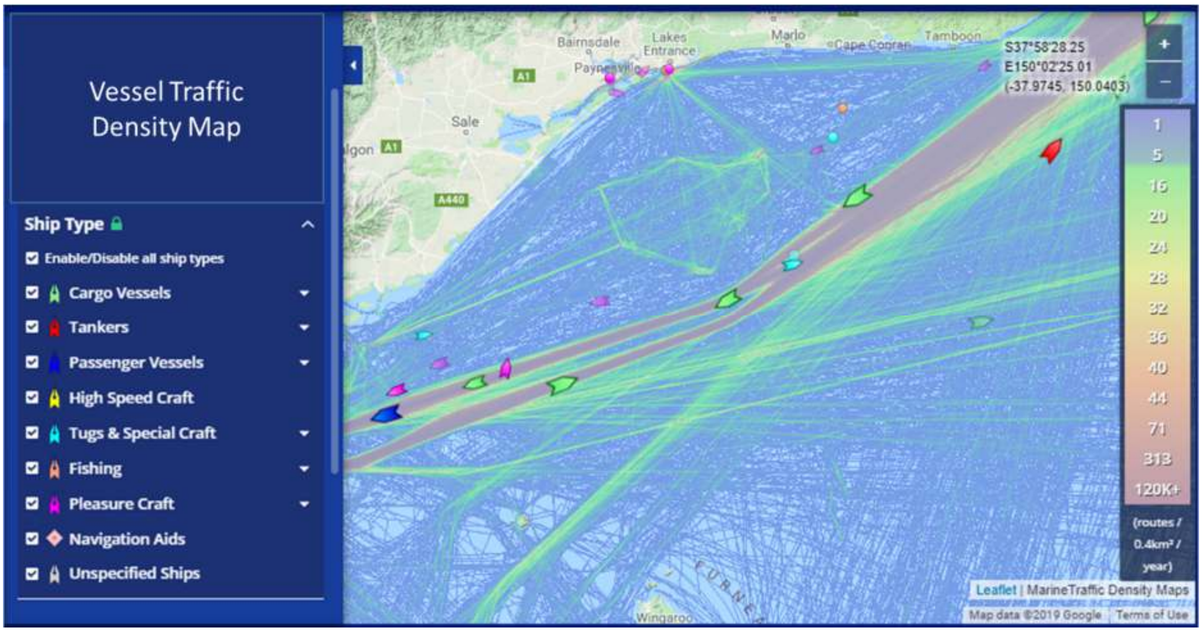


Figure 2-60 Shipping density around the Area to be Avoided real time data April, 2019 (VT, 2019)

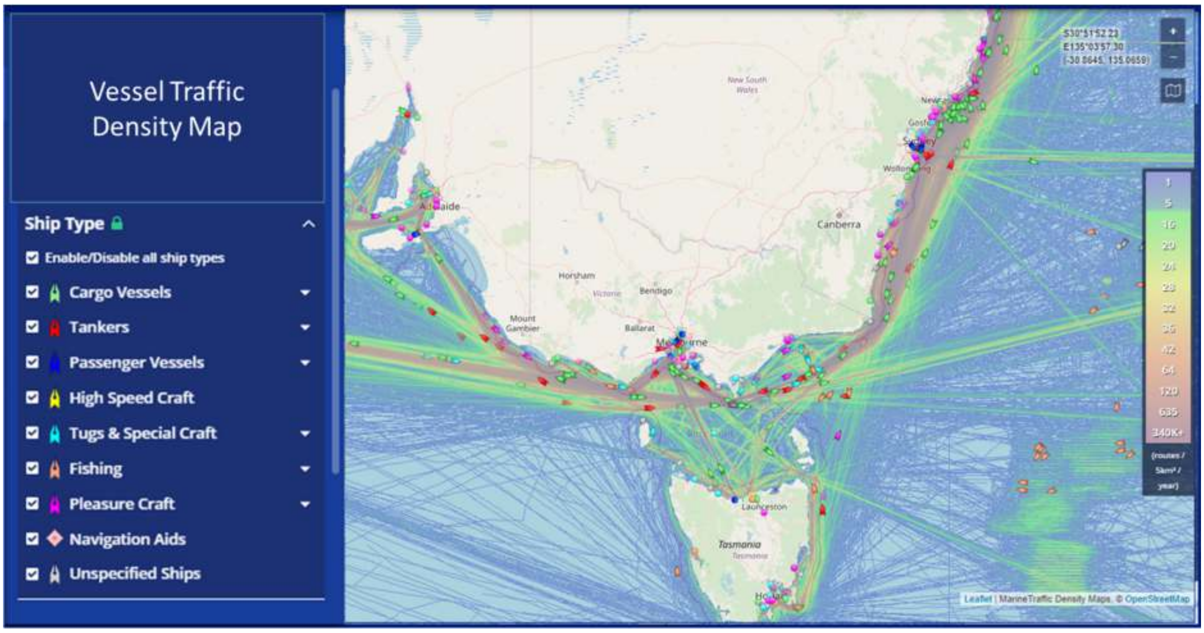


Figure 2-61 Shipping density in the DA real time data May, 2019 (VT, 2019)

2.4.4 Defence

The Australian Defence Force conducts a range of training, research activities, and preparatory operations in Australian waters (Figure 2-62). These activities may include transit of naval vessels, training exercises, shipbuilding and repairs, hydrographic survey, surveillance and enforcement, demolition, use of explosives, use of radar, sonar, sonobuoys, flares, sensors and other equipment, and search and rescue.

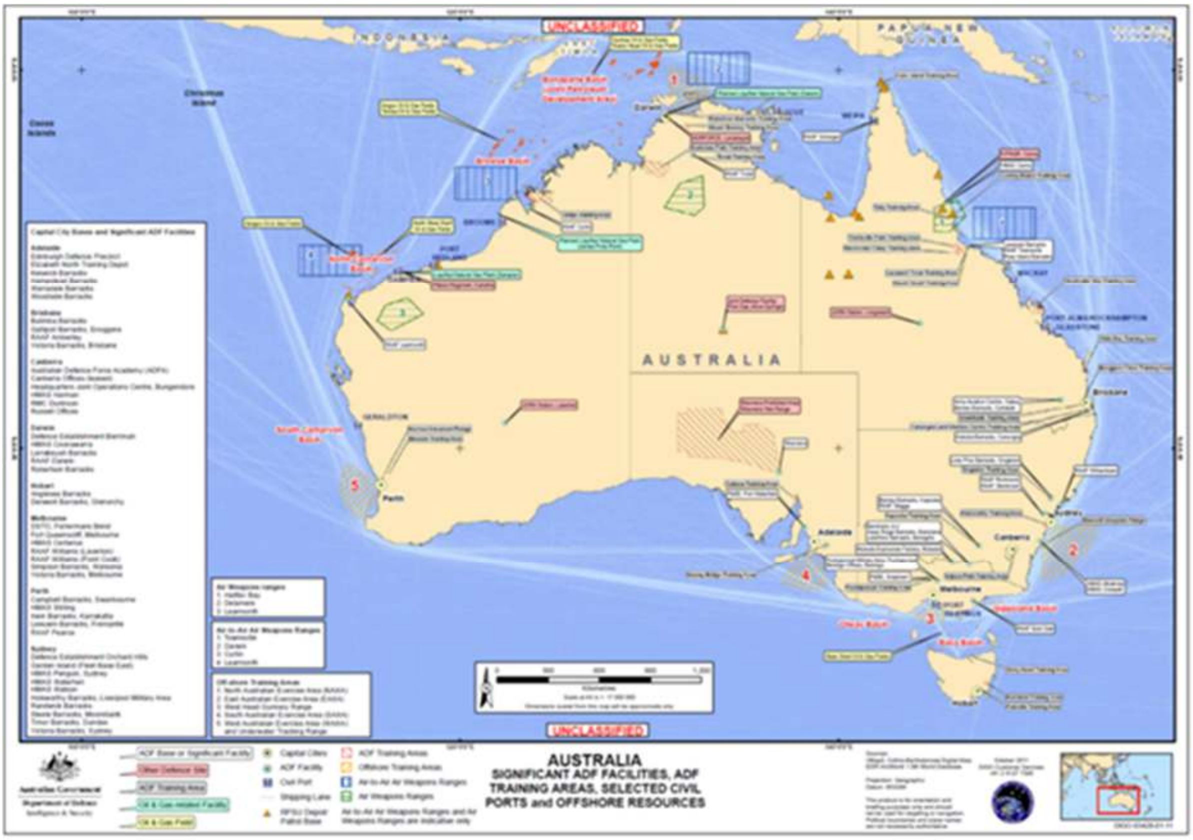


Figure 2-62 Significant Defence bases and facilities (Department of Defence, 2014)

Major defence bases within the DA include the multi-purpose wharf (naval operations) at Twofold Bay, Eden (New South Wales).

Primary training locations within the DA include the East Australia Exercise Area off the south coast of New South Wales.

Mine fields were laid in Australian waters during World War II. Post-war minefields were swept to remove mines and to make marine waters safe for maritime activities. There are three areas identified as dangerous due to unexploded ordnances, located south and east of Wilson's Promontory.

2.4.5 Tourism

The Australian coast and marine waters provide a diverse range of recreation and tourism opportunities, including scuba diving, charter boat cruises, cruise shipping, whale and wildlife watching, sailing, snorkelling, surfing, and kayaking.

In 2013-2014 the tourism industry contributed approximately $1.2 billion to the Gippsland economy; and employed approximately 12,400 (12.2%) (Tourism Victoria, 2014a, 2014b). Overnight visitors to the Gippsland area were predominantly Australian (86% intrastate, 11% interstate), with low (3%) international visitors (Tourism Victoria, 2014a). In East Gippsland, primary tourist locations are the Gippsland Lakes (the largest inland waterway in Australia), Lakes Entrance, Marlo, Cape Conran and Mallacoota. The area is renowned for its nature-based tourism (e.g. Croajingalong National Park), recreational fishing and water sports (lake and beaches) (Travel Victoria, 2017).

In 2017-2018 the South Coast NSW tourism industry contributed $2.6 billion to the economy. National and international visitor surveys identified ‘going to the beach’ as the second most popular activity (Destination NSW, 2018). The South Coast Region includes all the towns from Wollongong south to the Victorian border.

Tourism in Tasmania directly contributed $1.44 billion or about 4.9 per cent to Tasmania's Gross Product in the 2016-2017 period (TT, 2019). It directly supports around 18 900 jobs in Tasmania or about 7.9 per cent of total Tasmanian employment.

Tourism directly and indirectly supports around 38 000 jobs in Tasmania or about 15.8 per cent of total Tasmanian employment - higher than the national average and the highest in the country.

The East Coast has been identified as one of the most tourism-dependent regions in Australia. Port Arthur and the Freycinet National Park are rated in the top ten destinations in Tasmania (DT, 2019).

2.5 Cultural

The Commonwealth Heritage List is a list of Indigenous, historic and natural heritage places owned or controlled by the Australian Government which have a significant heritage value to the nation. These and other places within the DA with cultural values are described in this section.

2.5.1 Indigenous

No indigenous places are listed on the Commonwealth Heritage List within the DA. Other indigenous protected and recognised places are described below. In addition, places with indigenous cultural values are described within the National Parks and Reserves where they exist (Refer Section 2.2.8).

Indigenous Protected Areas

Indigenous Protected Areas are an essential component of Australia's National Reserve System, which is the network of formally recognised parks, reserves and protected areas across Australia, designed to protect the nation's biodiversity. Indigenous Protected Areas protect cultural heritage into the future, and provide employment, education and training opportunities for Indigenous people in remote areas. At the time of writing there were 75 Indigenous Protected Areas in Australia of which five occur in the DA. They are all areas on and around Flinders Island in Tasmania as shown in Figure 2-63 and are all important rookeries for mutton birds and important cultural resource for Tasmanian Aboriginal people.

Figure 2-63 Indigenous Protected Areas in the DA (DMPC, 2019 a)

Native Title

Non-exclusive native title rights and interests that exist over land and water in the determination area include:

- Rights of access.
- Rights to use and enjoy the land.
- Rights to take resources from the land for non-commercial purposes.
- Rights to protect and maintain sites of importance within the determination area.
- Rights to engage in certain activities on the land (including camping, cultural activities, rituals, ceremonies, meetings, gatherings, and teaching about the sites of significance within the determination area).

These rights do not confer exclusive rights of possession, use and enjoyment of the land or waters. Native title does not exist in minerals, petroleum or groundwater.

The Gunai-Kurnai people hold native title over much of Gippsland. The native title determination area (Tribunal file no. VCD2010/001) covers approximately 45,000 hectares and extends from west Gippsland near Warragul, east to the Snowy River, and north to the Great Dividing Range, (Figure 2-64). It also includes 200 metres of offshore sea territory between Lakes Entrance and Marlo. The area includes 10 parks and reserves that are jointly managed by the Victorian government and the Gunai-Kurnai people (NNTT, 2010).

Aboriginal occupancy by the Gunai-Kurnai people pre-dates the time at which the sea reached its present level by many thousands of years; thus, many early hunting grounds are now under the sea.

In the past, coastal wetlands were highly productive areas for hunter-gatherer people, having a variety of habitats and species, so the majority of archaeological sites in Victoria are found within 1 km of the coast (LCC 1993). Along the Gippsland coast, stone artefacts that have been found were mostly made from silcrete and quartz from the hinterland. Middens on offshore islands indicate that in the past, Aboriginal people from the area now known as Wilsons Promontory were likely to have visited (Jones & Allen 1979).

At the time of writing a Native Title Claimant Application was registered by the Gunai-Kurnai People (VID734/2014) for an area covering the Wilsons Promontory area (NNTT, 2019).

There are no native title determinations in NSW within the limits of the DA however a Native Title Claimant Application was registered by the South Coast People (NSD1331/2017) for an area covering the NSW south coast from the south of Sydney to Eden, including the coastal waters (NNTT, 2018). Indigenous places along the southern NSW coast include Barlings Beach, Ten Pelican Lake BrouBarunguba Aboriginal Place, Mystery Bay Fish Trap, Merriman Island and Bermagui Waterhole (NSW OEH, 2019a).

There are no native title determinations in Tasmania, although there are areas of indigenous cultural significance and indigenous protected areas including Mt Chappell Island, Badger Island, Babel Island, Great Dog Island in the Fernaux Group (DPMC, 2019).

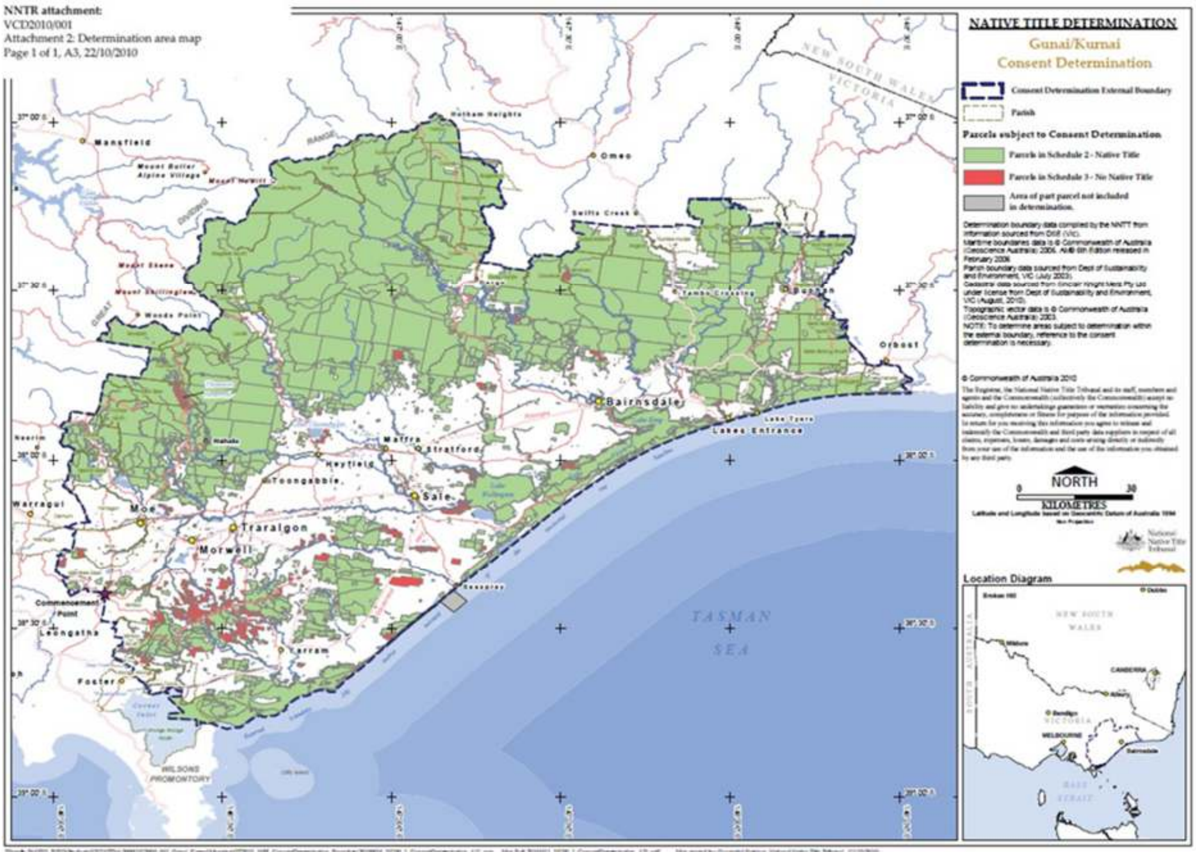


Figure 2-64 Gunai-Kurnai Native Title Determination Area (VCD2010/01)

2.5.2 Natural

The Commonwealth Heritage List is a list of Indigenous, historic and natural heritage places owned or controlled by the Australian Government. There are four listings on the Commonwealth Heritage list under the natural classification which occur in the DA.

- Point Wilson is an important part of the Western Port Phillip Bay Ramsar Area in Victoria, an internationally significant wetland that provides habitat for many migratory and resident wading birds and waterfowl. The Point Wilson Defence Area is a productive and diverse wetland and saltmarsh habitat supporting many shorebirds.

- The Beecroft Peninsula is the best example of a Permian cliffed coast in New South Wales. It is about 4040ha south of the town of Currarong. The area supports a high diversity of vegetation types within a small area including mangroves, saltmarsh, freshwater swamps, heathland, eucalypt forest and subtropical and littoral rainforest. Beecroft Peninsula retains the largest area of heath remaining on the south coast of New South Wales. This floristically rich vegetation provides important habitat for a variety of bird species, including the vulnerable ground parrot (PEZOPORUS WALLICUS). The place supports 35 bird species listed on international migratory bird treaties (JAMBA, CAMBA, and the Bonn Convention). The ground parrot (PEZOPORUS WALLICUS), which is listed as vulnerable in New South Wales, occurs in heath, swamp and sedgeland habitats and has an estimated maximum population size of 450 individuals on the peninsula.
- The Malabar Headland just north of Botany Bay, NSW contains two significant bushland remnants - referred to as the coastal section and the western section. Together, these contain what is probably the largest area of essentially unmodified bushland in Sydney's Eastern Suburbs. The bushland is a significant part of one of two semi-natural corridors between Botany Bay and Port Jackson. The two sections support at least seven distinct plant communities. This diversity of habitats is only matched in the Eastern Suburbs in Botany Bay National Park (DoEE, 2019al).
- Tasmanian Seamounts Area – also a key ecological feature, refer to Section 2.2.7.5 for information on the Seamounts South and East of Tasmania.

2.5.3 Historic – Commonwealth Heritage

The majority of listings on the Commonwealth Heritage list under the historic classification which occur in the DA are lighthouses; these and the other listings are not considered relevant.

No Historic Indigenous Commonwealth listed places were found within the DA (DoEE, 2019am).

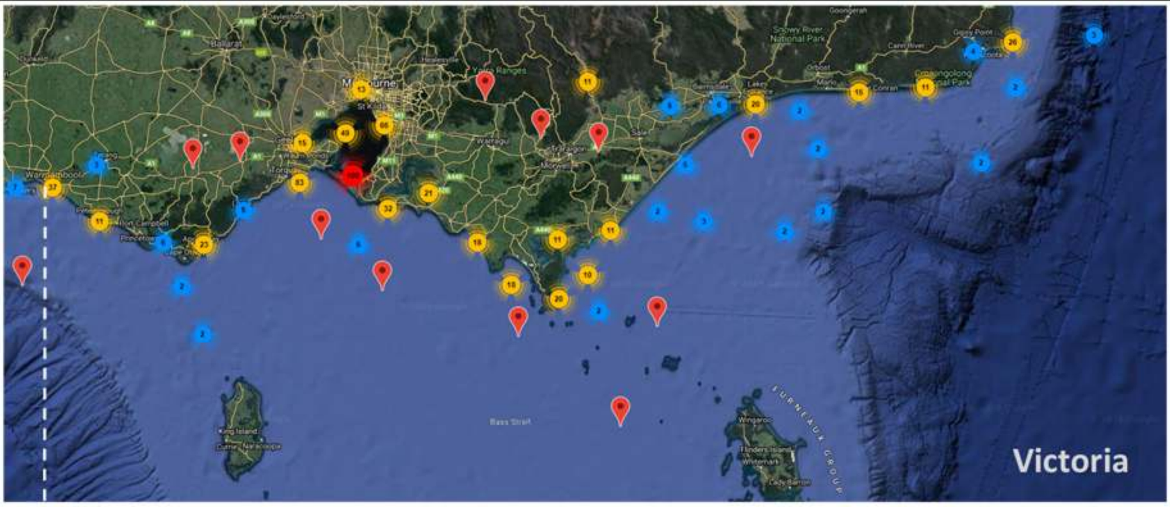
2.5.3.1 Historic – Maritime

A search of the National Shipwrecks Database which includes all known shipwrecks in Australian waters, identified 969 shipwrecks within the DA at the time of writing. The Historic Shipwrecks Act,1976, protects historic wrecks that are more than 75 years old and in Commonwealth waters (DoEE, 2019g). Table 2-43 below summarises both the historic and other shipwrecks within the DA, by state.

Figure 2-65 maps the location of the shipwrecks.

Table 2-43 Shipwreck numbers within the DA by state

	Historic Shipwrecks	Other Shipwrecks
Victoria	417	126
Tasmania	415	167
New South Wales	290	63



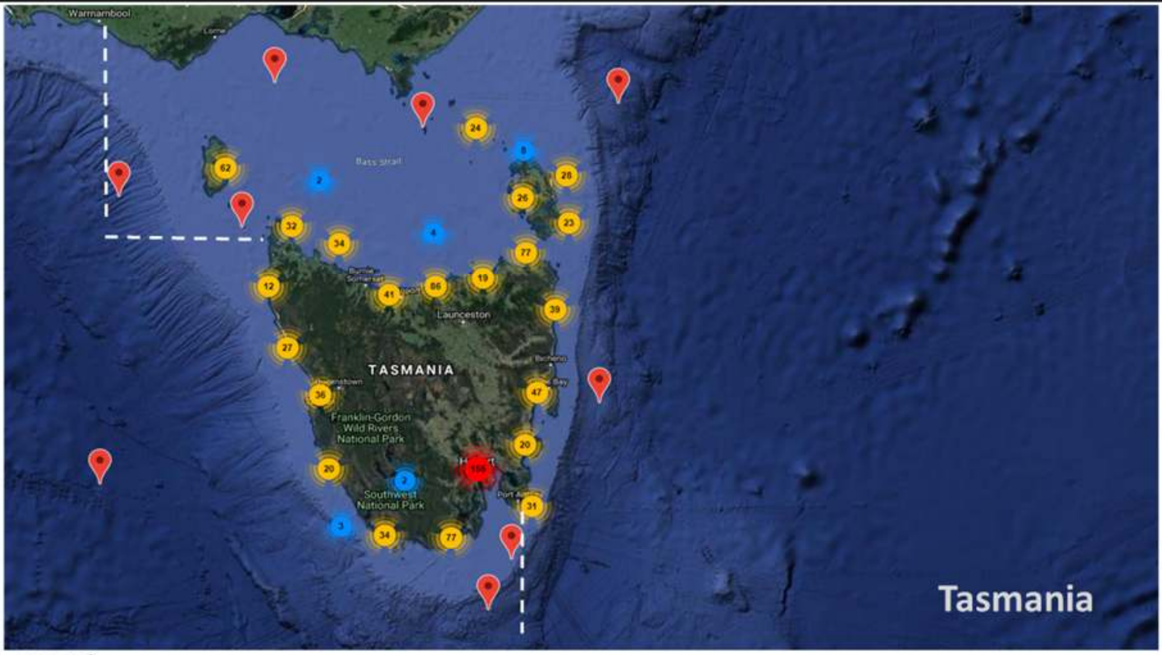
Legend

------ Limits of DA

- red marker indicates location of an individual shipwreck
- numbered blue and yellow markers indicate the number of shipwrecks in that location

Shipwrecks within the Described Area

General guidance only from publically available sources. No liability is taken for inaccuracies of data.



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------ Limits of the DA

- red marker indicates location of an individual shipwreck
- numbered blue and yellow markers indicate the number of shipwrecks in that location

Shipwrecks within the Described Area

General guidance only from publically available sources. No liability is taken for inaccuracies of data.

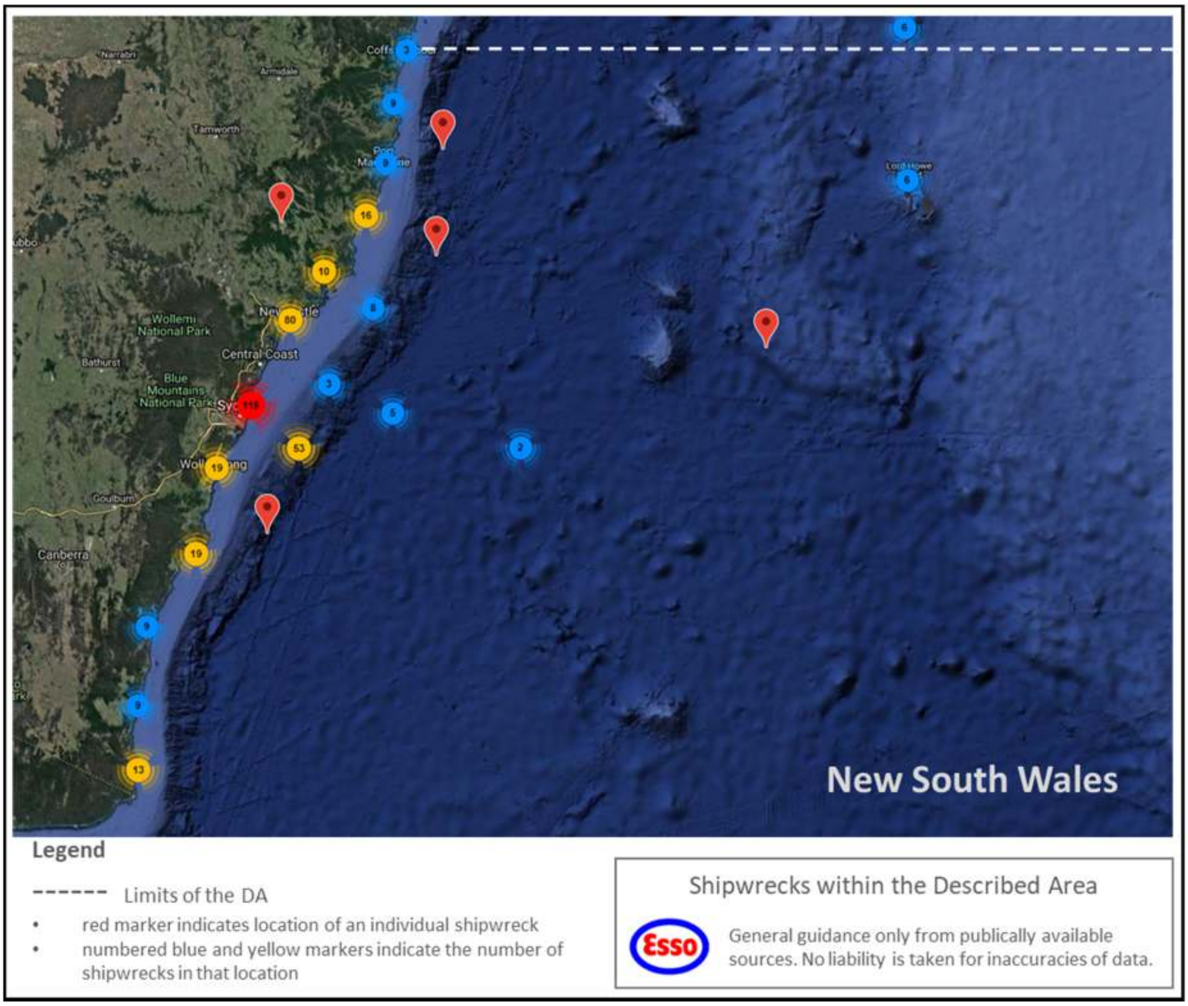

Figure 2-65 Shipwreck sites in the DA as listed in the National Shipwrecks Database (DoEE, 2019)

Table 2-44 lists the 29 shipwrecks in the Bass Strait within approximately 15 kms of the perimeter of the EGBPA. 15 of these are concentrated within 5 km of the coastline between Lakes Entrance and Golden Beach.

Table 2-44 Shipwrecks within approximately 15km of the EGBPA.

Vessel Name	Year wrecked	Location Latitude	Location Longitude
Magnolia	1887	-38.465	147.225
SS Glenelg Screw Steamer	1900	-38.55	147.21
Unidentified (ID 6700)	unknown	-38.61	147.57
City of Hobart Screw Steamer	1877	-38.61	147.57
Struan Sailing vessel	1856	-38.5	147.75
Victoria	1908	-38.835	148.125
Rembrandt Sailing vessel	1861	-38.67	148.2
AHO 6528	1941	-38.55	148.5
Talark	unknown	-38.37	148.3
Result	1880	-38.29	148.71

Favourite Sailing Vessel	1852	-38.215	147.95
Unidentified Sailing Vessel	1870	-37.95	148.02
Pomona Sailing Vessel	1866	-37.84	148.33
Anne and Mary Sailing Vessel	1887	-37.93333	148.3167
Rosedale Sailing Vessel	1872	-37.88	148.03
SS Despatch	1911	-37.89	147.98
Buaja	1980	-37.88	147.98
Tommy Norton Paddle Steamer	1877	-37.89	147.975
Shark	1978	-37.89	147.97
Baang Yardna	unknown	-37.88	147.96
Country Antrim Sailing Vessel	1897	-37.95	147.82
Latrobe Sailing Vessel	1978	-37.97	147.79
Unidentified (ID 6719)	unknown	-37.98	147.79
Pretty Jane	1882	-38.045	147.64
Norfolk Screw Steamer	1914	-38.055	147.61
Julius	1892	-38.09	147.565
Trinculo Sailing Vessel	1879	-38.25	147.34
Trancoolah	1884	-38.255	147.325
Leven Lass	1854	-38.165	148.46
Colleen Bawn	1913	-38.265	147.425

Some historic shipwrecks lie within protected or no-entry zones. These zones cover an area around a wreck site, and ensure that a fragile or sensitive historic shipwreck is actively managed.

Six of the historic shipwreck protected zones occur within nearshore coastal waters of the DA (Figure 2-66):

- SS Alert (1893)
- Clonmel (1841)
- SS Glenelg (1900),
- Bega (1908),
- Lady Darling (1880) and
- M24 (Japanese Midget Submarine) (1942)

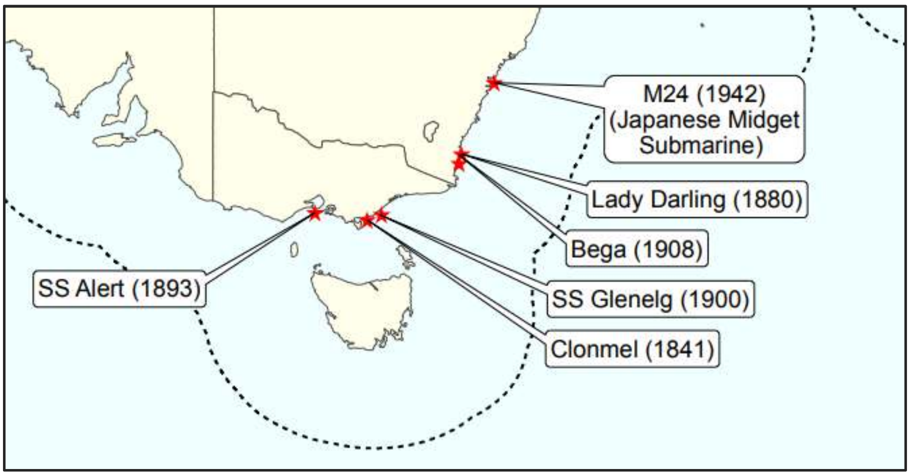

Figure 2-66 Historic Shipwreck Protected Zones within DA (ERIN, 2017)

The SS Glenelg, located approximately 10km from the EGBPA at the entrance to Gippsland Lakes, was a twin screw steamer owned by J.B.Ellerker. It was put on the coastal run during 1893 in opposition to Huddart Parker's S.S. Despatch. The vessel foundered suddenly on 25 March 1900, shortly after leaving Lakes Entrance. Only three people got ashore in a lifeboat. At the Marine Court of Inquiry, a number of possible reasons for the disaster were suggested. However, no evidence was found to explain the sinking, which took 38 lives.

The Clonmel is a famous Australian historic shipwreck located at the entrance to Corner Inlet approximately 60km west of the EGBPA. The luxury paddle steamer Clonmel was one of the first steamships to operate in Australian waters and was built especially for the Australian intercolonial passenger trade, intending to ply the sea-route between Sydney, Melbourne and Launceston in the early 1840s. It was also one of the last wooden steamships to be built before iron became the more popular construction material.

On just its second inter-colonial voyage, en route from Sydney to Port Phillip (Melbourne) with 80 passengers and crew, the Clonmel stuck a sandbar on the east coast of Victoria. All passengers were transferred to the shore, where a makeshift survivors’ camp was established. The passengers stayed for nine days after the wrecking, before being finally transferred to their destination.

Favourable descriptions of the arable land and ‘welcoming bay’ near the wrecksite were seized upon with great enthusiasm by the press and shortly thereafter the Gipps Land Company was formed. The wreck of the Clonmel was consequently instrumental in opening up East Gippsland for trade and pastoral settlement, and throughout the 1850s and 1860s was the centre of trade for south eastern Victoria (DOEE, 2019).

2.6 Social Environment

The Social values of the environment can be defined in many ways and the relative importance of the values will vary depending on the perspective and interests of the people, groups or organisations affected (or otherwise). Social values, therefore can be described in terms of conservation and biodiversity values (Section 2.2), economic drivers (Section 2.4) or cultural significance (Section 2.5). These values have been described in the sections noted. This section describes the values of the recreational activities in the DA.

2.6.1 Recreational Fishing

Recreational fishing in Australia is a multi-billion dollar industry. Most recreational fishing typically occurs in nearshore coastal waters (shore or inshore vessels), and within bays and estuaries. Offshore fishing (>5 km from the coast) only accounts for approximately 4% of recreational fishing activity in Australia; charter fishing vessels are likely to account for the majority of this offshore fishing activity.

The variation in recreational fishing intensity along the coast is illustrated in Figure 2-67; there is moderate to high recreational use along the majority of the coast in the DA. Common recreational fish species include Tiger Flathead, bream, snapper, Australian Salmon, and lobster. Offshore catches can include mackerel, tuna, groper and shark.

Recreational fishing amongst the Nooramunga islands, on the Gippsland Lakes, along Ninety Mile Beach, at Cape Conran Coastal Park and Croajingolong National Park and off the coast of Mallacoota, comprising both boat based fishing and beach based surf fishing. Boat based fishing includes charter operations and private craft launched from boat ramps in the region. Boatyards and slipways are located at Bullock Island (Lakes Entrance), Port Welshpool and Mallacoota.

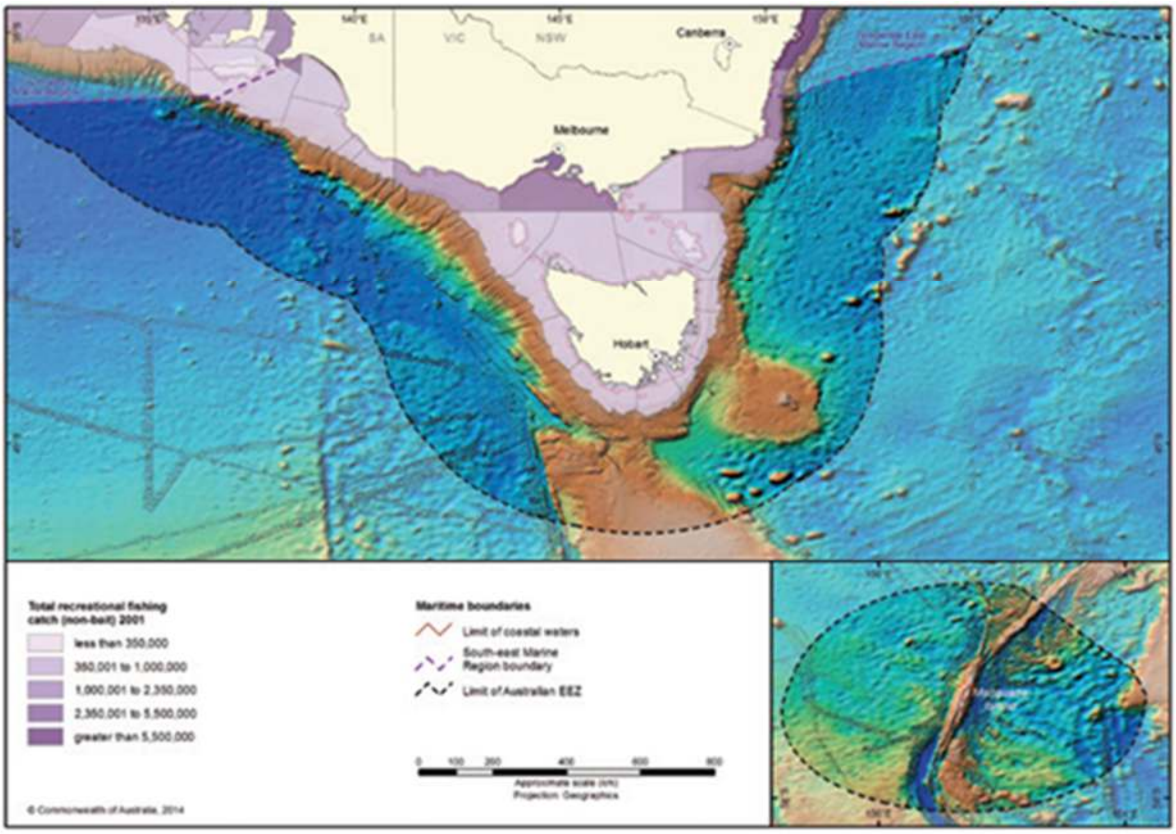

Figure 2-67 Recreational Fishing Catch in Temperate East (top) and South-eastern (bottom) Marine Region (DoEE, 2015a)

2.6.2 Recreational Boating and Leisure Activities

Australia and its people are renowned for their love of the outdoors – the outback and the beaches are often celebrated as part of its (our) cultural identity. With the majority of the population residing in coastal areas, recreational boating, coastal camping, hiking, touring and visits to the beach are leisure activities accessible to all most people and are integral to life in Australia for all ages. Popular coastal destinations are located across the coastline of the DA. Further description of declared parks and reserves are provided in Section 2.2.8.

3 Legislative and other requirements

3.1 Legislative Framework

The principal offshore legislation for production activities beyond three nautical miles to the outer extent of the Australian Exclusive Economic Zone at 200 nautical miles is the Commonwealth Offshore Petroleum and Greenhouse Gas Storage (OPGGS) Act 2006. The OPGGS Act is administered by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

3.2 Relevant Legislation

In accordance with Regulation 13(4), relevant Commonwealth, Victorian, New South Wales and Tasmanian Legislation as it applies to the operation of facilities and petroleum pipelines and projects is provided in Table 3-1,

Table 3-2,

Table 3-3 and

Table 3-4 respectively.

The Australian Petroleum Production and Exploration Association (APPEA) Code of Environmental Practice 2008 provides guidance on a set of recommended minimum standards for petroleum industry activities offshore. These standards are aimed at minimising adverse impact on the environment, and ensuring public health and safety by using the best practical technologies available.

The Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC 2000) are also relevant to the activity and provide water quality guidelines proposed to protect and manage the environmental values supported by the water resources.

Table 3-1 Key Commonwealth legislation

Legislation	Coverage and Applicability to Activity		International Convention Enacted	Administering Authority
Offshore Petroleum & Greenhouse Gas Storage Act 2006 & associated regulations (associated regulations include: OPGGS (Environment) Regulations 2009, Offshore Petroleum and Greenhouse Gas Storage (Resource Management and Administration) Regulations 2011 [RMAR], Offshore Petroleum and Greenhouse Gas Storage (Safety) Regulations 2009)	The *OPGGS Act* addresses all **licensing, health, safety, environmental** and royalty **issues for offshore petroleum exploration and recovery operations** extending beyond the 3 nautical mile limit. The *OPGGS (Environment) Regulations* ensures that petroleum activities are carried out in a manner; consistent with the principles of ecologically sustainable development set out in section 3A of the EPBC Act; and by which the environmental impacts and risks of the activity will be reduced to as low as reasonably practicable and will be of an acceptable level.	All Gippsland facilities operate under an accepted Environment Plan in accordance with the *OPGGS (Environment) Regulations, 2009.* All Gippsland facilities operate under an approved Safety Case per the *OPGGS (Safety) Regulations, 2009*. All wells in Gippsland are operated under an approved Well Operations Management Plan per the *OPGGS (Resource Management and Administration) Regulations 2011* which includes measures for well control as described in Vol 2		National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA)
Environment Protection & Biodiversity Conservation Act 1999	This Act focuses on environmental matters of National Significance, streamlines the Commonwealth environmental assessment and approval process and provides an integrated system for biodiversity conservation and management of protected areas. **Matters of national environmental significance** are world heritage properties; Ramsar wetlands; listed threatened species and communities; migratory species under international agreements; nuclear actions and the	Relevant Matters of National environmental significance covered in Volume 1 – Description of the Environment EPBC Protected matters search tool utilised to identify relevant data Approved conservation advice and management plans relating to listed species or threatened ecological communities have been identified and considered where appropriate	1992 Convention on Biological Diversity & Agenda 21. Convention on International Trade in Endangered Species of Wildlife and Flora 1973 (CITES). Japan/Australia Migratory Birds Agreement 1974 (JAMBA). China/Australia Migratory Birds Agreement 1974 (CAMBA).	Department of the Environment and Energy (DoEE) For petroleum activities in Commonwealth waters, National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA)

Legislation	Coverage and Applicability to Activity		International Convention Enacted	Administering Authority
	commonwealth marine environment. On 28 February 2014, NOPSEMA became the sole designated assessor of petroleum and greenhouse gas activities in Commonwealth waters in accordance with the Ministers for the Environment's endorsement of NOPSEMA' s environmental authorisation process under Part 10, Section 146 of the EPBC Act.		Republic of Korea Migratory Birds Agreement 2006 (ROKAMBA). USSR-Australia Migratory Bird Agreement. Convention on Wetlands of International Importance especially waterfowl habitat 1971 (Ramsar). International Convention on Whaling 1946. Convention on the Migratory Species of Wild Animals (Bonn Convention) 1979. Convention concerning the Protection of the World Cultural and Natural Heritage 1972.	
Environment Protection (Sea Dumping) Act 1981	Act prevents the deliberate **disposal of wastes** (loading, dumping, and incineration) **at sea** from vessels, aircraft, and operational areas.	Activities described in this plan are controlled to prevent actions that would contravene this Act. Relevant control measures are described in Vol 2 and the implementation strategy is described in Vol 4.	Convention on the Prevention of Marine Pollution by dumping of waste & other materials 1972 (London Convention) MARPOL	Department of the Environment and Energy (DoEE)
Australian Maritime Safety Authority Act 1990	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	Oil spill preparedness and response plans for dealing with a potential worst case scenario spill is described in Vol 3 including consultation and coordination of activities with AMSA	International Convention on Oil Pollution (Preparedness, Response and Cooperation) 1990 (OPRC)	Australian Maritime Safety Authority (AMSA)

Legislation	Coverage and Applicability to Activity		International Convention Enacted	Administering Authority
	emergencies. Requirements are given effect through AMSA.			
Historic Shipwrecks Act 1976	Protects the heritage values of shipwrecks and relics.	Heritage listed shipwrecks within the DA are identified in Vol 1.	Convention on Conservation of Nature in the South Pacific (APIA Convention) 1976. Aust-Netherlands Agreement concerning old Dutch Shipwrecks 1972. Convention on Protection of Underwater Cultural Heritage 2001.	Department of the Environment and Energy (DoEE)
National Environment Protection Council Act 1994 Associated act: National Environment Protection Measures (Implementation) Act 1998	Council develops (in conjunction with other state authorities) through the Intergovernmental Agreement on the Environment on consistent environmental standards to be adopted between states. These requirements take the form of National Environment Pollution Measures (NEPMs) such as **National Pollutant Inventory.**	Standards required under the NEPM are used to define operating limits and reporting of emissions required by the National Pollutant Inventory is conducted annually for all Esso operated activities covered by this plan.		Natural Resources Management Ministerial Council / Environment Protection & Heritage Council
National Greenhouse and Energy Reporting Act 2007	Provides for the reporting and dissemination of information related to greenhouse gas emissions, greenhouse gas projects, energy production and energy consumption.	Annual submission covering Gippsland activities provided to Clean Energy Regulator	United Nations Framework Convention on Climate Change,1992, and the Kyoto Protocol	Clean Energy Regulator
Protection of the Sea (Prevention of Pollution from Ships) Act 1983	Regulates ship-related operational activities and invokes certain requirements of the MARPOL convention relating to discharge of noxious liquid substances, sewage, garbage, air pollution etc.	Activities described in this plan are controlled to prevent actions that would contravene this Act. Relevant control measures are described in Vol 2 and the implementation strategy is described in Vol 3	International Convention for the Prevention of Pollution from Ships [MARPOL 73/78] provisions and unified interpretations of the articles, protocols and Annexes of MARPOL 73/78, including the	Australian Maritime Safety Authority (AMSA)

Legislation	Coverage and Applicability to Activity		International Convention Enacted	Administering Authority
			incorporation of all of the amendments that have been adopted by the MEPC and have entered into force, up to and including the 2000 amendments (as adopted by resolution MEPC 89(45)).	
Biosecurity Act 2015	The Act is about managing diseases and pests that may cause harm to human, animal or plant health or the environment. It empowers authorities to monitor, authorise, respond to and control biosecurity risks for the movement of goods, vessels and people to **prevent the introduction, establishment or spread of diseases or pests** affecting human beings, animals, or plants.	The risk of introduction of Invasive Marine Species is considered and managed for all vessels covered under this activity as described in Vol 2.	International Convention for the Control and Management of Ships Ballast Water & Sediments 2004 United Nations Convention on the Law of the Sea 1982 Convention on Biological Diversity 1992	Department of Agriculture and Water Resources
Navigation Act 2012	Regulates ship-related activities and invokes certain requirements of the MARPOL convention relating to **equipment and construction of ships**.	Vessels operating within the permit areas comply with the requirements of the Navigation Act. Specifically in relation to environment protection, activities relating to control of discharges are discussed in Vol 2.	International Convention for the Prevention of Pollution from Ships [MARPOL 73/78] (certain sections) Convention on the International Regulations for Preventing Collisions at Sea 1972	Department of Infrastructure, Regional Development and Cities(DoIRDC) /AMSA (formerly Department of Infrastructure & Regional Development)
Coastal Waters (State Powers) Act 1980	This Act transferred **constitutional power over coastal waters**, and title to seabed minerals within territorial	Consultation, reporting and other matters impacting coastal waters are addressed with State authorities as described in Vol 4		Geoscience Australia (Maritime Boundaries Advice Unit)

Legislation	Coverage and Applicability to Activity		International Convention Enacted	Administering Authority
	limits, from the Commonwealth to the States.			
Protection of the Sea (Harmful Anti-fouling Systems) Act 2006	Regulates the use of harmful **anti-fouling systems employed on vessels** and their effects on the marine environment.	The risk of introduction of Invasive Marine Species is considered and managed for all vessels covered under this activity as described in Vol 2. This includes consideration of appropriate antifouling systems.	International Convention on the Control of Harmful Anti-fouling Systems on Ships 2001	AMSA
Native Title Act 1993	Allows for **recognition of native title** through a claims and mediation process and also sets up regimes for obtaining interests **in lands or waters** where native title may exist.	Native Title within the DA is identified and recognised in Vol 1.		Attorney-General's Department
Civil Aviation Act 1988 and associated regulations (including Civil Aviation Safety Regulations 1998)	The Act sets up a Civil Aviation Safety Authority with functions to regulate the safety of civil aviation, including the carrying of dangerous goods, airworthiness standards for aviation, maintenance; general operational and flight rules; and aerial application operations.	Rotary wing aircraft servicing the Gippsland facilities operate under the requirements of CASA. This contributes to safe operation and transport of goods thereby reducing risk of incidents which could have environmental impacts as described in Vol 2.	Chicago Convention 1944.	Civil Aviation Safety Authority (CASA)
Radiocommunications Act 1992	The Act provides for the **management of the radiofrequency spectrum** in order to make adequate provision of the spectrum for use by agencies involved in the defence or national security of Australia, law enforcement or the provision of emergency services; and for use by the public or community services.	Radiocommunications systems on platforms, vessels and aircraft operate within frequency ranges permitted under the Act. Clear communication channels are required to enable effective controls preventing or limiting potential impacts from incidents (e.g., collision, emergency response) as defined in Vol 2 and Vol 3		Australian Communications and Media Authority (ACMA)

Legislation	Coverage and Applicability to Activity		International Convention Enacted	Administering Authority
		Prevention of collision		

Table 3-2 Key Victorian legislation

Legislation	Coverage
Environment Protection Act 1970	This Act is the key Victorian Legislation regulating emissions to the environment within Victoria (relevant for waste transfer and disposal, National Pollutant Inventory reporting). Administered by the Victorian Environment Protection Authority.
Pollution of Waters by Oil and Noxious Substances Act 1986	This Act is the Victorian state legislation giving effect to the requirements of MARPOL 73/78 within state waters. Administered by the Victorian Environment Protection Authority
Emergency Management Act 1986	This Act ensures that the components of emergency management (prevention, response and recovery) are organised to facilitate planning, preparedness, operational coordination and community participation. Administered by Department of Justice's Police and Emergency Management Division.
Port Management Act 1995	Under this Act all managers of local and commercial ports must prepare a Safety Management Plan and Environmental Management Plan (together known as SEMPs).
Marine Safety Act 2010	This Act provides for safe marine operations in Victoria.
Heritage Act 1995	This Act is the Victorian state legislation which protects the heritage values of shipwrecks and relics within state waters. Administered by the Heritage Council of Victoria.
National Parks Act 1975	This Act provides for the protection, use and management of Victoria's national and other parks. Administered by the Department of Environment and Primary Industries.
Radiation Act 2005	This Act provides for licencing for use and management of radioactive sources, and conducting radiation practice (including radiation testing).
Catchment and Land Protection Act 1994	This Act sets up a framework for the integrated management and protection of catchments. Administered by the Catchment Management Authorities.
Coastal Management Act 1995	This Act provides for co-ordinated strategic planning and management for Victorian coast, the preparation and implementation of management plans for coastal Crown land and a co-ordinated approach to approvals for use and development of coastal Crown land.
Land Titles Validation Act 1994	This Act validates past acts, provides for compensation rights for the holders of native title which has been affected by past acts, and confirms certain existing rights. The Act also confirms ownership by the Crown of natural resources, the right to regulate water flows and

Legislation	Coverage
	existing fishing rights under State law; and public access to waterways, beds and banks of waterways, coastal waters, beaches and public areas.
Dangerous Goods Act 1985	This Act, the associated Dangerous Goods (Storage and Handling) Regulations 2012 and the Code of Practice for the Storage and Handling of Dangerous Goods 2013 (WorkSafe) promotes the safety of persons and property in relation to the manufacture, storage, transfer, transport, sale, purchase and use of dangerous goods and the import of explosives and other dangerous goods.
OPGGS Act 2010 and OPGGS Regulations 2011	This Act and Regulations apply to petroleum operations effectively within three nautical miles of the Victorian coast and address licensing, health, safety, environmental and royalty issues for offshore petroleum exploration and development operations. Waters greater than 3 nautical miles offshore from the coast are Commonwealth waters and are covered by Commonwealth legislation (*OPGGS Act 2006*). The Commonwealth and Victorian legislation are, by agreement, very similar with regard to petroleum.

Table 3-3 Key New South Wales legislation

Legislation	Coverage
Protection of the Environment Operations Act 1997	This is the main piece of NSW environmental legislation covering water, land, air and noise pollution and waste management. Administered by the NSW Environment Protection Authority
Marine Pollution Act 2012	This Act is the NSW state legislation giving effect to the requirements of MARPOL 73/78 within state waters. Administered by Transport for NSW.
Ports and Maritime Administration Act 1995	This Act provides for the provision of marine safety services and emergency environment protection services for dealing with pollution incidents in NSW waters.
Heritage Act 1977	This Act provides for the identification, registration and interim protection of items of State heritage significance (including shipwrecks within state waters) in NSW. Administered by Heritage Council of NSW.
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. Administered by the NSW National Parks and Wildlife Service.
Wilderness Act 1987	This Act affords declared wilderness the most secure level of protection, requiring it to be managed in a way that will maintain its wilderness values and pristine condition by limiting activities likely to damage flora, fauna and cultural heritage. Administered by the NSW National Parks and Wildlife Service.
Marine Parks Act 1997	This Act provides for the protection and management of marine areas. Administered by the NSW Marine Parks Authority.

Table 3-4 Key Tasmanian legislation

Legislation	Coverage
Environmental Management and Pollution Control Act 1994	This is the primary environment protection and pollution control legislation in Tasmania. Administered by the Environment Protection Authority Tasmania
Pollution of Waters by Oil and Noxious Substances Act 1987	This Act is the Tasmanian state legislation giving effect to the requirements of MARPOL 73/78 within state waters. Administered by Environment Protection Authority Tasmania.
Emergency Management Act 2006	This Act establishes the Tasmanian emergency management framework which operates at state, regional and municipal levels.
Marine and Safety Authority Act 1997	This Act establishes Marine and Safety Tasmania as the authority responsible for the safe No probs. operation of vessels in Tasmanian waters and managing its marine facilities.
Historic Cultural Heritage Act 1995	This Act provides for the identification, assessment, protection and conservation of places having historic cultural heritage significance (including shipwrecks within state waters) in Tasmania. Administered by Tasmanian Heritage Council and Historic Heritage Section of Parks and Wildlife Service Tasmania (shipwrecks).
National Parks and Reserves Management Act 2002	This Act provides for the management of national parks and other reserved land. Administered by the Parks and Wildlife Service Tasmania.

APPENDIX A – Environment Policy

INTRODUCTION

The high quality of the directors, officers, and employees of Exxon Mobil Corporation is the Corporation's greatest strength. The resourcefulness, professionalism, and dedication of those directors, officers, and employees make the Corporation competitive in the short term and well positioned for ongoing success in the long term.

The Corporation's directors, officers, and employees are responsible for developing, approving, and implementing plans and actions designed to achieve corporate objectives. The methods we employ to attain results are as important as the results themselves. The Corporation's directors, officers, and employees are expected to observe the highest standards of integrity in the conduct of the Corporation's business.

The Board of Directors of the Corporation has adopted and oversees the administration of the Corporation's *Standards of Business Conduct*. The policies in the *Standards of Business Conduct* are the foundation policies of the Corporation. Wholly-owned and majority-owned subsidiaries of Exxon Mobil Corporation generally adopt policies similar to the Corporation's foundation policies. Thus, the Corporation's foundation policies collectively express the Corporation's expectations and define the basis for the worldwide conduct of the businesses of the Corporation and its majority-owned subsidiaries.

The directors, officers, and employees of Exxon Mobil Corporation are expected to review these foundation policies periodically and apply them to all of their work. The Corporation publishes from time to time guidelines with respect to selected policies. Those guidelines are interpretive and administrative and are not part of the *Standards of Business Conduct*. Any employee who has questions concerning any aspect of these policies should not hesitate to seek answers from management or the other sources indicated in the section below called "Procedures and Open Door Communication."

No one in the ExxonMobil organization has the authority to make exceptions or grant waivers with respect to the foundation policies. Regardless of how much difficulty we encounter or pressure we face in performing our jobs, no situation can justify the willful violation of these policies. Our reputation as a corporate citizen depends on our understanding of and compliance with these policies.

Darren W. Woods
Chairman
January 2017

ENVIRONMENT POLICY

It is Exxon Mobil Corporation's policy to conduct its business in a manner that is compatible with the balanced environmental and economic needs of the communities in which it operates. The Corporation is committed to continuous efforts to improve environmental performance throughout its operations.

Accordingly, the Corporation's policy is to:

- comply with all applicable environmental laws and regulations and apply responsible standards where laws and regulations do not exist;
- encourage concern and respect for the environment, emphasize every employee's responsibility in environmental performance, and foster appropriate operating practices and training;
- work with government and industry groups to foster timely development of effective environmental laws and regulations based on sound science and considering risks, costs, and benefits, including effects on energy and product supply;
- manage its business with the goal of preventing incidents and of controlling emissions and wastes to below harmful levels; design, operate, and maintain facilities to this end;
- respond quickly and effectively to incidents resulting from its operations, in cooperation with industry organizations and authorized government agencies;
- conduct and support research to improve understanding of the impact of its business on the environment, to improve methods of environmental protection, and to enhance its capability to make operations and products compatible with the environment;
- communicate with the public on environmental matters and share its experience with others to facilitate improvements in industry performance;
- undertake appropriate reviews and evaluations of its operations to measure progress and to foster compliance with this policy.

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APPENDIX C – EPBC Act Protected Matters Reports

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

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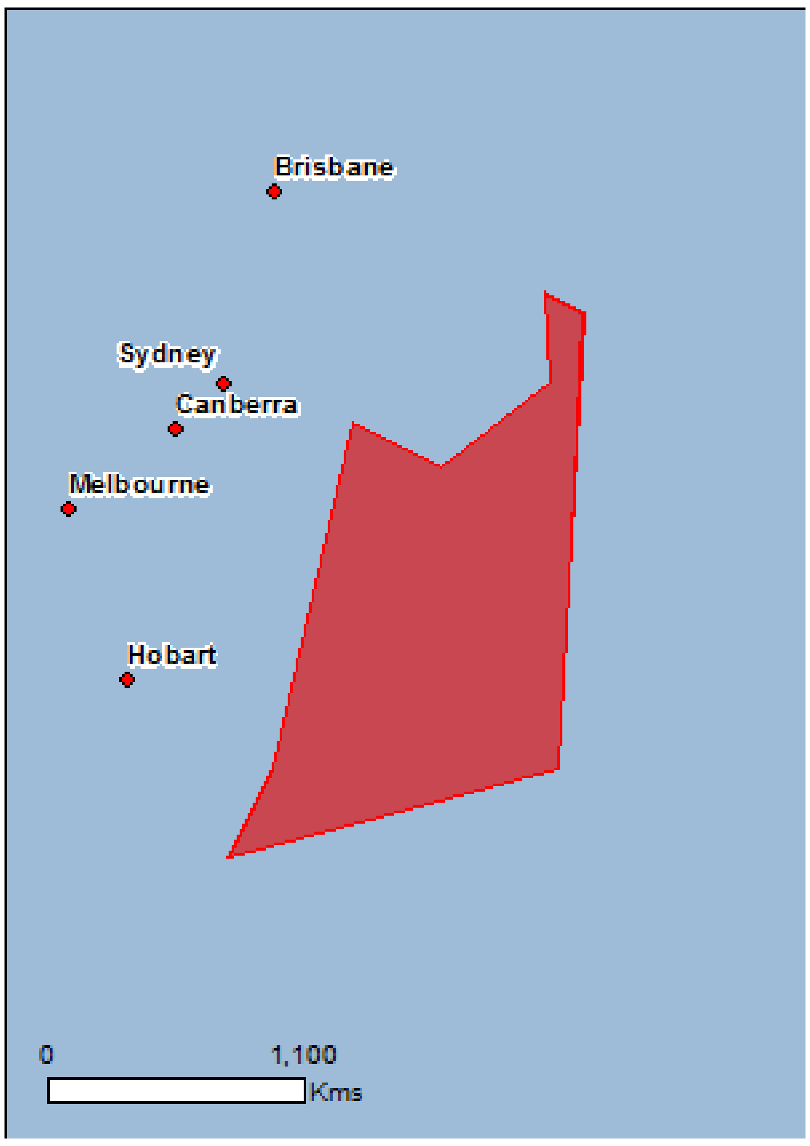

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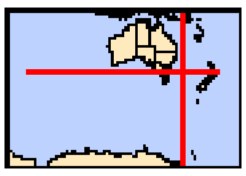

Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	1
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	36
Listed Migratory Species:	41

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	34
Whales and Other Cetaceans:	40
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	None
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Commonwealth Marine Area [Resource Information]

Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside the Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area. Generally the Commonwealth Marine Area stretches from three nautical miles to two hundred nautical miles from the coast.

Name
Extended Continental Shelf

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Species or species habitat likely to occur within area
Diomedea antipodensis gibsoni Gibson's Albatross [82270]	Vulnerable	Species or species habitat likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Species or species habitat likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Species or species habitat likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Species or species habitat likely to occur within area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat likely to occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat may occur within

Name	Status	Type of Presence
		area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area
Pterodroma heraldica Herald Petrel [66973]	Critically Endangered	Species or species habitat may occur within area
Pterodroma leucoptera leucoptera Gould's Petrel, Australian Gould's Petrel [26033]	Endangered	Species or species habitat may occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Species or species habitat may occur within area
Pterodroma neglecta neglecta Kermadec Petrel (western) [64450]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat likely to occur within area
Thalassarche bulleri platei Northern Buller's Albatross, Pacific Albatross [82273]	Vulnerable	Species or species habitat likely to occur within area
Thalassarche cauta cauta Shy Albatross, Tasmanian Shy Albatross [82345]	Vulnerable	Species or species habitat likely to occur within area
Thalassarche cauta steadi White-capped Albatross [82344]	Vulnerable	Species or species habitat likely to occur within area
Thalassarche chrysostoma Grey-headed Albatross [66491]	Endangered	Species or species habitat likely to occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Species or species habitat likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat likely to occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat likely to occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Species or species habitat likely to occur within area
Mammals		
Balaenoptera borealis Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Foraging, feeding or related behaviour likely

Name	Status	Type of Presence
		to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat likely to occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat may occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat may occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat may occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat may occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Species or species habitat may occur within area
Sharks		
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat likely to occur within area

Listed Migratory Species

[Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Anous stolidus Common Noddy [825]		Species or species habitat may occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Species or species habitat likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Species or species habitat likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Species or species habitat likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Species or species habitat likely to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat may occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat likely to occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat likely to occur within area
Thalassarche cauta Tasmanian Shy Albatross [89224]	Vulnerable*	Species or species habitat likely to occur within area
Thalassarche chrysostoma Grey-headed Albatross [66491]	Endangered	Species or species habitat likely to occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Species or species habitat likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat likely to occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat likely to occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Species or species habitat likely to occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable*	Species or species habitat likely to occur within area
Migratory Marine Species		
Balaena glacialis australis Southern Right Whale [75529]	Endangered*	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera bonaerensis Antarctic Minke Whale, Dark-shoulder Minke Whale [67812]		Species or species habitat likely to occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area
Caperea marginata Pygmy Right Whale [39]		Species or species habitat may occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat likely to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat may occur within area

Name	Threatened	Type of Presence
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat may occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat may occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat may occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat likely to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat likely to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Species or species habitat may occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat likely to occur within area
Phocoena dioptrica Spectacled Porpoise [66728]		Species or species habitat may occur within area
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Anous stolidus Common Noddy [825]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Catharacta skua Great Skua [59472]		Species or species habitat may occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Species or species habitat likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Species or species habitat likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Species or species habitat likely to occur within area
Diomedea gibsoni Gibson's Albatross [64466]	Vulnerable*	Species or species habitat likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Species or species habitat likely to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat may occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat may occur within area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat likely to occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat likely to occur

Name	Threatened	Type of Presence
		within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat may occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Species or species habitat may occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat likely to occur within area
Thalassarche cauta Tasmanian Shy Albatross [89224]	Vulnerable*	Species or species habitat likely to occur within area
Thalassarche chrysostoma Grey-headed Albatross [66491]	Endangered	Species or species habitat likely to occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Species or species habitat likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat likely to occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat likely to occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Species or species habitat likely to occur within area
Thalassarche sp. nov. Pacific Albatross [66511]	Vulnerable*	Species or species habitat likely to occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable*	Species or species habitat likely to occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat may occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat may occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat may occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat may occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Species or species habitat may occur within

Name	Threatened	Type of Presence
		area

Whales and other Cetaceans [Resource Information]

Name	Status	Type of Presence
Mammals		
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera bonaerensis Antarctic Minke Whale, Dark-shoulder Minke Whale [67812]		Species or species habitat likely to occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area
Berardius arnuxii Arnoux's Beaked Whale [70]		Species or species habitat may occur within area
Caperea marginata Pygmy Right Whale [39]		Species or species habitat may occur within area
Delphinus delphis Common Dophin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Feresa attenuata Pygmy Killer Whale [61]		Species or species habitat may occur within area
Globicephala macrorhynchus Short-finned Pilot Whale [62]		Species or species habitat may occur within area
Globicephala melas Long-finned Pilot Whale [59282]		Species or species habitat may occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Hyperoodon planifrons Southern Bottlenose Whale [71]		Species or species habitat may occur within area
Kogia breviceps Pygmy Sperm Whale [57]		Species or species habitat may occur within area
Kogia simus Dwarf Sperm Whale [58]		Species or species habitat may occur within area

Name	Status	Type of Presence
Lagenorhynchus cruciger Hourglass Dolphin [42]		Species or species habitat may occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat likely to occur within area
Lissodelphis peronii Southern Right Whale Dolphin [44]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat likely to occur within area
Mesoplodon bowdoini Andrew's Beaked Whale [73]		Species or species habitat may occur within area
Mesoplodon densirostris Blainville's Beaked Whale, Dense-beaked Whale [74]		Species or species habitat may occur within area
Mesoplodon ginkgodens Gingko-toothed Beaked Whale, Gingko-toothed Whale, Gingko Beaked Whale [59564]		Species or species habitat may occur within area
Mesoplodon grayi Gray's Beaked Whale, Scamperdown Whale [75]		Species or species habitat may occur within area
Mesoplodon hectori Hector's Beaked Whale [76]		Species or species habitat may occur within area
Mesoplodon layardii Strap-toothed Beaked Whale, Strap-toothed Whale, Layard's Beaked Whale [25556]		Species or species habitat may occur within area
Mesoplodon mirus True's Beaked Whale [54]		Species or species habitat may occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat likely to occur within area
Peponocephala electra Melon-headed Whale [47]		Species or species habitat may occur within area
Phocoena dioptrica Spectacled Porpoise [66728]		Species or species habitat may occur within area
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area
Pseudorca crassidens False Killer Whale [48]		Species or species habitat likely to occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Stenella coeruleoalba Striped Dolphin, Euphrosyne Dolphin [52]		Species or species habitat may occur within area

Name	Status	Type of Presence
Stenella longirostris Long-snouted Spinner Dolphin [29]		Species or species habitat may occur within area
Steno bredanensis Rough-toothed Dolphin [30]		Species or species habitat may occur within area
Tasmacetus shepherdi Shepherd's Beaked Whale, Tasman Beaked Whale [55]		Species or species habitat may occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area
Ziphius cavirostris Cuvier's Beaked Whale, Goose-beaked Whale [56]		Species or species habitat may occur within area

Extra Information

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-30.850305 163.351497,-30.92573 163.426753,-31.564437 164.876948,-45.294163 163.878841,-47.654242 151.1347,-45.294163 152.804622,-35.124346 155.968685,-36.478669 159.396419,-33.820174 163.615169,-30.850305 163.351497

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

Department of the Environment
GPO Box 787
Canberra ACT 2601 Australia
+61 2 6274 1111

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

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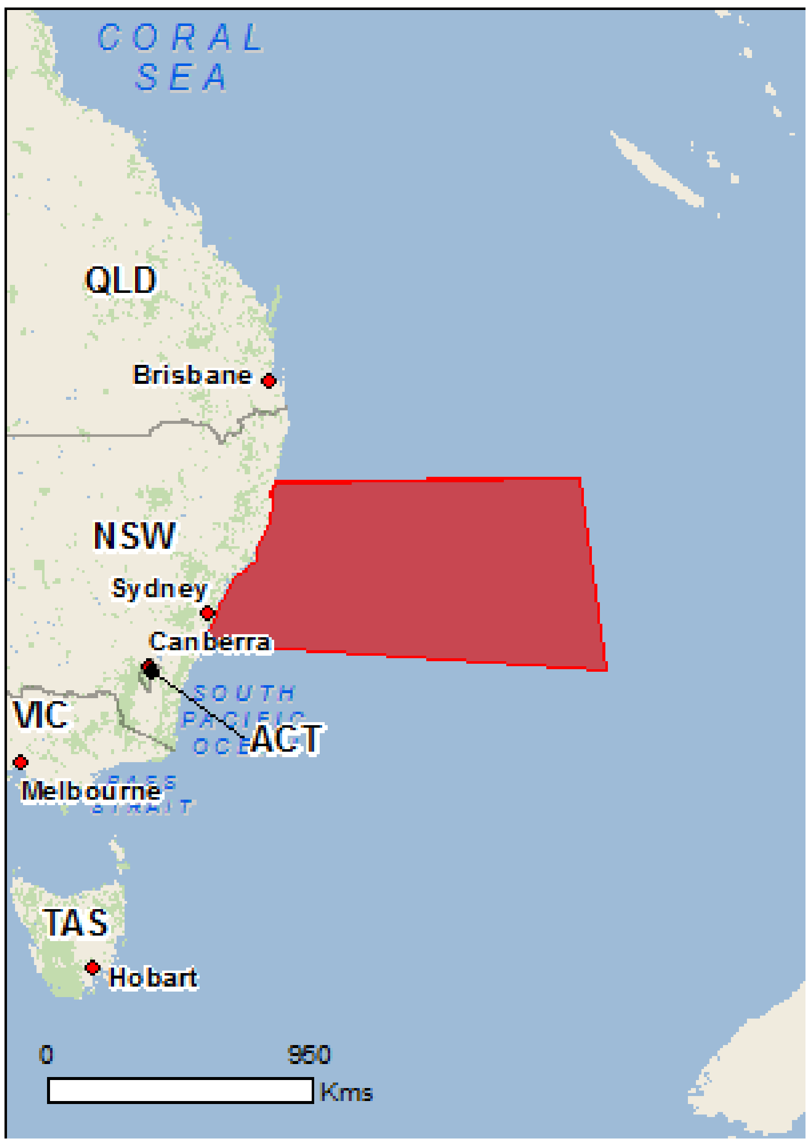

Coordinates
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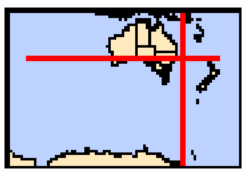


Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	1
National Heritage Places:	8
Wetlands of International Importance:	3
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	2
Listed Threatened Ecological Communities:	10
Listed Threatened Species:	152
Listed Migratory Species:	91

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	21
Commonwealth Heritage Places:	19
Listed Marine Species:	138
Whales and Other Cetaceans:	40
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	11

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	42
Regional Forest Agreements:	1
Invasive Species:	58
Nationally Important Wetlands:	7
Key Ecological Features (Marine)	5

Details

Matters of National Environmental Significance

World Heritage Properties [Resource Information]

Name	State	Status
Lord Howe Island Group	NSW	Declared property

National Heritage Properties [Resource Information]

Name	State	Status
Natural		
Ku-ring-gai Chase National Park, Lion, Long and Spectacle Island Nature Reserves	NSW	Listed place
Lord Howe Island Group	NSW	Listed place
Royal National Park and Garawarra State Conservation Area	NSW	Listed place
Historic		
Bondi Beach	NSW	Listed place
Kamay Botany Bay: botanical collection sites	NSW	Listed place
Kurnell Peninsula Headland	NSW	Listed place
North Head - Sydney	NSW	Listed place
Bondi Surf Pavilion	NSW	Within listed place

Wetlands of International Importance (Ramsar) [Resource Information]

Name	Proximity
Hunter estuary wetlands	Within 10km of Ramsar
Myall lakes	Within Ramsar site
Towra point nature reserve	Within 10km of Ramsar

Commonwealth Marine Area [Resource Information]

Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside the Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area. Generally the Commonwealth Marine Area stretches from three nautical miles to two hundred nautical miles from the coast.

Name
EEZ and Territorial Sea
Extended Continental Shelf

Marine Regions [Resource Information]

If you are planning to undertake action in an area in or close to the Commonwealth Marine Area, and a marine bioregional plan has been prepared for the Commonwealth Marine Area in that area, the marine bioregional plan may inform your decision as to whether to refer your proposed action under the EPBC Act.

Name
Temperate East

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Central Hunter Valley eucalypt forest and woodland	Critically Endangered	Community may occur within area
Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community	Endangered	Community likely to occur within area
Coastal Upland Swamps in the Sydney Basin Bioregion	Endangered	Community likely to occur within area
Eastern Suburbs Banksia Scrub of the Sydney Region	Endangered	Community known to occur within area
Illawarra and south coast lowland forest and woodland ecological community	Critically Endangered	Community likely to occur within area
Littoral Rainforest and Coastal Vine Thickets of Eastern Australia	Critically Endangered	Community likely to occur within area

Name	Status	Type of Presence
Lowland Rainforest of Subtropical Australia	Critically Endangered	Community likely to occur within area
Posidonia australis seagrass meadows of the Manning-Hawkesbury ecoregion	Endangered	Community likely to occur within area
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area
Upland Basalt Eucalypt Forests of the Sydney Basin Bioregion	Endangered	Community may occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Species or species habitat known to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Roosting known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Roosting known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area
Dasyornis brachypterus Eastern Bristlebird [533]	Endangered	Species or species habitat likely to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea antipodensis gibsoni Gibson's Albatross [82270]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat likely to occur within area
Fregetta grallaria grallaria White-bellied Storm-Petrel (Tasman Sea), White-bellied Storm-Petrel (Australasian) [64438]	Vulnerable	Breeding known to occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat may occur within area

Name	Status	Type of Presence
Hypotaenidia sylvestris Lord Howe Woodhen [87732]	Endangered	Breeding likely to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area
Limosa lapponica baueri Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat known to occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Bar-tailed Godwit (menzbieri) [86432]	Critically Endangered	Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Neophema chrysogaster Orange-bellied Parrot [747]	Critically Endangered	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat known to occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Pterodroma heraldica Herald Petrel [66973]	Critically Endangered	Species or species habitat likely to occur within area
Pterodroma leucoptera leucoptera Gould's Petrel, Australian Gould's Petrel [26033]	Endangered	Breeding known to occur within area
Pterodroma neglecta neglecta Kermadec Petrel (western) [64450]	Vulnerable	Breeding known to occur within area
Rostratula australis Australian Painted-snipe, Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Breeding likely to occur within area
Strepera graculina crissalis Lord Howe Island Currawong, Pied Currawong (Lord Howe Island) [25994]	Vulnerable	Species or species habitat likely to occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche bulleri platei Northern Buller's Albatross, Pacific Albatross [82273]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta cauta Shy Albatross, Tasmanian Shy Albatross [82345]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area

Name	Status	Type of Presence
Thalassarche cauta steadi		
White-capped Albatross [82344]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche eremita		
Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida		
Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris		
Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini		
Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Fish		
Epinephelus daemelii		
Black Rockcod, Black Cod, Saddled Rockcod [68449]	Vulnerable	Species or species habitat likely to occur within area
Maccullochella peelii		
Murray Cod [66633]	Vulnerable	Species or species habitat may occur within area
Macquaria australasica		
Macquarie Perch [66632]	Endangered	Species or species habitat may occur within area
Prototroctes maraena		
Australian Grayling [26179]	Vulnerable	Species or species habitat likely to occur within area
Frogs		
Heleioporus australiacus		
Giant Burrowing Frog [1973]	Vulnerable	Species or species habitat known to occur within area
Litoria aurea		
Green and Golden Bell Frog [1870]	Vulnerable	Species or species habitat known to occur within area
Litoria littlejohni		
Littlejohn's Tree Frog, Heath Frog [64733]	Vulnerable	Species or species habitat likely to occur within area
Mixophyes balbus		
Stuttering Frog, Southern Barred Frog (in Victoria) [1942]	Vulnerable	Species or species habitat likely to occur within area
Mixophyes iteratus		
Giant Barred Frog, Southern Barred Frog [1944]	Endangered	Species or species habitat may occur within area
Insects		
Argynnis hyperbius inconstans		
Australian Fritillary [88056]	Critically Endangered	Species or species habitat likely to occur within area
Dryococelus australis		
Lord Howe Island Phasmid, Land Lobster [66752]	Critically Endangered	Species or species habitat known to occur within area
Phyllodes imperialis smithersi		
Pink Underwing Moth [86084]	Endangered	Species or species habitat may occur within area
Mammals		

Name	Status	Type of Presence
Balaenoptera borealis		
Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera musculus		
Blue Whale [36]	Endangered	Species or species habitat may occur within area
Balaenoptera physalus		
Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Chalinolobus dwyeri		
Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat known to occur within area
Dasyurus maculatus maculatus (SE mainland population)		
Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat known to occur within area
Eubalaena australis		
Southern Right Whale [40]	Endangered	Species or species habitat known to occur within area
Isoodon obesulus obesulus		
Southern Brown Bandicoot (eastern), Southern Brown Bandicoot (south-eastern) [68050]	Endangered	Species or species habitat known to occur within area
Megaptera novaeangliae		
Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Petauroides volans		
Greater Glider [254]	Vulnerable	Species or species habitat known to occur within area
Petrogale penicillata		
Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat likely to occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)		
Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
Potorous tridactylus tridactylus		
Long-nosed Potoroo (SE mainland) [66645]	Vulnerable	Species or species habitat known to occur within area
Pseudomys novaehollandiae		
New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat known to occur within area
Pteropus poliocephalus		
Grey-headed Flying-fox [186]	Vulnerable	Roosting known to occur within area
Other		
Gudeoconcha sophiae magnifica		
Magnificent Helicarionid Land Snail [82864]	Critically Endangered	Species or species habitat likely to occur within area
Mystivagor mastersi		
Masters' Charopid Land Snail [81247]	Critically Endangered	Species or species habitat known to occur within area
Placostylus bivaricosus		
Lord Howe Flax Snail, Lord Howe Placostylus [66769]	Endangered	Species or species habitat known to occur within area
Pseudocharopa ledgbirdi		
Mount Lidgbird Charopid Land Snail [85279]	Critically Endangered	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Pseudocharopa whiteleggei Whitelegge's Land Snail [81249]	Critically Endangered	Species or species habitat likely to occur within area
Plants		
Acacia bynoeana Bynoe's Wattle, Tiny Wattle [8575]	Vulnerable	Species or species habitat may occur within area
Acacia courtii Northern Brother Wattle [56299]	Vulnerable	Species or species habitat likely to occur within area
Acacia terminalis subsp. terminalis MS Sunshine Wattle (Sydney region) [88882]	Endangered	Species or species habitat known to occur within area
Acronychia littoralis Scented Acronychia [8582]	Endangered	Species or species habitat likely to occur within area
Allocasuarina defungens Dwarf Heath Casuarina [21924]	Endangered	Species or species habitat known to occur within area
Allocasuarina glareicola [21932]	Endangered	Species or species habitat may occur within area
Allocasuarina portuensis Nielsen Park She-oak [21937]	Endangered	Species or species habitat known to occur within area
Allocasuarina simulans Nabiac Casuarina [21935]	Vulnerable	Species or species habitat likely to occur within area
Allocasuarina thalassoscopica [21927]	Endangered	Species or species habitat known to occur within area
Angophora inopina Charmhaven Apple [64832]	Vulnerable	Species or species habitat may occur within area
Arthraxon hispidus Hairy-joint Grass [9338]	Vulnerable	Species or species habitat known to occur within area
Asperula asthenes Trailing Woodruff [14004]	Vulnerable	Species or species habitat likely to occur within area
Asterolasia elegans [56780]	Endangered	Species or species habitat known to occur within area
Caladenia tessellata Thick-lipped Spider-orchid, Daddy Long-legs [2119]	Vulnerable	Species or species habitat known to occur within area
Calystegia affinis [48909]	Critically Endangered	Species or species habitat known to occur within area
Commersonia prostrata Dwarf Kerrawang [87152]	Endangered	Species or species habitat may occur within area
Corunastylis insignis Wyong Midge Orchid 1, Variable Midge Orchid 1 [84692]	Critically Endangered	Species or species habitat known to occur within area

Name	Status	Type of Presence
Corunastylis littoralis Tuncurry Midge Orchid [82945]	Critically Endangered	Species or species habitat likely to occur within area
Cryptocarya foetida Stinking Cryptocarya, Stinking Laurel [11976]	Vulnerable	Species or species habitat may occur within area
Cryptostylis hunteriana Leafless Tongue-orchid [19533]	Vulnerable	Species or species habitat known to occur within area
Cynanchum elegans White-flowered Wax Plant [12533]	Endangered	Species or species habitat known to occur within area
Diploglottis campbellii Small-leaved Tamarind [21484]	Endangered	Species or species habitat may occur within area
Diuris praecox Newcastle Doubletail [55086]	Vulnerable	Species or species habitat likely to occur within area
Elymus multiflorus subsp. kingianus Phillip Island Wheat Grass [82413]	Critically Endangered	Species or species habitat known to occur within area
Endiandra hayesii Rusty Rose Walnut, Velvet Laurel [13866]	Vulnerable	Species or species habitat may occur within area
Eucalyptus camfieldii Camfield's Stringybark [15460]	Vulnerable	Species or species habitat likely to occur within area
Eucalyptus parramattensis subsp. decadens Earp's Gum, Earp's Dirty Gum [56148]	Vulnerable	Species or species habitat known to occur within area
Euphrasia arguta [4325]	Critically Endangered	Species or species habitat may occur within area
Geniostoma huttonii [56368]	Endangered	Species or species habitat known to occur within area
Genoplesium baueri Yellow Gnat-orchid [7528]	Endangered	Species or species habitat likely to occur within area
Grevillea caleyi Caley's Grevillea [9683]	Critically Endangered	Species or species habitat likely to occur within area
Grevillea parviflora subsp. parviflora Small-flower Grevillea [64910]	Vulnerable	Species or species habitat may occur within area
Grevillea shiressii [19186]	Vulnerable	Species or species habitat may occur within area
Haloragis exalata subsp. exalata Wingless Raspwort, Square Raspwort [24636]	Vulnerable	Species or species habitat likely to occur within area
Haloragodendron lucasii Hal [6480]	Endangered	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Hicksbeachia pinnatifolia Monkey Nut, Bopple Nut, Red Bopple, Red Bopple Nut, Red Nut, Beef Nut, Red Apple Nut, Red Boppel Nut, Ivory Silky Oak [21189]	Vulnerable	Species or species habitat may occur within area
Kunzea rupestris [8798]	Vulnerable	Species or species habitat likely to occur within area
Lepidorrhachis mooreana Little Mountain Palm, Moorei Palm [6388]	Critically Endangered	Species or species habitat known to occur within area
Macadamia integrifolia Macadamia Nut, Queensland Nut Tree, Smooth-shelled Macadamia, Bush Nut, Nut Oak [7326]	Vulnerable	Species or species habitat may occur within area
Macadamia tetraphylla Rough-shelled Bush Nut, Macadamia Nut, Rough-shelled Macadamia, Rough-leaved Queensland Nut [6581]	Vulnerable	Species or species habitat known to occur within area
Marsdenia longiloba Clear Milkvine [2794]	Vulnerable	Species or species habitat likely to occur within area
Melaleuca biconvexa Biconvex Paperbark [5583]	Vulnerable	Species or species habitat known to occur within area
Melaleuca deanei Deane's Melaleuca [5818]	Vulnerable	Species or species habitat may occur within area
Parsonsia dorrigoensis Milky Silkpod [64684]	Endangered	Species or species habitat likely to occur within area
Persicaria elatior Knotweed, Tall Knotweed [5831]	Vulnerable	Species or species habitat likely to occur within area
Persoonia hirsuta Hairy Geebung, Hairy Persoonia [19006]	Endangered	Species or species habitat known to occur within area
Phaius australis Lesser Swamp-orchid [5872]	Endangered	Species or species habitat known to occur within area
Pimelea curviflora var. curviflora [4182]	Vulnerable	Species or species habitat known to occur within area
Pimelea spicata Spiked Rice-flower [20834]	Endangered	Species or species habitat likely to occur within area
Polystichum moorei Rock Shield Fern [40755]	Endangered	Species or species habitat likely to occur within area
Prasophyllum sp. Wybong (C.Phelps ORG 5269) a leek-orchid [81964]	Critically Endangered	Species or species habitat may occur within area
Prostanthera askania Tranquillity Mintbush, Tranquility Mintbush [64958]	Endangered	Species or species habitat known to occur within area
Prostanthera densa Villous Mintbush [12233]	Vulnerable	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Prostanthera junonis Somersby Mintbush [64960]	Endangered	Species or species habitat may occur within area
Pterostylis gibbosa Illawarra Greenhood, Rufa Greenhood, Pouched Greenhood [4562]	Endangered	Species or species habitat likely to occur within area
Pterostylis saxicola Sydney Plains Greenhood [64537]	Endangered	Species or species habitat may occur within area
Pterostylis sp. Botany Bay (A.Bishop J221/1-13) Botany Bay Bearded Greenhood, Botany Bay Bearded Orchid [64965]	Endangered	Species or species habitat likely to occur within area
Pultenaea aristata [18062]	Vulnerable	Species or species habitat likely to occur within area
Pultenaea glabra Smooth Bush-pea, Swamp Bush-pea [11887]	Vulnerable	Species or species habitat likely to occur within area
Rutidosis heterogama Heath Wrinklewort [13132]	Vulnerable	Species or species habitat known to occur within area
Samadera sp. Moonee Creek (J.King s.n. Nov. 1949) [86885]	Endangered	Species or species habitat likely to occur within area
Syzygium paniculatum Magenta Lilly Pilly, Magenta Cherry, Daguba, Scrub Cherry, Creek Lilly Pilly, Brush Cherry [20307]	Vulnerable	Species or species habitat known to occur within area
Tetratheca juncea Black-eyed Susan [21407]	Vulnerable	Species or species habitat known to occur within area
Thelymitra kangaloonica Kangaloon Sun Orchid [81861]	Critically Endangered	Species or species habitat may occur within area
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat known to occur within area
Tylophora woollsii [20503]	Endangered	Species or species habitat likely to occur within area
Xylosma parvifolia [48040]	Endangered	Species or species habitat known to occur within area
Zieria granulata Hill Zieria, Hilly Zieria, Illawarra Zieria [17147]	Endangered	Species or species habitat likely to occur within area
Zieria prostrata Headland Zieria [56782]	Endangered	Species or species habitat known to occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area

Name	Status	Type of Presence
Christinus guentheri		
Lord Howe Island Gecko, Lord Howe Island Southern Gecko [59250]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Eretmochelys imbricata		
Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Hoplocephalus bungaroides		
Broad-headed Snake [1182]	Vulnerable	Species or species habitat likely to occur within area
Natator depressus		
Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Oligosoma lichenigera		
Lord Howe Island Skink [82034]	Vulnerable	Species or species habitat known to occur within area
Saiphos reticulatus		
Three-toed Snake-tooth Skink [88328]	Vulnerable	Species or species habitat may occur within area
Sharks		
Carcharias taurus (east coast population)		
Grey Nurse Shark (east coast population) [68751]	Critically Endangered	Species or species habitat known to occur within area
Carcharodon carcharias		
White Shark, Great White Shark [64470]	Vulnerable	Breeding known to occur within area
Rhincodon typus		
Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Anous stolidus		
Common Noddy [825]		Breeding known to occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardenna carneipes		
Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Breeding known to occur within area
Ardenna grisea		
Sooty Shearwater [82651]		Breeding known to occur within area
Ardenna pacifica		
Wedge-tailed Shearwater [84292]		Breeding known to occur within area
Ardenna tenuirostris		
Short-tailed Shearwater [82652]		Breeding known to occur within area
Calonectris leucomelas		
Streaked Shearwater [1077]		Species or species habitat known to occur within area
Diomedea antipodensis		
Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area

Name	Threatened	Type of Presence
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat known to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Phaethon rubricauda Red-tailed Tropicbird [994]		Breeding known to occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Sternula albifrons Little Tern [82849]		Breeding known to occur within area
Sula dactylatra Masked Booby [1021]		Breeding known to occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta Tasmanian Shy Albatross [89224]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Migratory Marine Species		
Balaena glacialis australis Southern Right Whale [75529]	Endangered*	Species or species habitat known to occur

Name	Threatened	Type of Presence
		within area
[Balaenoptera bonaerensis] Antarctic Minke Whale, Dark-shoulder Minke Whale [67812]		Species or species habitat likely to occur within area
[Balaenoptera borealis] Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
[Balaenoptera edeni] Bryde's Whale [35]		Species or species habitat likely to occur within area
[Balaenoptera musculus] Blue Whale [36]	Endangered	Species or species habitat may occur within area
[Balaenoptera physalus] Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
[Caperea marginata] Pygmy Right Whale [39]		Foraging, feeding or related behaviour may occur within area
[Carcharodon carcharias] White Shark, Great White Shark [64470]	Vulnerable	Breeding known to occur within area
[Caretta caretta] Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
[Chelonia mydas] Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
[Dermochelys coriacea] Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
[Dugong dugon] Dugong [28]		Species or species habitat may occur within area
[Eretmochelys imbricata] Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
[Isurus oxyrinchus] Shortfin Mako, Mako Shark [79073]		Species or species habitat likely to occur within area
[Isurus paucus] Longfin Mako [82947]		Species or species habitat likely to occur within area
[Lagenorhynchus obscurus] Dusky Dolphin [43]		Species or species habitat likely to occur within area
[Lamna nasus] Porbeagle, Mackerel Shark [83288]		Species or species habitat likely to occur within area
[Manta alfredi] Reef Manta Ray, Coastal Manta Ray, Inshore Manta Ray, Prince Alfred's Ray, Resident Manta Ray [84994]		Species or species habitat known to occur within area
[Manta birostris] Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat likely to occur within area
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat known to occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat known to occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat known to occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Arenaria interpres Ruddy Turnstone [872]		Roosting known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Roosting known to occur within area
Calidris alba Sanderling [875]		Roosting known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species

Name	Threatened	Type of Presence
		habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area
Calidris ruficollis Red-necked Stint [860]		Roosting known to occur within area
Calidris subminuta Long-toed Stint [861]		Roosting known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Roosting known to occur within area
Charadrius bicinctus Double-banded Plover [895]		Roosting known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Roosting known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Roosting known to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Foraging, feeding or related behaviour known to occur within area
Gallinago megala Swinhoe's Snipe [864]		Roosting likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Roosting likely to occur within area
Limicola falcinellus Broad-billed Sandpiper [842]		Roosting known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Roosting known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Roosting likely to occur within area
Numenius phaeopus Whimbrel [849]		Roosting known to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Philomachus pugnax Ruff (Reeve) [850]		Species or species habitat known to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Roosting known to occur within area
Pluvialis squatarola Grey Plover [865]		Roosting known to occur within area
Thalasseus bergii Crested Tern [83000]		Breeding known to occur

Name	Threatened	Type of Presence
		within area
Tringa brevipes Grey-tailed Tattler [851]		Roosting known to occur within area
Tringa incana Wandering Tattler [831]		Roosting known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Foraging, feeding or related behaviour known to occur within area
Xenus cinereus Terek Sandpiper [59300]		Roosting known to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land -
Commonwealth Land - Australian & Overseas Telecommunications Corporation
Commonwealth Land - Australian Postal Commission
Commonwealth Land - Australian Postal Corporation
Commonwealth Land - Australian Telecommunications Commission
Commonwealth Land - Australian Telecommunications Corporation
Commonwealth Land - Commonwealth Bank of Australia
Commonwealth Land - Defence Housing Authority
Commonwealth Land - Defence Service Homes Corporation
Commonwealth Land - Director of War Service Homes
Commonwealth Land - Telstra Corporation Limited
Defence - DEE WHY DEPOT
Defence - HMAS WATSON
Defence - LADY GOWRIE HOUSE
Defence - OFFICES
Defence - PITTWATER DIVING ANNEX (forms part of "RAN Torpedo Range")
Defence - THROSBY TRG DEPOT-PORT KEMBLA
Defence - TRAINING SHIP CONDAMINE
Defence - TS TOBRUK
Defence - Training Depot
Defence - VAUCLUSE TRAINING DEPOT

Commonwealth Heritage Places [Resource Information]

Name	State	Status
Natural		
Malabar Headland	NSW	Listed place
Historic		
Army Cottage with return verandah	NSW	Listed place
Barracks Group HMAS Watson	NSW	Listed place
Bondi Beach Post Office	NSW	Listed place
Cape Baily Lighthouse	NSW	Listed place
Cliff House	NSW	Listed place
Cottage at Macquarie Lighthouse	NSW	Listed place
Defence site - Georges Heights and Middle Head	NSW	Listed place
Macquarie Lighthouse	NSW	Listed place
Macquarie Lighthouse Group	NSW	Listed place
Macquarie Lighthouse Surrounding Wall	NSW	Listed place
Marine Biological Station (former)	NSW	Listed place
Military Road Framework - Defence Land	NSW	Listed place

Name	State	Status
Nobbys Lighthouse	NSW	Listed place
North Head Artillery Barracks	NSW	Listed place
Shark Point Battery	NSW	Listed place
Smoky Cape Lighthouse	NSW	Listed place
Sugarloaf Point Lighthouse	NSW	Listed place
Ten Terminal Regiment Headquarters and AusAid Training Centre	NSW	Listed place

Listed Marine Species

[Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Anous stolidus Common Noddy [825]		Breeding known to occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Breeding known to occur within area
Ardea ibis Cattle Egret [59542]		Breeding likely to occur within area
Arenaria interpres Ruddy Turnstone [872]		Roosting known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Roosting known to occur within area
Calidris alba Sanderling [875]		Roosting known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area
Calidris ruficollis Red-necked Stint [860]		Roosting known to occur within area
Calidris subminuta Long-toed Stint [861]		Roosting known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Roosting known to occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat known to occur within area
Catharacta skua Great Skua [59472]		Species or species habitat may occur within area
Charadrius bicinctus Double-banded Plover [895]		Roosting known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Roosting known to occur

Name	Threatened	Type of Presence
		within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area
Charadrius ruficapillus Red-capped Plover [881]		Roosting known to occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Roosting known to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea gibsoni Gibson's Albatross [64466]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Eudyptula minor Little Penguin [1085]		Breeding known to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat known to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat known to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Foraging, feeding or related behaviour known to occur within area
Gallinago megala Swinhoe's Snipe [864]		Roosting likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Roosting likely to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Heteroscelus brevipes Grey-tailed Tattler [59311]		Roosting known to occur within area
Heteroscelus incanus Wandering Tattler [59547]		Roosting known to occur within area
Himantopus himantopus Pied Stilt, Black-winged Stilt [870]		Roosting known to occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat known to occur within area
Larus dominicanus Kelp Gull [809]		Breeding known to occur within area

Name	Threatened	Type of Presence
Larus novaehollandiae Silver Gull [810]		Breeding known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area
Limicola falcinellus Broad-billed Sandpiper [842]		Roosting known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Roosting known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat known to occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Neophema chrysogaster Orange-bellied Parrot [747]	Critically Endangered	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Roosting likely to occur within area
Numenius phaeopus Whimbrel [849]		Roosting known to occur within area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Pelagodroma marina White-faced Storm-Petrel [1016]		Breeding known to occur within area
Phaethon rubricauda Red-tailed Tropicbird [994]		Breeding known to occur within area

Name	Threatened	Type of Presence
Philomachus pugnax Ruff (Reeve) [850]		Species or species habitat known to occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Roosting known to occur within area
Pluvialis squatarola Grey Plover [865]		Roosting known to occur within area
Procelsterna cerulea Grey Noddy, Grey Ternlet [64378]		Breeding known to occur within area
Pterodroma nigripennis Black-winged Petrel [1038]		Breeding known to occur within area
Pterodroma solandri Providence Petrel [1040]		Breeding known to occur within area
Puffinus assimilis Little Shearwater [59363]		Breeding known to occur within area
Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Breeding known to occur within area
Puffinus griseus Sooty Shearwater [1024]		Breeding known to occur within area
Puffinus pacificus Wedge-tailed Shearwater [1027]		Breeding known to occur within area
Puffinus tenuirostris Short-tailed Shearwater [1029]		Breeding known to occur within area
Recurvirostra novaehollandiae Red-necked Avocet [871]		Roosting known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area
Sterna albifrons Little Tern [813]		Breeding known to occur within area
Sterna bergii Crested Tern [816]		Breeding known to occur within area
Sula dactylatra Masked Booby [1021]		Breeding known to occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta Tasmanian Shy Albatross [89224]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed	Vulnerable	Species or species

Name	Threatened	Type of Presence
Albatross [64459]		habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche sp. nov. Pacific Albatross [66511]	Vulnerable*	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Foraging, feeding or related behaviour known to occur within area
Xenus cinereus Terek Sandpiper [59300]		Roosting known to occur within area
Fish		
Acentronura tentaculata Shortpouch Pygmy Pipehorse [66187]		Species or species habitat may occur within area
Campichthys tryoni Tryon's Pipefish [66193]		Species or species habitat may occur within area
Corythoichthys amplexus Fijian Banded Pipefish, Brown-banded Pipefish [66199]		Species or species habitat may occur within area
Corythoichthys ocellatus Orange-spotted Pipefish, Ocellated Pipefish [66203]		Species or species habitat may occur within area
Cosmocampus howensis Lord Howe Pipefish [66208]		Species or species habitat may occur within area
Festucalex cinctus Girdled Pipefish [66214]		Species or species habitat may occur within area
Filicampus tigris Tiger Pipefish [66217]		Species or species habitat may occur within area
Halicampus boothae Booth's Pipefish [66218]		Species or species habitat may occur within area
Halicampus grayi Mud Pipefish, Gray's Pipefish [66221]		Species or species habitat may occur within area
Heraldia nocturna Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area
Hippichthys cyanospilos Blue-speckled Pipefish, Blue-spotted Pipefish [66228]		Species or species habitat may occur within

Name	Threatened	Type of Presence
		area
Hippichthys heptagonus Madura Pipefish, Reticulated Freshwater Pipefish [66229]		Species or species habitat may occur within area
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area
Hippocampus abdominalis Big-belly Seahorse, Eastern Potbelly Seahorse, New Zealand Potbelly Seahorse [66233]		Species or species habitat may occur within area
Hippocampus breviceps Short-head Seahorse, Short-snouted Seahorse [66235]		Species or species habitat may occur within area
Hippocampus kelloggi Kellogg's Seahorse, Great Seahorse [66723]		Species or species habitat may occur within area
Hippocampus kuda Spotted Seahorse, Yellow Seahorse [66237]		Species or species habitat may occur within area
Hippocampus planifrons Flat-face Seahorse [66238]		Species or species habitat may occur within area
Hippocampus trimaculatus Three-spot Seahorse, Low-crowned Seahorse, Flat-faced Seahorse [66720]		Species or species habitat may occur within area
Hippocampus whitei White's Seahorse, Crowned Seahorse, Sydney Seahorse [66240]		Species or species habitat known to occur within area
Histiogamphelus briggsii Crested Pipefish, Briggs' Crested Pipefish, Briggs' Pipefish [66242]		Species or species habitat may occur within area
Kimblaeus bassensis Trawl Pipefish, Bass Strait Pipefish [66247]		Species or species habitat may occur within area
Lissocampus runa Javelin Pipefish [66251]		Species or species habitat may occur within area
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area
Micrognathus andersonii Anderson's Pipefish, Shortnose Pipefish [66253]		Species or species habitat may occur within area
Micrognathus brevirostris thorntail Pipefish, Thorn-tailed Pipefish [66254]		Species or species habitat may occur within area
Microphis manadensis Manado Pipefish, Manado River Pipefish [66258]		Species or species habitat may occur within area
Notiocampus ruber Red Pipefish [66265]		Species or species habitat may occur within area
Phyllopteryx taeniolatus Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Solegnathus dunckeri Duncker's Pipehorse [66271]		Species or species habitat may occur within area
Solegnathus hardwickii Pallid Pipehorse, Hardwick's Pipehorse [66272]		Species or species habitat may occur within area
Solegnathus spinosissimus Spiny Pipehorse, Australian Spiny Pipehorse [66275]		Species or species habitat may occur within area
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
Solenostomus paradoxus Ornate Ghostpipefish, Harlequin Ghost Pipefish, Ornate Ghost Pipefish [66184]		Species or species habitat may occur within area
Stigmatopora argus Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Trachyrhamphus bicoarctatus Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
Urocampus carinirostris Hairy Pipefish [66282]		Species or species habitat may occur within area
Vanacampus margaritifer Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area
Vanacampus phillipi Port Phillip Pipefish [66284]		Species or species habitat may occur within area
Mammals		
Arctocephalus forsteri Long-nosed Fur-seal, New Zealand Fur-seal [20]		Species or species habitat may occur within area
Arctocephalus pusillus Australian Fur-seal, Australo-African Fur-seal [21]		Species or species habitat may occur within area
Dugong dugon Dugong [28]		Species or species habitat may occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known

Name	Threatened	Type of Presence
		to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Hydrophis elegans Elegant Seasnake [1104]		Species or species habitat may occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Pelamis platurus Yellow-bellied Seasnake [1091]		Species or species habitat may occur within area

Whales and other Cetaceans [Resource Information]

Name	Status	Type of Presence
Mammals		
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera bonaerensis Antarctic Minke Whale, Dark-shoulder Minke Whale [67812]		Species or species habitat likely to occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Berardius arnuxii Arnoux's Beaked Whale [70]		Species or species habitat may occur within area
Caperea marginata Pygmy Right Whale [39]		Foraging, feeding or related behaviour may occur within area
Delphinus delphis Common Dophin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat known to occur within area
Feresa attenuata Pygmy Killer Whale [61]		Species or species habitat may occur within area
Globicephala macrorhynchus Short-finned Pilot Whale [62]		Species or species habitat may occur within area
Globicephala melas Long-finned Pilot Whale [59282]		Species or species habitat may occur within area

Name	Status	Type of Presence
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Hyperoodon planifrons Southern Bottlenose Whale [71]		Species or species habitat may occur within area
Kogia breviceps Pygmy Sperm Whale [57]		Species or species habitat may occur within area
Kogia simus Dwarf Sperm Whale [58]		Species or species habitat may occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat likely to occur within area
Lissodelphis peronii Southern Right Whale Dolphin [44]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Mesoplodon bowdoini Andrew's Beaked Whale [73]		Species or species habitat may occur within area
Mesoplodon densirostris Blainville's Beaked Whale, Dense-beaked Whale [74]		Species or species habitat may occur within area
Mesoplodon ginkgodens Gingko-toothed Beaked Whale, Gingko-toothed Whale, Gingko Beaked Whale [59564]		Species or species habitat may occur within area
Mesoplodon grayi Gray's Beaked Whale, Scamperdown Whale [75]		Species or species habitat may occur within area
Mesoplodon hectori Hector's Beaked Whale [76]		Species or species habitat may occur within area
Mesoplodon layardii Strap-toothed Beaked Whale, Strap-toothed Whale, Layard's Beaked Whale [25556]		Species or species habitat may occur within area
Mesoplodon mirus True's Beaked Whale [54]		Species or species habitat may occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat likely to occur within area
Peponocephala electra Melon-headed Whale [47]		Species or species habitat may occur within area
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area
Pseudorca crassidens False Killer Whale [48]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Species or species habitat likely to occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Stenella coeruleoalba Striped Dolphin, Euphrosyne Dolphin [52]		Species or species habitat may occur within area
Stenella longirostris Long-snouted Spinner Dolphin [29]		Species or species habitat may occur within area
Steno bredanensis Rough-toothed Dolphin [30]		Species or species habitat may occur within area
Tasmacetus shepherdi Shepherd's Beaked Whale, Tasman Beaked Whale [55]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area
Ziphius cavirostris Cuvier's Beaked Whale, Goose-beaked Whale [56]		Species or species habitat may occur within area

Australian Marine Parks [Resource Information]

Name	Label
Central Eastern	Habitat Protection Zone (IUCN IV)
Central Eastern	Multiple Use Zone (IUCN VI)
Central Eastern	National Park Zone (IUCN II)
Cod Grounds	National Park Zone (IUCN II)
Hunter	Habitat Protection Zone (IUCN IV)
Hunter	Special Purpose Zone (Trawl) (IUCN VI)
Lord Howe	Habitat Protection Zone (IUCN IV)
Lord Howe	Habitat Protection Zone (Lord Howe)
Lord Howe	Multiple Use Zone (IUCN VI)
Lord Howe	National Park Zone (IUCN II)
Solitary Islands	Special Purpose Zone (Trawl) (IUCN VI)

Extra Information

State and Territory Reserves [Resource Information]

Name	State
Arakoon	NSW
Awabakal	NSW
Bird Island	NSW
Bongil Bongil	NSW
Boondelbah	NSW
Booti Booti	NSW
Botany Bay	NSW
Bouddi	NSW
Coffs Coast	NSW
Crowdy Bay	NSW
Darawank	NSW
Five Islands	NSW
Gaagal Wanggaan (South Beach)	NSW
Goolawah	NSW
Gumma	NSW

Name	State
Hat Head	NSW
Jagun	NSW
John Gould	NSW
Kattang	NSW
Ku-ring-gai Chase	NSW
LNE Special Management Zone No1	NSW
Lake Innes	NSW
Limeburners Creek	NSW
Little Broughton Island	NSW
Lord Howe Island	NSW
Malabar Headland	NSW
Munmorah	NSW
Muttonbird Island	NSW
Myall Lakes	NSW
North Head	NSW
Queens Lake	NSW
Royal	NSW
Sea Acres	NSW
Seal Rocks	NSW
Shark Island	NSW
Stormpetrel	NSW
Sydney Harbour	NSW
Tomaree	NSW
Valla	NSW
Wamberal Lagoon	NSW
Worimi	NSW
Wyrrabalong	NSW

Regional Forest Agreements [Resource Information]

Note that all areas with completed RFAs have been included.

Name	State
North East NSW RFA	New South Wales

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Alauda arvensis Skylark [656]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Carduelis chloris European Greenfinch [404]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Lonchura punctulata Nutmeg Mannikin [399]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Pycnonotus jocosus Red-whiskered Bulbul [631]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Turdus philomelos Song Thrush [597]		Species or species habitat likely to occur within area
Frogs		
Rhinella marina Cane Toad [83218]		Species or species habitat known to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Equus caballus Horse [5]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur

Name	Status	Type of Presence
		within area
Rattus rattus		
Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa		
Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes		
Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Alternanthera philoxeroides		
Alligator Weed [11620]		Species or species habitat likely to occur within area
Anredera cordifolia		
Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
Asparagus aethiopicus		
Asparagus Fern, Ground Asparagus, Basket Fern, Sprengi's Fern, Bushy Asparagus, Emerald Asparagus [62425]		Species or species habitat likely to occur within area
Asparagus asparagoides		
Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Asparagus plumosus		
Climbing Asparagus-fern [48993]		Species or species habitat likely to occur within area
Asparagus scandens		
Asparagus Fern, Climbing Asparagus Fern [23255]		Species or species habitat likely to occur within area
Cabomba caroliniana		
Cabomba, Fanwort, Carolina Watershield, Fish Grass, Washington Grass, Watershield, Carolina Fanwort, Common Cabomba [5171]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera		
Bitou Bush, Boneseed [18983]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera subsp. monilifera		
Boneseed [16905]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera subsp. rotundata		
Bitou Bush [16332]		Species or species habitat likely to occur within area
Cytisus scoparius		
Broom, English Broom, Scotch Broom, Common Broom, Scottish Broom, Spanish Broom [5934]		Species or species habitat likely to occur within area
Dolichandra unguis-cati		
Cat's Claw Vine, Yellow Trumpet Vine, Cat's Claw Creeper, Funnel Creeper [85119]		Species or species habitat likely to occur within area
Eichhornia crassipes		
Water Hyacinth, Water Orchid, Nile Lily [13466]		Species or species habitat likely to occur within area
Genista linifolia		
Flax-leaved Broom, Mediterranean Broom, Flax Broom [2800]		Species or species habitat likely to occur within area
Genista monspessulana		
Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom		Species or species habitat likely to occur

Name	Status	Type of Presence
[20126]		within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Nassella neesiana Chilean Needle grass [67699]		Species or species habitat likely to occur within area
Nassella trichotoma Serrated Tussock, Yass River Tussock, Yass Tussock, Nassella Tussock (NZ) [18884]		Species or species habitat likely to occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Sagittaria platyphylla Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Senecio madagascariensis Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area
Solanum elaeagnifolium Silver Nightshade, Silver-leaved Nightshade, White Horse Nettle, Silver-leaf Nightshade, Tomato Weed, White Nightshade, Bull-nettle, Prairie-berry, Satansbos, Silver-leaf Bitter-apple, Silverleaf-nettle, Trompillo [12323]		Species or species habitat likely to occur within area
Ulex europaeus Gorse, Furze [7693]		Species or species habitat likely to occur within area
Reptiles		
Hemidactylus frenatus Asian House Gecko [1708]		Species or species habitat likely to occur within area

Nationally Important Wetlands

[Resource Information]

Name	State
Avoca Lagoon	NSW
Clybucca Creek Estuary	NSW
Cockrone Lagoon	NSW
Crowdy Bay National Park	NSW

Name	State
Five Islands Nature Reserve	NSW
Limeburners Creek Nature Reserve	NSW
Port Stephens Estuary	NSW

Key Ecological Features (Marine) [Resource Information]

Key Ecological Features are the parts of the marine ecosystem that are considered to be important for the biodiversity or ecosystem functioning and integrity of the Commonwealth Marine Area.

Name	Region
Canyons on the eastern continental slope	Temperate east
Lord Howe seamount chain	Temperate east
Shelf rocky reefs	Temperate east
Tasman Front and eddy field	Temperate east
Tasmantid seamount chain	Temperate east

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-34.643629 150.895723,-34.63911 150.901216,-34.643629 150.901216,-34.317606 150.939668,-34.135932 151.131929,-33.981202 151.258272,-33.625167 151.291231,-33.524479 151.401094,-32.885611 151.818574,-32.742495 152.186616,-32.668539 152.208589,-32.432395 152.538179,-32.21887 152.565645,-32.139831 152.521699,-31.397281 152.961152,-30.856522 153.054536,-30.64881 152.999605,-30.288982 153.092988,-30.175077 162.936738,-35.381463 163.793672,-34.643629 150.895723

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

Department of the Environment
GPO Box 787
Canberra ACT 2601 Australia
+61 2 6274 1111

Australian Government
Department of the Environment and Energy

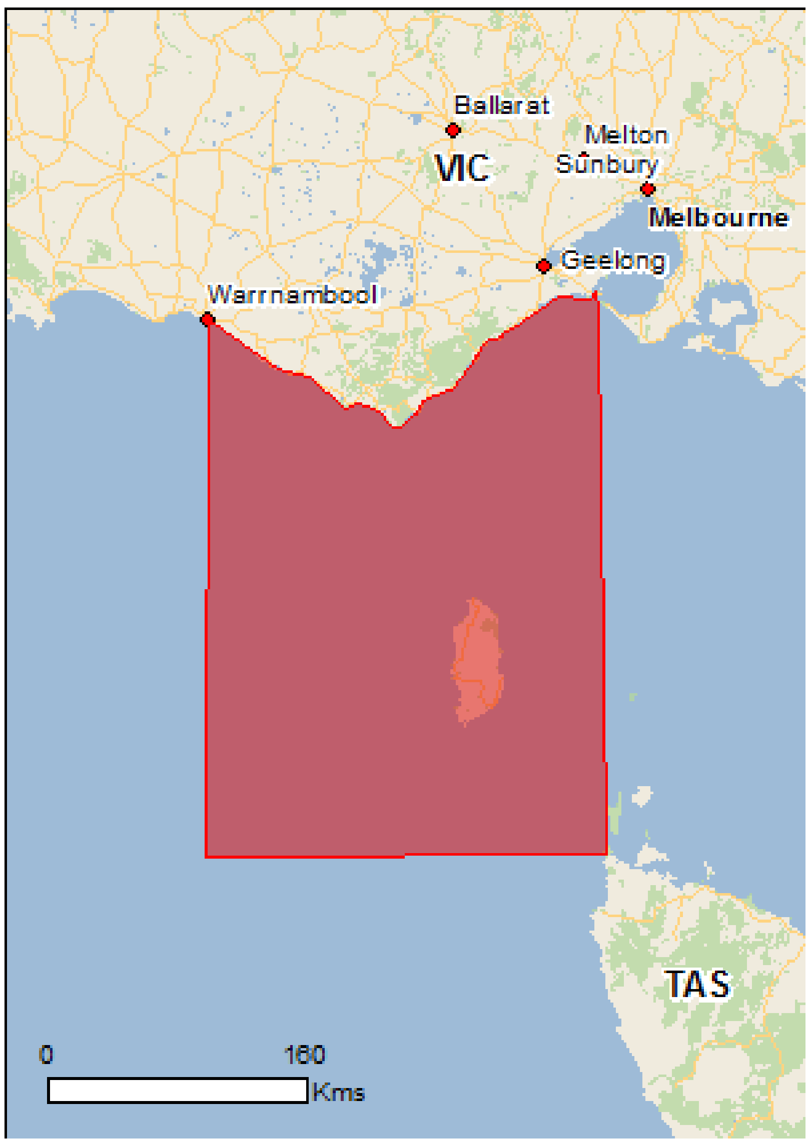
EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

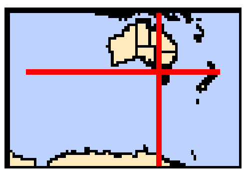
Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 27/05/19 20:05:01



Coordinates
Buffer: 1.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	2
Wetlands of International Importance:	2
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	1
Listed Threatened Ecological Communities:	8
Listed Threatened Species:	98
Listed Migratory Species:	69

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	1
Commonwealth Heritage Places:	1
Listed Marine Species:	113
Whales and Other Cetaceans:	29
Critical Habitats:	1
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	4

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	63
Regional Forest Agreements:	2
Invasive Species:	52
Nationally Important Wetlands:	11
Key Ecological Features (Marine)	1

Details

Matters of National Environmental Significance

National Heritage Properties [Resource Information]

Name	State	Status
Historic		
Great Ocean Road and Scenic Environs	VIC	Listed place
Point Nepean Defence Sites and Quarantine Station Area	VIC	Listed place

Wetlands of International Importance (Ramsar) [Resource Information]

Name	Proximity
Lavinia	Within Ramsar site
Port phillip bay (western shoreline) and bellarine peninsula	Within Ramsar site

Commonwealth Marine Area [Resource Information]

Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside the Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area. Generally the Commonwealth Marine Area stretches from three nautical miles to two hundred nautical miles from the coast.

Name
EEZ and Territorial Sea

Marine Regions [Resource Information]

If you are planning to undertake action in an area in or close to the Commonwealth Marine Area, and a marine bioregional plan has been prepared for the Commonwealth Marine Area in that area, the marine bioregional plan may inform your decision as to whether to refer your proposed action under the EPBC Act.

Name
South-east

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Assemblages of species associated with open-coast salt-wedge estuaries of western and central Victoria ecological community	Endangered	Community likely to occur within area
Giant Kelp Marine Forests of South East Australia	Endangered	Community may occur within area
Grassy Eucalypt Woodland of the Victorian Volcanic Plain	Critically Endangered	Community likely to occur within area
Natural Damp Grassland of the Victorian Coastal Plains	Critically Endangered	Community likely to occur within area
Natural Temperate Grassland of the Victorian Volcanic Plain	Critically Endangered	Community likely to occur within area
Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains	Critically Endangered	Community likely to occur within area
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Acanthiza pusilla archibaldi		
King Island Brown Thornbill, Brown Thornbill (King Island) [59430]	Endangered	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Acanthornis magna greeniana King Island Scrubtit, Scrubtit (King Island) [82329]	Critically Endangered	Species or species habitat known to occur within area
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Foraging, feeding or related behaviour likely to occur within area
Aquila audax fleayi Tasmanian Wedge-tailed Eagle, Wedge-tailed Eagle (Tasmanian) [64435]	Endangered	Breeding likely to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Roosting known to occur within area
Ceyx azureus diemenensis Tasmanian Azure Kingfisher [25977]	Endangered	Species or species habitat known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Roosting known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Fregetta grallaria grallaria White-bellied Storm-Petrel (Tasman Sea), White-bellied Storm-Petrel (Australasian) [64438]	Vulnerable	Species or species habitat likely to occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat may occur within area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area
Limosa lapponica baueri Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat known to occur within area

Name	Status	Type of Presence
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Bar-tailed Godwit (menzbieri) [86432]	Critically Endangered	Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Neophema chrysogaster Orange-bellied Parrot [747]	Critically Endangered	Migration route known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat known to occur within area
Pedionomus torquatus Plains-wanderer [906]	Critically Endangered	Species or species habitat likely to occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area
Platycercus caledonicus brownii Green Rosella (King Island) [67041]	Vulnerable	Species or species habitat known to occur within area
Pterodroma leucoptera leucoptera Gould's Petrel, Australian Gould's Petrel [26033]	Endangered	Species or species habitat may occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Species or species habitat may occur within area
Rostratula australis Australian Painted-snipe, Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Breeding likely to occur within area
Strepera fuliginosa colei Black Currawong (King Island) [67113]	Vulnerable	Breeding likely to occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche bulleri platei Northern Buller's Albatross, Pacific Albatross [82273]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche cauta cauta Shy Albatross, Tasmanian Shy Albatross [82345]	Vulnerable	Breeding known to occur within area
Thalassarche cauta steadi White-capped Albatross [82344]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche chrysostoma Grey-headed Albatross [66491]	Endangered	Species or species habitat may occur within area

Name	Status	Type of Presence
Thalassarche impavida		
Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche melanophris		
Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche salvini		
Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thinornis rubricollis rubricollis		
Hooded Plover (eastern) [66726]	Vulnerable	Species or species habitat known to occur within area
Tyto novaehollandiae castanops (Tasmanian population)		
Masked Owl (Tasmanian) [67051]	Vulnerable	Species or species habitat known to occur within area
Crustaceans		
Astacopsis gouldi		
Giant Freshwater Crayfish, Tasmanian Giant Freshwater Lobster [64415]	Vulnerable	Species or species habitat may occur within area
Fish		
Galaxiella pusilla		
Eastern Dwarf Galaxias, Dwarf Galaxias [56790]	Vulnerable	Species or species habitat likely to occur within area
Maccullochella peelii		
Murray Cod [66633]	Vulnerable	Species or species habitat may occur within area
Nannoperca obscura		
Yarra Pygmy Perch [26177]	Vulnerable	Species or species habitat likely to occur within area
Prototroctes maraena		
Australian Grayling [26179]	Vulnerable	Species or species habitat known to occur within area
Frogs		
Litoria raniformis		
Growling Grass Frog, Southern Bell Frog, Green and Golden Frog, Warty Swamp Frog [1828]	Vulnerable	Species or species habitat known to occur within area
Insects		
Synemon plana		
Golden Sun Moth [25234]	Critically Endangered	Species or species habitat may occur within area
Mammals		
Antechinus minimus maritimus		
Swamp Antechinus (mainland) [83086]	Vulnerable	Species or species habitat known to occur within area
Balaenoptera borealis		
Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera musculus		
Blue Whale [36]	Endangered	Foraging, feeding or related behaviour known to occur within area
Balaenoptera physalus		
Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Dasyurus maculatus maculatus (SE mainland population)		
Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat known to occur within area

Name	Status	Type of Presence
Dasyurus maculatus maculatus (Tasmanian population)		
Spotted-tail Quoll, Spot-tailed Quoll, Tiger Quoll (Tasmanian population) [75183]	Vulnerable	Species or species habitat known to occur within area
Dasyurus viverrinus		
Eastern Quoll, Luaner [333]	Endangered	Species or species habitat may occur within area
Eubalaena australis		
Southern Right Whale [40]	Endangered	Breeding known to occur within area
Isoodon obesulus obesulus		
Southern Brown Bandicoot (eastern), Southern Brown Bandicoot (south-eastern) [68050]	Endangered	Species or species habitat known to occur within area
Mastacomys fuscus mordicus		
Broad-toothed Rat (mainland), Tooarrana [87617]	Vulnerable	Species or species habitat known to occur within area
Megaptera novaeangliae		
Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Miniopterus orianae bassanii		
Southern Bent-wing Bat [87645]	Critically Endangered	Breeding known to occur within area
Neophoca cinerea		
Australian Sea-lion, Australian Sea Lion [22]	Vulnerable	Species or species habitat known to occur within area
Perameles gunnii gunnii		
Eastern Barred Bandicoot (Tasmania) [66651]	Vulnerable	Species or species habitat likely to occur within area
Petauroides volans		
Greater Glider [254]	Vulnerable	Species or species habitat may occur within area
Potorous tridactylus tridactylus		
Long-nosed Potoroo (SE mainland) [66645]	Vulnerable	Species or species habitat known to occur within area
Pseudomys fumeus		
Smoky Mouse, Konoom [88]	Endangered	Species or species habitat likely to occur within area
Pseudomys novaehollandiae		
New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat likely to occur within area
Pteropus poliocephalus		
Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Sarcophilus harrisii		
Tasmanian Devil [299]	Endangered	Species or species habitat likely to occur within area
Plants		
Amphibromus fluitans		
River Swamp Wallaby-grass, Floating Swamp Wallaby-grass [19215]	Vulnerable	Species or species habitat likely to occur within area
Caladenia caudata		
Tailed Spider-orchid [17067]	Vulnerable	Species or species habitat likely to occur within area
Diuris lanceolata		
Snake Orchid [10231]	Endangered	Species or species habitat known to occur within area
Glycine latrobeana		
Clover Glycine, Purple Clover [13910]	Vulnerable	Species or species

Name	Status	Type of Presence
		habitat known to occur within area
Haloragis exalata subsp. exalata Wingless Raspwort, Square Raspwort [24636]	Vulnerable	Species or species habitat known to occur within area
Hypolepis distans Scrambling Ground-fern [2148]	Endangered	Species or species habitat likely to occur within area
Ixodia achillaeoides subsp. arenicola Sand Ixodia, Ixodia [21474]	Vulnerable	Species or species habitat may occur within area
Lachnagrostis adamsonii Adamson's Blown-grass, Adamson's Blowngrass [76211]	Endangered	Species or species habitat may occur within area
Leiocarpa gatesii Wrinkled Buttons [76212]	Vulnerable	Species or species habitat likely to occur within area
Lepidium aschersonii Spiny Pepper-cress [10976]	Vulnerable	Species or species habitat likely to occur within area
Pimelea spinescens subsp. spinescens Plains Rice-flower, Spiny Rice-flower, Prickly Pimelea [21980]	Critically Endangered	Species or species habitat likely to occur within area
Prasophyllum frenchii Maroon Leek-orchid, Slaty Leek-orchid, Stout Leek-orchid, French's Leek-orchid, Swamp Leek-orchid [9704]	Endangered	Species or species habitat likely to occur within area
Prasophyllum secutum Northern Leek-orchid [64954]	Endangered	Species or species habitat likely to occur within area
Prasophyllum spicatum Dense Leek-orchid [55146]	Vulnerable	Species or species habitat known to occur within area
Pterostylis chlorogramma Green-striped Greenhood [56510]	Vulnerable	Species or species habitat likely to occur within area
Pterostylis cucullata Leafy Greenhood [15459]	Vulnerable	Species or species habitat known to occur within area
Pterostylis tenuissima Swamp Greenhood, Dainty Swamp Orchid [13139]	Vulnerable	Species or species habitat known to occur within area
Pterostylis ziegeleri Grassland Greenhood, Cape Portland Greenhood [64971]	Vulnerable	Species or species habitat may occur within area
Senecio psilocarpus Swamp Fireweed, Smooth-fruited Groundsel [64976]	Vulnerable	Species or species habitat likely to occur within area
Taraxacum cygnorum Coast Dandelion [2508]	Vulnerable	Species or species habitat likely to occur within area
Thelymitra epipactoides Metallic Sun-orchid [11896]	Endangered	Species or species habitat known to occur within area
Thelymitra matthewsii Spiral Sun-orchid [4168]	Vulnerable	Species or species habitat likely to occur

Name	Status	Type of Presence
		within area
Xerochrysum palustre Swamp Everlasting, Swamp Paper Daisy [76215]	Vulnerable	Species or species habitat likely to occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Sharks		
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Foraging, feeding or related behaviour known to occur within area

Listed Migratory Species

[Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Anous stolidus Common Noddy [825]		Species or species habitat likely to occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardenna carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Foraging, feeding or related behaviour likely to occur within area
Ardenna tenuirostris Short-tailed Shearwater [82652]		Breeding known to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Sternula albifrons Little Tern [82849]		Species or species habitat may occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche cauta Tasmanian Shy Albatross [89224]	Vulnerable*	Breeding known to occur within area
Thalassarche chrysostoma Grey-headed Albatross [66491]	Endangered	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Migratory Marine Species		
Balaena glacialis australis Southern Right Whale [75529]	Endangered*	Breeding known to occur within area
Balaenoptera bonaerensis Antarctic Minke Whale, Dark-shoulder Minke Whale [67812]		Species or species habitat likely to occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Foraging, feeding or related behaviour known to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Caperea marginata Pygmy Right Whale [39]		Foraging, feeding or related behaviour may occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Isurus oxyrinchus Shortfin Mako, Mako Shark [79073]		Species or species

Name	Threatened	Type of Presence
		habitat likely to occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat likely to occur within area
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat likely to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat likely to occur within area
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area
Migratory Terrestrial Species		
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat known to occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat likely to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Breeding known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Arenaria interpres Ruddy Turnstone [872]		Roosting known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Roosting known to occur within area
Calidris alba Sanderling [875]		Roosting known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area
Calidris ruficollis Red-necked Stint [860]		Roosting known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Roosting known to occur

Name	Threatened	Type of Presence
		within area
Charadrius bicinctus Double-banded Plover [895]		Roosting known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Roosting known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Roosting known to occur within area
Gallinago megala Swinhoe's Snipe [864]		Roosting likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Roosting likely to occur within area
Limicola falcinellus Broad-billed Sandpiper [842]		Roosting known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Roosting known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Roosting likely to occur within area
Numenius phaeopus Whimbrel [849]		Roosting known to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Phalaropus lobatus Red-necked Phalarope [838]		Roosting known to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Roosting known to occur within area
Pluvialis squatarola Grey Plover [865]		Roosting known to occur within area
Tringa brevipes Grey-tailed Tattler [851]		Roosting known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Roosting known to occur within area
Xenus cinereus Terek Sandpiper [59300]		Roosting known to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land -

Commonwealth Heritage Places [Resource Information]

Name	State	Status
Historic		
Cape Wickham Lighthouse	TAS	Listed place

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Anous stolidus Common Noddy [825]		Species or species habitat likely to occur within area
Anseranas semipalmata Magpie Goose [978]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Breeding known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Arenaria interpres Ruddy Turnstone [872]		Roosting known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Roosting known to occur within area
Calidris alba Sanderling [875]		Roosting known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area
Calidris ruficollis Red-necked Stint [860]		Roosting known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Roosting known to occur within area
Catharacta skua Great Skua [59472]		Species or species

Name	Threatened	Type of Presence
		habitat may occur within area
Charadrius bicinctus Double-banded Plover [895]		Roosting known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Roosting known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area
Charadrius ruficapillus Red-capped Plover [881]		Roosting known to occur within area
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat known to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Eudyptula minor Little Penguin [1085]		Breeding known to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Roosting known to occur within area
Gallinago megala Swinhoe's Snipe [864]		Roosting likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Roosting likely to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Breeding known to occur within area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area
Heteroscelus brevipes Grey-tailed Tattler [59311]		Roosting known to occur within area
Himantopus himantopus Pied Stilt, Black-winged Stilt [870]		Roosting known to occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat known to occur within area
Larus novaehollandiae Silver Gull [810]		Breeding known to occur within area
Larus pacificus Pacific Gull [811]		Breeding known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur

Name	Threatened	Type of Presence
		within area
Limicola falcinellus Broad-billed Sandpiper [842]		Roosting known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Roosting known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat likely to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Breeding known to occur within area
Neophema chrysogaster Orange-bellied Parrot [747]	Critically Endangered	Migration route known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Roosting likely to occur within area
Numenius phaeopus Whimbrel [849]		Roosting known to occur within area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Pelagodroma marina White-faced Storm-Petrel [1016]		Breeding known to occur within area
Pelecanoides urinatrix Common Diving-Petrel [1018]		Breeding known to occur within area
Phalacrocorax fuscescens Black-faced Cormorant [59660]		Breeding known to occur within area
Phalaropus lobatus Red-necked Phalarope [838]		Roosting known to occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Pluvialis fulva Pacific Golden Plover [25545]		Roosting known to occur within area
Pluvialis squatarola Grey Plover [865]		Roosting known to occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Species or species habitat may occur within area
Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Foraging, feeding or related behaviour likely to occur within area
Puffinus tenuirostris Short-tailed Shearwater [1029]		Breeding known to occur within area
Recurvirostra novaehollandiae Red-necked Avocet [871]		Roosting known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area
Sterna albifrons Little Tern [813]		Species or species habitat may occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche cauta Tasmanian Shy Albatross [89224]	Vulnerable*	Breeding known to occur within area
Thalassarche chrysostoma Grey-headed Albatross [66491]	Endangered	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche sp. nov. Pacific Albatross [66511]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thinornis rubricollis Hooded Plover [59510]		Species or species habitat known to occur within area
Thinornis rubricollis rubricollis Hooded Plover (eastern) [66726]	Vulnerable	Species or species habitat known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species

Name	Threatened	Type of Presence
		habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Roosting known to occur within area
Xenus cinereus Terek Sandpiper [59300]		Roosting known to occur within area
Fish		
Heraldia nocturna Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area
Hippocampus abdominalis Big-belly Seahorse, Eastern Potbelly Seahorse, New Zealand Potbelly Seahorse [66233]		Species or species habitat may occur within area
Hippocampus breviceps Short-head Seahorse, Short-snouted Seahorse [66235]		Species or species habitat may occur within area
Hippocampus minotaur Bullneck Seahorse [66705]		Species or species habitat may occur within area
Histiogamphelus briggsii Crested Pipefish, Briggs' Crested Pipefish, Briggs' Pipefish [66242]		Species or species habitat may occur within area
Histiogamphelus cristatus Rhino Pipefish, Macleay's Crested Pipefish, Ring-back Pipefish [66243]		Species or species habitat may occur within area
Hypselognathus rostratus Knifesnout Pipefish, Knife-snouted Pipefish [66245]		Species or species habitat may occur within area
Kaupus costatus Deepbody Pipefish, Deep-bodied Pipefish [66246]		Species or species habitat may occur within area
Kimblaeus bassensis Trawl Pipefish, Bass Strait Pipefish [66247]		Species or species habitat may occur within area
Leptoichthys fistularius Brushtail Pipefish [66248]		Species or species habitat may occur within area
Lissocampus caudalis Australian Smooth Pipefish, Smooth Pipefish [66249]		Species or species habitat may occur within area
Lissocampus runa Javelin Pipefish [66251]		Species or species habitat may occur within area
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area
Mitotichthys mollisoni Mollison's Pipefish [66260]		Species or species habitat may occur within area
Mitotichthys semistriatus Halfbanded Pipefish [66261]		Species or species habitat may occur within area
Mitotichthys tuckeri Tucker's Pipefish [66262]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Notiocampus ruber Red Pipefish [66265]		Species or species habitat may occur within area
Phycodurus eques Leafy Seadragon [66267]		Species or species habitat may occur within area
Phyllopteryx taeniolatus Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area
Pugnaso curtirostris Pugnose Pipefish, Pug-nosed Pipefish [66269]		Species or species habitat may occur within area
Solegnathus robustus Robust Pipehorse, Robust Spiny Pipehorse [66274]		Species or species habitat may occur within area
Solegnathus spinosissimus Spiny Pipehorse, Australian Spiny Pipehorse [66275]		Species or species habitat may occur within area
Stigmatopora argus Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area
Stipecampus cristatus Ringback Pipefish, Ring-backed Pipefish [66278]		Species or species habitat may occur within area
Urocampus carinirostris Hairy Pipefish [66282]		Species or species habitat may occur within area
Vanacampus margaritifer Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area
Vanacampus phillipi Port Phillip Pipefish [66284]		Species or species habitat may occur within area
Vanacampus poecilolaemus Longsnout Pipefish, Australian Long-snout Pipefish, Long-snouted Pipefish [66285]		Species or species habitat may occur within area
Mammals		
Arctocephalus forsteri Long-nosed Fur-seal, New Zealand Fur-seal [20]		Species or species habitat may occur within area
Arctocephalus pusillus Australian Fur-seal, Australo-African Fur-seal [21]		Breeding likely to occur within area
Neophoca cinerea Australian Sea-lion, Australian Sea Lion [22]	Vulnerable	Species or species habitat known to occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area

Name	Threatened	Type of Presence
Dermochelys coriacea		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area

Whales and other Cetaceans [Resource Information]

Name	Status	Type of Presence
Mammals		
Balaenoptera acutorostrata		
Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera bonaerensis		
Antarctic Minke Whale, Dark-shoulder Minke Whale [67812]		Species or species habitat likely to occur within area
Balaenoptera borealis		
Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera musculus		
Blue Whale [36]	Endangered	Foraging, feeding or related behaviour known to occur within area
Balaenoptera physalus		
Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Berardius arnuxii		
Arnoux's Beaked Whale [70]		Species or species habitat may occur within area
Caperea marginata		
Pygmy Right Whale [39]		Foraging, feeding or related behaviour may occur within area
Delphinus delphis		
Common Dophin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Eubalaena australis		
Southern Right Whale [40]	Endangered	Breeding known to occur within area
Globicephala macrorhynchus		
Short-finned Pilot Whale [62]		Species or species habitat may occur within area
Globicephala melas		
Long-finned Pilot Whale [59282]		Species or species habitat may occur within area
Grampus griseus		
Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Kogia breviceps		
Pygmy Sperm Whale [57]		Species or species habitat may occur within area
Kogia simus		
Dwarf Sperm Whale [58]		Species or species habitat may occur within area
Lagenorhynchus obscurus		
Dusky Dolphin [43]		Species or species habitat likely to occur within area
Lissodelphis peronii		
Southern Right Whale Dolphin [44]		Species or species habitat may occur within area
Megaptera novaeangliae		
Humpback Whale [38]	Vulnerable	Species or species

Name	Status	Type of Presence
		habitat known to occur within area
Mesoplodon bowdoini Andrew's Beaked Whale [73]		Species or species habitat may occur within area
Mesoplodon densirostris Blainville's Beaked Whale, Dense-beaked Whale [74]		Species or species habitat may occur within area
Mesoplodon grayi Gray's Beaked Whale, Scamperdown Whale [75]		Species or species habitat may occur within area
Mesoplodon hectori Hector's Beaked Whale [76]		Species or species habitat may occur within area
Mesoplodon layardii Strap-toothed Beaked Whale, Strap-toothed Whale, Layard's Beaked Whale [25556]		Species or species habitat may occur within area
Mesoplodon mirus True's Beaked Whale [54]		Species or species habitat may occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat likely to occur within area
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area
Pseudorca crassidens False Killer Whale [48]		Species or species habitat likely to occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area
Ziphius cavirostris Cuvier's Beaked Whale, Goose-beaked Whale [56]		Species or species habitat may occur within area

Critical Habitats [Resource Information]

Name	Type of Presence
Thalassarche cauta (Shy Albatross) - Albatross Island, The Mewstone, Pedra Branca	Listed Critical Habitat

Australian Marine Parks [Resource Information]

Name	Label
Apollo	Multiple Use Zone (IUCN VI)
Franklin	Multiple Use Zone (IUCN VI)
Zeehan	Multiple Use Zone (IUCN VI)
Zeehan	Special Purpose Zone (IUCN VI)

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Aire River	VIC
Aire River W.R.	VIC
Albatross Island	TAS
Anglesea B.R.	VIC
Anglesea Heath	VIC
Badger Box Creek	TAS
Bay of Islands Coastal Park	VIC
Breamlea F.F.R.	VIC
Cape Wickham	TAS
Cape Wickham	TAS
Christmas Island	TAS
City of Melbourne Bay	TAS
Colliers Forest Reserve	TAS
Colliers Swamp	TAS
Councillor Island	TAS
Counsel Hill	TAS
Currie Lightkeepers Residence	TAS
Deep Lagoons	TAS
Disappointment Bay	TAS
Edna Bowman N.C.R.	VIC
Eldorado	TAS
Gentle Annie	TAS
Great Otway National Park	VIC
Hunter Island	TAS
Kentford Forest	TAS
Kentford Forest	TAS
Kentford Road	TAS
King Island	TAS
Lake Connewarre W.R	VIC
Lake Flannigan	TAS
Lavinia	TAS
Lily Lagoon	TAS
Lily Pond B.R.	VIC
Loorana	TAS
Lymwood	TAS
Marengo N.C.R.	VIC
Millwood Road	TAS
Muddy Lagoon	TAS
New Year Island	TAS
Nugara	TAS
Pegarah	TAS
Pegarah Forest	TAS
Point Nepean National Park	VIC
Port Campbell National Park	VIC
Queenscliff N.F.R	VIC
Red Hut Point	TAS
Red Hut Road #1	TAS
Reekara	TAS
Sandfly Beach	TAS
Sea Elephant	TAS
Sea Elephant Bootlace	TAS
Sea Elephant River	TAS
Seal Rocks	TAS
Seal Rocks	TAS
Stokes Point	TAS
Stony Creek (Otways)	VIC
Tambar	TAS
Tathams Lagoon	TAS
The Doughboys	TAS
Unnamed P0176	VIC
Wicks Road Nugara	TAS
Wild Dog Creek SS.R.	VIC
Yambacoona	TAS

Regional Forest Agreements [Resource Information]

Note that all areas with completed RFAs have been included.

Name	State
Tasmania RFA	Tasmania
West Victoria RFA	Victoria

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Alauda arvensis Skylark [656]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Callipepla californica California Quail [59451]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Carduelis chloris European Greenfinch [404]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Meleagris gallopavo Wild Turkey [64380]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Pavo cristatus Indian Peafowl, Peacock [919]		Species or species habitat likely to occur within area
Phasianus colchicus Common Pheasant [920]		Species or species habitat likely to occur within area
Pycnonotus jocosus Red-whiskered Bulbul [631]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species

Name	Status	Type of Presence
		habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Turdus philomelos Song Thrush [597]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Alternanthera philoxeroides Alligator Weed [11620]		Species or species habitat likely to occur within area
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Asparagus scandens Asparagus Fern, Climbing Asparagus Fern [23255]		Species or species habitat likely to occur within area
Austrocylindropuntia spp. Prickly Pears [85132]		Species or species habitat likely to occur within area
Carrichtera annua Ward's Weed [9511]		Species or species habitat may occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera subsp. rotundata Bitou Bush [16332]		Species or species habitat likely to occur within area
Cytisus scoparius Broom, English Broom, Scotch Broom, Common Broom, Scottish Broom, Spanish Broom [5934]		Species or species habitat likely to occur within area
Eichhornia crassipes Water Hyacinth, Water Orchid, Nile Lily [13466]		Species or species habitat likely to occur within area
Genista linifolia Flax-leaved Broom, Mediterranean Broom, Flax Broom [2800]		Species or species habitat likely to occur within area
Genista monspessulana Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Nassella neesiana Chilean Needle grass [67699]		Species or species habitat likely to occur within area
Nassella trichotoma Serrated Tussock, Yass River Tussock, Yass Tussock, Nassella Tussock (NZ) [18884]		Species or species habitat likely to occur within area
Olea europaea Olive, Common Olive [9160]		Species or species habitat may occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Ulex europaeus Gorse, Furze [7693]		Species or species habitat likely to occur within area

Nationally Important Wetlands [Resource Information]

Name	State
Bungaree Lagoon	TAS
Lake Connewarre State Wildlife Reserve	VIC
Lake Flannigan	TAS
Lavinia Nature Reserve	TAS
Lower Aire River Wetlands	VIC
Pearshape Lagoon 1	TAS
Pearshape Lagoon 2	TAS
Pearshape Lagoon 3	TAS
Pearshape Lagoon 4	TAS
Princetown Wetlands	VIC
Swan Bay & Swan Island	VIC

Key Ecological Features (Marine) [Resource Information]

Key Ecological Features are the parts of the marine ecosystem that are considered to be important for the biodiversity or ecosystem functioning and integrity of the Commonwealth Marine Area.

Name	Region
West Tasmania Canyons	South-east

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-38.391427 142.485689,-38.404342 142.513154,-38.602087 142.863344,-38.636422 143.054231,-38.758606 143.223146,-38.770385 143.261598,-38.748968 143.309663,-38.757535 143.374208,-38.783232 143.431886,-38.857059 143.50879,-38.853851 143.552736,-38.792866 143.624147,-38.795007 143.648866,-38.74147 143.676332,-38.685749 143.826021,-38.687893 143.839753,-38.544109 143.985322,-38.533367 143.974336,-38.466733 144.045747,-38.466733 144.089692,-38.462432 144.119905,-38.430165 144.139131,-38.425862 144.177583,-38.281554 144.430269,-38.291255 144.612916,-38.264304 144.639009,-38.304188 144.655488,-40.681912 144.699434,-40.686078 142.469209,-38.386045 142.485689,-38.391427 142.485689

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

Department of the Environment
GPO Box 787
Canberra ACT 2601 Australia
+61 2 6274 1111

Australian Government
Department of the Environment and Energy

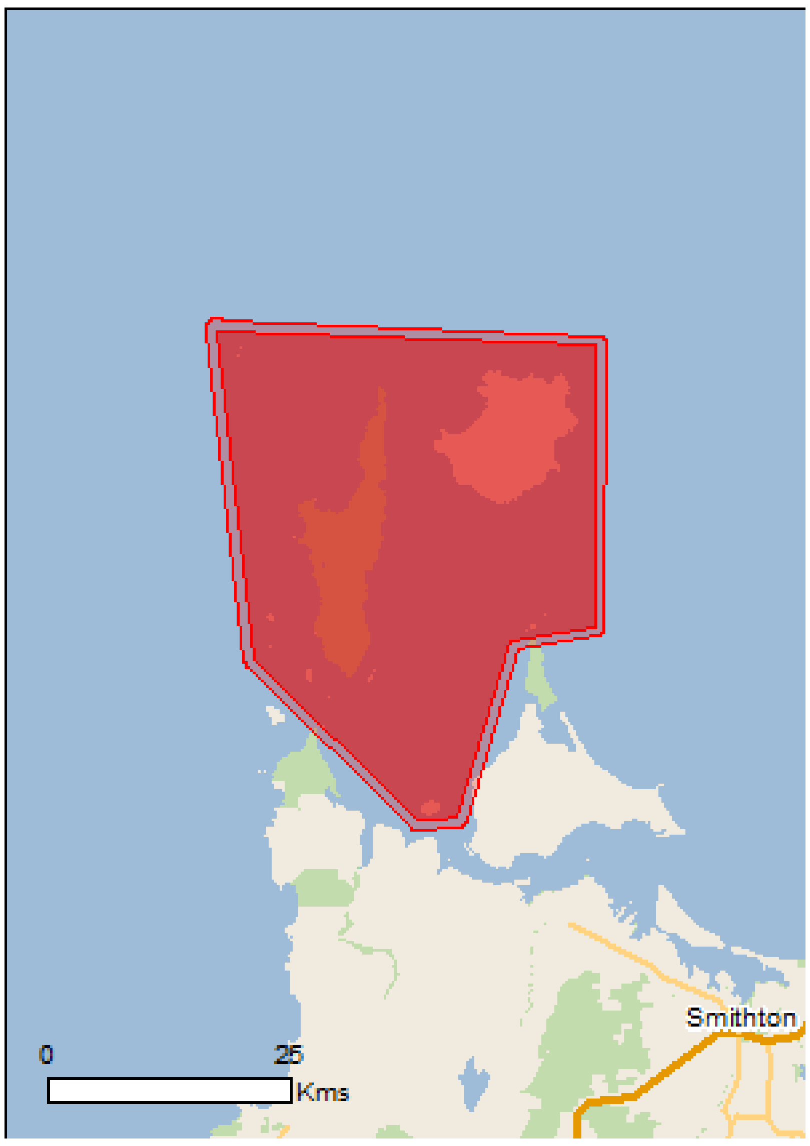
EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

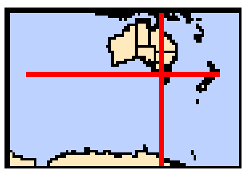
Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 15/05/19 16:27:26



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

Coordinates
Buffer: 1.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	1
Listed Threatened Ecological Communities:	1
Listed Threatened Species:	58
Listed Migratory Species:	60

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	99
Whales and Other Cetaceans:	13
Critical Habitats:	1
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	10
Regional Forest Agreements:	1
Invasive Species:	21
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Commonwealth Marine Area [Resource Information]

Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside the Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area. Generally the Commonwealth Marine Area stretches from three nautical miles to two hundred nautical miles from the coast.

Name
EEZ and Territorial Sea

Marine Regions [Resource Information]

If you are planning to undertake action in an area in or close to the Commonwealth Marine Area, and a marine bioregional plan has been prepared for the Commonwealth Marine Area in that area, the marine bioregional plan may inform your decision as to whether to refer your proposed action under the EPBC Act.

Name
South-east

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Giant Kelp Marine Forests of South East Australia	Endangered	Community may occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Aquila audax fleayi		
Tasmanian Wedge-tailed Eagle, Wedge-tailed Eagle (Tasmanian) [64435]	Endangered	Breeding likely to occur within area
Botaurus poiciloptilus		
Australasian Bittern [1001]	Endangered	Species or species habitat likely to occur within area
Calidris canutus		
Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris tenuirostris		
Great Knot [862]	Critically Endangered	Roosting known to occur within area
Ceyx azureus diemenensis		
Tasmanian Azure Kingfisher [25977]	Endangered	Species or species habitat likely to occur within area
Charadrius leschenaultii		
Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Roosting known to occur within area
Charadrius mongolus		
Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur

Name	Status	Type of Presence
		within area
[Diomedea antipodensis](#) Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
[Diomedea epomophora](#) Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
[Diomedea exulans](#) Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
[Diomedea sanfordi](#) Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
[Fregetta grallaria grallaria](#) White-bellied Storm-Petrel (Tasman Sea), White-bellied Storm-Petrel (Australasian) [64438]	Vulnerable	Species or species habitat likely to occur within area
[Halobaena caerulea](#) Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area
[Lathamus discolor](#) Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area
[Limosa lapponica baueri](#) Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat known to occur within area
[Limosa lapponica menzbieri](#) Northern Siberian Bar-tailed Godwit, Bar-tailed Godwit (menzbieri) [86432]	Critically Endangered	Species or species habitat may occur within area
[Macronectes giganteus](#) Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Foraging, feeding or related behaviour likely to occur within area
[Macronectes halli](#) Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
[Neophema chrysogaster](#) Orange-bellied Parrot [747]	Critically Endangered	Migration route known to occur within area
[Numenius madagascariensis](#) Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
[Pachyptila turtur subantarctica](#) Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat known to occur within area
[Phoebetria fusca](#) Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area
[Pterodroma leucoptera leucoptera](#) Gould's Petrel, Australian Gould's Petrel [26033]	Endangered	Species or species habitat may occur within area
[Pterodroma mollis](#) Soft-plumaged Petrel [1036]	Vulnerable	Species or species habitat may occur within area
[Sternula nereis nereis](#) Australian Fairy Tern [82950]	Vulnerable	Breeding likely to occur within area
[Thalassarche bulleri](#) Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species

Name	Status	Type of Presence
		habitat may occur within area
Thalassarche bulleri platei Northern Buller's Albatross, Pacific Albatross [82273]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta cauta Shy Albatross, Tasmanian Shy Albatross [82345]	Vulnerable	Breeding known to occur within area
Thalassarche cauta steadi White-capped Albatross [82344]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche chrysostoma Grey-headed Albatross [66491]	Endangered	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thinornis rubricollis rubricollis Hooded Plover (eastern) [66726]	Vulnerable	Species or species habitat known to occur within area
Tyto novaehollandiae castanops (Tasmanian population) Masked Owl (Tasmanian) [67051]	Vulnerable	Species or species habitat known to occur within area
Crustaceans		
Astacopsis gouldi Giant Freshwater Crayfish, Tasmanian Giant Freshwater Lobster [64415]	Vulnerable	Species or species habitat may occur within area
Fish		
Galaxiella pusilla Eastern Dwarf Galaxias, Dwarf Galaxias [56790]	Vulnerable	Species or species habitat may occur within area
Prototroctes maraena Australian Grayling [26179]	Vulnerable	Species or species habitat likely to occur within area
Frogs		
Litoria raniformis Growling Grass Frog, Southern Bell Frog, Green and Golden Frog, Warty Swamp Frog [1828]	Vulnerable	Species or species habitat likely to occur within area
Mammals		
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Dasyurus maculatus maculatus (Tasmanian population) Spotted-tail Quoll, Spot-tailed Quoll, Tiger Quoll (Tasmanian population) [75183]	Vulnerable	Species or species habitat known to occur within area

Name	Status	Type of Presence
Dasyurus viverrinus Eastern Quoll, Luaner [333]	Endangered	Species or species habitat may occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat known to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Sarcophilus harrisii Tasmanian Devil [299]	Endangered	Species or species habitat likely to occur within area
Plants		
Caladenia caudata Tailed Spider-orchid [17067]	Vulnerable	Species or species habitat likely to occur within area
Caladenia dienema Windswept Spider-orchid [64858]	Endangered	Species or species habitat may occur within area
Diuris lanceolata Snake Orchid [10231]	Endangered	Species or species habitat likely to occur within area
Prasophyllum atratum Three Hummock Leek-orchid [82677]	Critically Endangered	Species or species habitat known to occur within area
Prasophyllum secutum Northern Leek-orchid [64954]	Endangered	Species or species habitat likely to occur within area
Pterostylis cucullata Leafy Greenhood [15459]	Vulnerable	Species or species habitat known to occur within area
Pterostylis ziegeleri Grassland Greenhood, Cape Portland Greenhood [64971]	Vulnerable	Species or species habitat may occur within area
Reptiles		
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
Sharks		
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area

Listed Migratory Species

[Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardenna carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Foraging, feeding or related behaviour likely to occur within area

Name	Threatened	Type of Presence
Ardenna tenuirostris		
Short-tailed Shearwater [82652]		Breeding known to occur within area
Diomedea antipodensis		
Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora		
Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans		
Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi		
Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Hydroprogne caspia		
Caspian Tern [808]		Breeding known to occur within area
Macronectes giganteus		
Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Macronectes halli		
Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Phoebetria fusca		
Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area
Sternula albifrons		
Little Tern [82849]		Species or species habitat may occur within area
Thalassarche bulleri		
Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta		
Tasmanian Shy Albatross [89224]	Vulnerable*	Breeding known to occur within area
Thalassarche chrysostoma		
Grey-headed Albatross [66491]	Endangered	Species or species habitat may occur within area
Thalassarche impavida		
Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche melanophris		
Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche salvini		
Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche steadi		
White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Migratory Marine Species		
Balaena glacialis australis		
Southern Right Whale [75529]	Endangered*	Species or species habitat known to occur within area
Balaenoptera borealis		
Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely

Name	Threatened	Type of Presence
		to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Caperea marginata Pygmy Right Whale [39]		Foraging, feeding or related behaviour may occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat likely to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat likely to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Arenaria interpres Ruddy Turnstone [872]		Roosting known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Roosting known to occur within area
Calidris alba Sanderling [875]		Roosting known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Calidris ruficollis Red-necked Stint [860]		Roosting known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Roosting known to occur within area
Charadrius bicinctus Double-banded Plover [895]		Roosting known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Roosting known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Roosting known to occur within area
Gallinago megala Swinhoe's Snipe [864]		Roosting likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Roosting likely to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Roosting known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Roosting likely to occur within area
Numenius phaeopus Whimbrel [849]		Roosting known to occur within area
Philomachus pugnax Ruff (Reeve) [850]		Roosting known to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Roosting known to occur within area
Pluvialis squatarola Grey Plover [865]		Roosting known to occur within area
Tringa brevipes Grey-tailed Tattler [851]		Roosting known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Xenus cinereus Terek Sandpiper [59300]		Roosting known to occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Arenaria interpres Ruddy Turnstone [872]		Roosting known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Roosting known to occur within area
Calidris alba Sanderling [875]		Roosting known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Calidris ruficollis Red-necked Stint [860]		Roosting known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Roosting known to occur within area
Catharacta skua Great Skua [59472]		Species or species habitat may occur within area
Charadrius bicinctus Double-banded Plover [895]		Roosting known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Roosting known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area
Charadrius ruficapillus Red-capped Plover [881]		Roosting known to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely

Name	Threatened	Type of Presence
		to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Eudyptula minor Little Penguin [1085]		Breeding known to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Roosting known to occur within area
Gallinago megala Swinhoe's Snipe [864]		Roosting likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Roosting likely to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Breeding known to occur within area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area
Heteroscelus brevipes Grey-tailed Tattler [59311]		Roosting known to occur within area
Himantopus himantopus Pied Stilt, Black-winged Stilt [870]		Roosting known to occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat likely to occur within area
Larus novaehollandiae Silver Gull [810]		Breeding known to occur within area
Larus pacificus Pacific Gull [811]		Breeding known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Roosting known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Neophema chrysogaster Orange-bellied Parrot [747]	Critically Endangered	Migration route known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Roosting likely to occur within area
Numenius phaeopus Whimbrel [849]		Roosting known to occur within area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat known to occur within area
Pelagodroma marina White-faced Storm-Petrel [1016]		Breeding known to occur within area
Pelecanoides urinatrix Common Diving-Petrel [1018]		Breeding known to occur within area
Phalacrocorax fuscescens Black-faced Cormorant [59660]		Breeding known to occur within area
Philomachus pugnax Ruff (Reeve) [850]		Roosting known to occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Roosting known to occur within area
Pluvialis squatarola Grey Plover [865]		Roosting known to occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Species or species habitat may occur within area
Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Foraging, feeding or related behaviour likely to occur within area
Puffinus tenuirostris Short-tailed Shearwater [1029]		Breeding known to occur within area
Sterna albifrons Little Tern [813]		Species or species habitat may occur within area
Sterna caspia Caspian Tern [59467]		Breeding known to occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta Tasmanian Shy Albatross [89224]	Vulnerable*	Breeding known to occur within area
Thalassarche chrysostoma Grey-headed Albatross [66491]	Endangered	Species or species habitat may occur within area

Name	Threatened	Type of Presence
Thalassarche impavida		
Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche melanophris		
Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche salvini		
Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche sp. nov.		
Pacific Albatross [66511]	Vulnerable*	Species or species habitat may occur within area
Thalassarche steadi		
White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thinornis rubricollis		
Hooded Plover [59510]		Species or species habitat known to occur within area
Thinornis rubricollis rubricollis		
Hooded Plover (eastern) [66726]	Vulnerable	Species or species habitat known to occur within area
Tringa nebularia		
Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Xenus cinereus		
Terek Sandpiper [59300]		Roosting known to occur within area
Fish		
Heraldia nocturna		
Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area
Hippocampus abdominalis		
Big-belly Seahorse, Eastern Potbelly Seahorse, New Zealand Potbelly Seahorse [66233]		Species or species habitat may occur within area
Hippocampus breviceps		
Short-head Seahorse, Short-snouted Seahorse [66235]		Species or species habitat may occur within area
Histiogamphelus briggsii		
Crested Pipefish, Briggs' Crested Pipefish, Briggs' Pipefish [66242]		Species or species habitat may occur within area
Histiogamphelus cristatus		
Rhino Pipefish, Macleay's Crested Pipefish, Ring-back Pipefish [66243]		Species or species habitat may occur within area
Hypselognathus rostratus		
Knifesnout Pipefish, Knife-snouted Pipefish [66245]		Species or species habitat may occur within area
Kaupus costatus		
Deepbody Pipefish, Deep-bodied Pipefish [66246]		Species or species habitat may occur within area
Kimblaeus bassensis		
Trawl Pipefish, Bass Strait Pipefish [66247]		Species or species habitat may occur within area
Leptoichthys fistularius		
Brushtail Pipefish [66248]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Lissocampus caudalis Australian Smooth Pipefish, Smooth Pipefish [66249]		Species or species habitat may occur within area
Lissocampus runa Javelin Pipefish [66251]		Species or species habitat may occur within area
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area
Mitotichthys semistriatus Halfbanded Pipefish [66261]		Species or species habitat may occur within area
Mitotichthys tuckeri Tucker's Pipefish [66262]		Species or species habitat may occur within area
Notiocampus ruber Red Pipefish [66265]		Species or species habitat may occur within area
Phycodurus eques Leafy Seadragon [66267]		Species or species habitat may occur within area
Phyllopteryx taeniolatus Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area
Pugnaso curtirostris Pugnose Pipefish, Pug-nosed Pipefish [66269]		Species or species habitat may occur within area
Solegnathus robustus Robust Pipehorse, Robust Spiny Pipehorse [66274]		Species or species habitat may occur within area
Solegnathus spinosissimus Spiny Pipehorse, Australian Spiny Pipehorse [66275]		Species or species habitat may occur within area
Stigmatopora argus Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area
Stipecampus cristatus Ringback Pipefish, Ring-backed Pipefish [66278]		Species or species habitat may occur within area
Urocampus carinirostris Hairy Pipefish [66282]		Species or species habitat may occur within area
Vanacampus margaritifer Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area
Vanacampus phillipi Port Phillip Pipefish [66284]		Species or species habitat may occur within area
Vanacampus poecilolaemus Longsnout Pipefish, Australian Long-snout Pipefish, Long-snouted Pipefish [66285]		Species or species habitat may occur within area
Mammals		

Name	Threatened	Type of Presence
Arctocephalus forsteri Long-nosed Fur-seal, New Zealand Fur-seal [20]		Species or species habitat may occur within area
Arctocephalus pusillus Australian Fur-seal, Australo-African Fur-seal [21]		Species or species habitat may occur within area
Reptiles		
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area

Whales and other Cetaceans

[Resource Information]

Name	Status	Type of Presence
Mammals		
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Caperea marginata Pygmy Right Whale [39]		Foraging, feeding or related behaviour may occur within area
Delphinus delphis Common Dophin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat known to occur within area
Globicephala macrorhynchus Short-finned Pilot Whale [62]		Species or species habitat may occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat likely to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area

Critical Habitats [Resource Information]

Name	Type of Presence
Thalassarche cauta (Shy Albatross) - Albatross Island, The Mewstone, Pedra Branca	Listed Critical Habitat

Extra Information

State and Territory Reserves [Resource Information]

Name	State
Albatross Island	TAS
Bird Island	TAS
Harbour Islets	TAS
Hunter Island	TAS
Kangaroo Island	TAS
Penguin Islet	TAS
Petrel Islands	TAS
Seacrow Islet	TAS
Stack Island	TAS
Three Hummock Island	TAS

Regional Forest Agreements [Resource Information]

Note that all areas with completed RFAs have been included.

Name	State
Tasmania RFA	Tasmania

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Alauda arvensis Skylark [656]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Carduelis chloris European Greenfinch [404]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Pavo cristatus Indian Peafowl, Peacock [919]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Plants		
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Ulex europaeus Gorse, Furze [7693]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-40.360133 144.632349,-40.35804 144.632349,-40.360133 144.632349,-40.370597 144.985285,-40.569095 144.983911,-40.578483 144.905634,-40.70353 144.856195,-40.705612 144.819116,-40.593084 144.668054,-40.360133 144.632349

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

Department of the Environment
GPO Box 787
Canberra ACT 2601 Australia
+61 2 6274 1111

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

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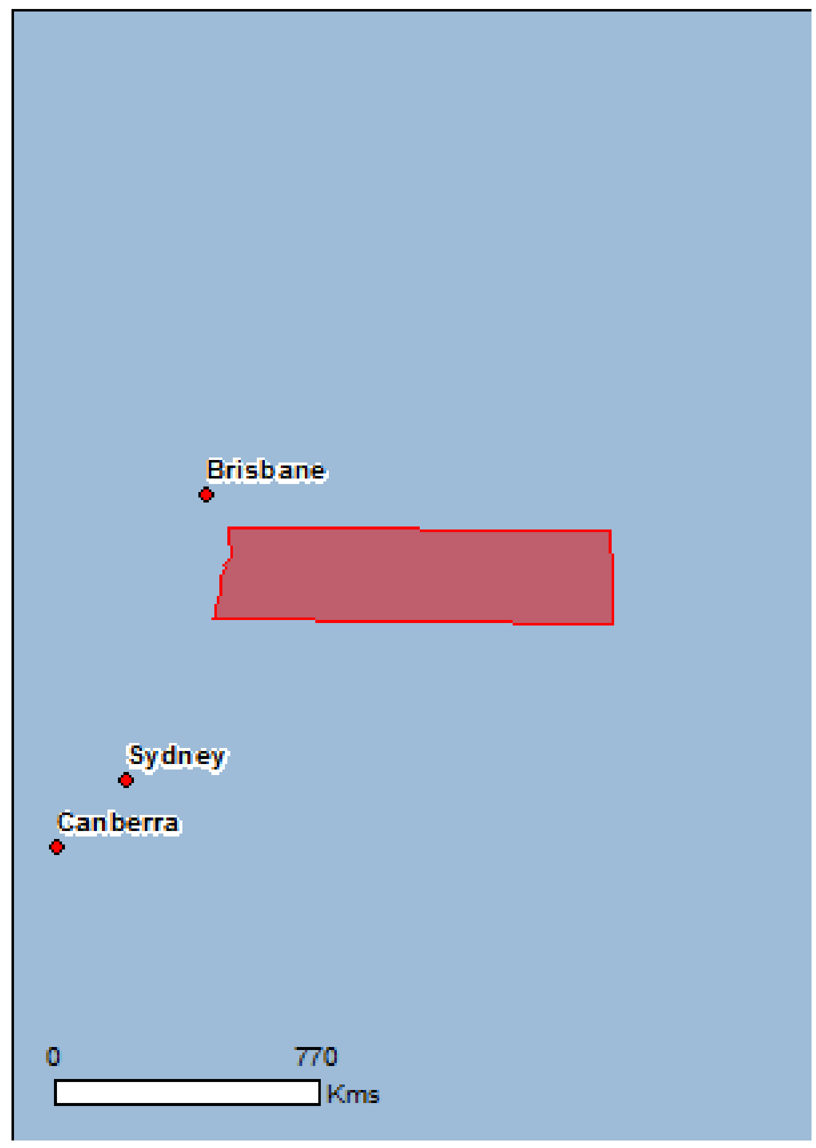

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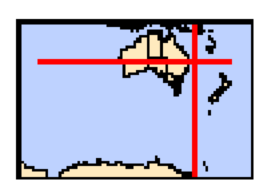

Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	1
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	2
Listed Threatened Ecological Communities:	3
Listed Threatened Species:	107
Listed Migratory Species:	89

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	None
Commonwealth Heritage Places:	1
Listed Marine Species:	118
Whales and Other Cetaceans:	36
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	9

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	15
Regional Forest Agreements:	1
Invasive Species:	43
Nationally Important Wetlands:	3
Key Ecological Features (Marine)	6

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar) [Resource Information]

Name	Proximity
Elizabeth and middleton reefs marine national nature reserve	Within Ramsar site

Commonwealth Marine Area [Resource Information]

Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside the Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area. Generally the Commonwealth Marine Area stretches from three nautical miles to two hundred nautical miles from the coast.

Name
EEZ and Territorial Sea
Extended Continental Shelf

Marine Regions [Resource Information]

If you are planning to undertake action in an area in or close to the Commonwealth Marine Area, and a marine bioregional plan has been prepared for the Commonwealth Marine Area in that area, the marine bioregional plan may inform your decision as to whether to refer your proposed action under the EPBC Act.

Name
Temperate East

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community	Endangered	Community likely to occur within area
Littoral Rainforest and Coastal Vine Thickets of Eastern Australia	Critically Endangered	Community likely to occur within area
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Anthochaera phrygia		
Regent Honeyeater [82338]	Critically Endangered	Species or species habitat known to occur within area
Botaurus poiciloptilus		
Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Calidris canutus		
Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris tenuirostris		
Great Knot [862]	Critically Endangered	Roosting known to occur within area

Name	Status	Type of Presence
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Roosting known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area
Cyclopsitta diophthalma coxeni Coxen's Fig-Parrot [59714]	Endangered	Species or species habitat known to occur within area
Dasyornis brachypterus Eastern Bristlebird [533]	Endangered	Species or species habitat may occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea antipodensis gibsoni Gibson's Albatross [82270]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat known to occur within area
Fregetta grallaria grallaria White-bellied Storm-Petrel (Tasman Sea), White-bellied Storm-Petrel (Australasian) [64438]	Vulnerable	Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area
Limosa lapponica baueri Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat known to occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Bar-tailed Godwit (menzbieri) [86432]	Critically Endangered	Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat known to occur

Name	Status	Type of Presence
		within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Poephila cincta cincta Southern Black-throated Finch [64447]	Endangered	Species or species habitat may occur within area
Pterodroma heraldica Herald Petrel [66973]	Critically Endangered	Species or species habitat likely to occur within area
Pterodroma leucoptera leucoptera Gould's Petrel, Australian Gould's Petrel [26033]	Endangered	Species or species habitat may occur within area
Pterodroma neglecta neglecta Kermadec Petrel (western) [64450]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Rostratula australis Australian Painted-snipe, Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche bulleri platei Northern Buller's Albatross, Pacific Albatross [82273]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta cauta Shy Albatross, Tasmanian Shy Albatross [82345]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta steadi White-capped Albatross [82344]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Turnix melanogaster Black-breasted Button-quail [923]	Vulnerable	Species or species habitat likely to occur within area
Fish		
Epinephelus daemelii Black Rockcod, Black Cod, Saddled Rockcod [68449]	Vulnerable	Species or species habitat likely to occur within area
Nannoperca oxleyana Oxleyan Pygmy Perch [64468]	Endangered	Species or species habitat known to occur within area
Frogs		
Litoria aurea Green and Golden Bell Frog [1870]	Vulnerable	Species or species

Name	Status	Type of Presence
		habitat known to occur within area
Litoria olongburensis Wallum Sedge Frog [1821]	Vulnerable	Species or species habitat known to occur within area
Mixophyes fleayi Fleay's Frog [25960]	Endangered	Species or species habitat likely to occur within area
Mixophyes iteratus Giant Barred Frog, Southern Barred Frog [1944]	Endangered	Species or species habitat may occur within area
Insects		
Argynnis hyperbius inconstans Australian Fritillary [88056]	Critically Endangered	Species or species habitat likely to occur within area
Phyllodes imperialis smithersi Pink Underwing Moth [86084]	Endangered	Breeding may occur within area
Mammals		
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat likely to occur within area
Dasyurus maculatus maculatus (SE mainland population) Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat known to occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Congregation or aggregation known to occur within area
Petauroides volans Greater Glider [254]	Vulnerable	Species or species habitat likely to occur within area
Petrogale penicillata Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat may occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
Potorous tridactylus tridactylus Long-nosed Potoroo (SE Mainland) [66645]	Vulnerable	Species or species habitat likely to occur within area
Pseudomys novaehollandiae New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat known to occur within area
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Roosting known to occur

Name	Status	Type of Presence
		within area
Xeromys myoides Water Mouse, False Water Rat, Yirrkoo [66]	Vulnerable	Species or species habitat likely to occur within area
Other		
Thersites mitchellae Mitchell's Rainforest Snail [66774]	Critically Endangered	Species or species habitat known to occur within area
Plants		
Acronychia littoralis Scented Acronychia [8582]	Endangered	Species or species habitat likely to occur within area
Allocasuarina thalassoscopica [21927]	Endangered	Species or species habitat known to occur within area
Arthraxon hispidus Hairy-joint Grass [9338]	Vulnerable	Species or species habitat known to occur within area
Corokia whiteana [17820]	Vulnerable	Species or species habitat likely to occur within area
Cryptocarya foetida Stinking Cryptocarya, Stinking Laurel [11976]	Vulnerable	Species or species habitat known to occur within area
Cryptostylis hunteriana Leafless Tongue-orchid [19533]	Vulnerable	Species or species habitat likely to occur within area
Cynanchum elegans White-flowered Wax Plant [12533]	Endangered	Species or species habitat likely to occur within area
Davidsonia jerseyana Davidson's Plum [67219]	Endangered	Species or species habitat known to occur within area
Davidsonia johnsonii Smooth Davidsonia, Smooth Davidson's Plum, Small-leaved Davidson's Plum [67178]	Endangered	Species or species habitat likely to occur within area
Diploglottis campbellii Small-leaved Tamarind [21484]	Endangered	Species or species habitat may occur within area
Elaeocarpus williamsianus Hairy Quandong [8956]	Endangered	Species or species habitat likely to occur within area
Endiandra floydii Floyd's Walnut [52955]	Endangered	Species or species habitat known to occur within area
Endiandra hayesii Rusty Rose Walnut, Velvet Laurel [13866]	Vulnerable	Species or species habitat likely to occur within area
Eucalyptus tetrapleura Square-fruited Ironbark [7490]	Vulnerable	Species or species habitat may occur within area
Floydia praealta Ball Nut, Possum Nut, Big Nut, Beefwood [15762]	Vulnerable	Species or species habitat likely to occur within area
Fontainea australis Southern Fontainea [24037]	Vulnerable	Species or species

Name	Status	Type of Presence
		habitat may occur within area
Hicksbeachia pinnatifolia Monkey Nut, Bopple Nut, Red Bopple, Red Bopple Nut, Red Nut, Beef Nut, Red Apple Nut, Red Boppel Nut, Ivory Silky Oak [21189]	Vulnerable	Species or species habitat likely to occur within area
Leucopogon confertus Torrington Beard-heath [14417]	Endangered	Species or species habitat likely to occur within area
Macadamia integrifolia Macadamia Nut, Queensland Nut Tree, Smooth-shelled Macadamia, Bush Nut, Nut Oak [7326]	Vulnerable	Species or species habitat may occur within area
Macadamia tetraphylla Rough-shelled Bush Nut, Macadamia Nut, Rough-shelled Macadamia, Rough-leaved Queensland Nut [6581]	Vulnerable	Species or species habitat known to occur within area
Marsdenia longiloba Clear Milkvine [2794]	Vulnerable	Species or species habitat likely to occur within area
Ochrosia moorei Southern Ochrosia [11350]	Endangered	Species or species habitat likely to occur within area
Olax angulata Minnie Waters Olax [10666]	Vulnerable	Species or species habitat likely to occur within area
Persicaria elatior Knotweed, Tall Knotweed [5831]	Vulnerable	Species or species habitat likely to occur within area
Phaius australis Lesser Swamp-orchid [5872]	Endangered	Species or species habitat known to occur within area
Prostanthera palustris Swamp Mint-bush [66703]	Vulnerable	Species or species habitat likely to occur within area
Randia moorei Spiny Gardenia [10577]	Endangered	Species or species habitat known to occur within area
Rutidosis heterogama Heath Wrinklewort [13132]	Vulnerable	Species or species habitat likely to occur within area
Samadera sp. Moonee Creek (J.King s.n. Nov. 1949) [86885]	Endangered	Species or species habitat likely to occur within area
Syzygium hodgkinsoniae Smooth-bark Rose Apple, Red Lilly Pilly [3539]	Vulnerable	Species or species habitat likely to occur within area
Syzygium moorei Rose Apple, Coolamon, Robby, Durobby, Watermelon Tree, Coolamon Rose Apple [12284]	Vulnerable	Species or species habitat known to occur within area
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat known to occur within area
Zieria prostrata Headland Zieria [56782]	Endangered	Species or species habitat known to occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding known to occur

Name	Status	Type of Presence
		within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Delma torquata Adorned Delma, Collared Delma [1656]	Vulnerable	Species or species habitat may occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Furina dunmalli Dunmall's Snake [59254]	Vulnerable	Species or species habitat may occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Breeding likely to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Sharks		
Carcharias taurus (east coast population) Grey Nurse Shark (east coast population) [68751]	Critically Endangered	Species or species habitat known to occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Breeding may occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Anous stolidus Common Noddy [825]		Species or species habitat likely to occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardenna carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Species or species habitat known to occur within area
Ardenna pacifica Wedge-tailed Shearwater [84292]		Breeding known to occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat known to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area

Name	Threatened	Type of Presence
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat known to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Sternula albifrons Little Tern [82849]		Breeding known to occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta Tasmanian Shy Albatross [89224]	Vulnerable*	Species or species habitat may occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Migratory Marine Species		
Balaena glacialis australis Southern Right Whale [75529]	Endangered*	Species or species habitat likely to occur within area
Balaenoptera bonaerensis Antarctic Minke Whale, Dark-shoulder Minke Whale [67812]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding known to occur within area
Dugong dugon Dugong [28]		Species or species habitat may occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Isurus oxyrinchus Shortfin Mako, Mako Shark [79073]		Species or species habitat likely to occur within area
Isurus paucus Longfin Mako [82947]		Species or species habitat likely to occur within area
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat may occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Breeding likely to occur within area
Manta alfredi Reef Manta Ray, Coastal Manta Ray, Inshore Manta Ray, Prince Alfred's Ray, Resident Manta Ray [84994]		Species or species habitat known to occur within area
Manta birostris Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat likely to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Congregation or aggregation known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Orcaella heinsohni Australian Snubfin Dolphin [81322]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Breeding may occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Species or species habitat known to occur within area
Migratory Terrestrial Species		
Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat likely to occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Breeding known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Arenaria interpres Ruddy Turnstone [872]		Roosting known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Roosting known to occur within area
Calidris alba Sanderling [875]		Roosting known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Calidris ruficollis Red-necked Stint [860]		Roosting known to occur within area
Calidris subminuta Long-toed Stint [861]		Roosting known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Roosting known to occur within area
Charadrius bicinctus Double-banded Plover [895]		Roosting known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Roosting known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Roosting known to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Roosting known to occur within area
Gallinago megala Swinhoe's Snipe [864]		Roosting likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Roosting likely to occur within area
Limicola falcinellus Broad-billed Sandpiper [842]		Roosting known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Roosting known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Roosting known to occur within area
Numenius phaeopus Whimbrel [849]		Roosting known to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Philomachus pugnax Ruff (Reeve) [850]		Roosting known to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Roosting known to occur within area
Pluvialis squatarola Grey Plover [865]		Roosting known to occur within area
Thalasseus bergii Crested Tern [83000]		Breeding known to occur within area
Tringa brevipes Grey-tailed Tattler [851]		Roosting known to occur within area
Tringa glareola Wood Sandpiper [829]		Roosting known to occur within area

Name	Threatened	Type of Presence
Tringa incana Wandering Tattler [831]		Roosting known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Roosting known to occur within area
Xenus cinereus Terek Sandpiper [59300]		Roosting known to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Heritage Places [Resource Information]

Name	State	Status
Historic		
Cape Byron Lighthouse	NSW	Listed place

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Anous stolidus Common Noddy [825]		Species or species habitat likely to occur within area
Anseranas semipalmata Magpie Goose [978]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Breeding known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Arenaria interpres Ruddy Turnstone [872]		Roosting known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Roosting known to occur within area
Calidris alba Sanderling [875]		Roosting known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species

Name	Threatened	Type of Presence
		habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat likely to occur within area
Calidris ruficollis Red-necked Stint [860]		Roosting known to occur within area
Calidris subminuta Long-toed Stint [861]		Roosting known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Roosting known to occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat known to occur within area
Catharacta skua Great Skua [59472]		Species or species habitat may occur within area
Charadrius bicinctus Double-banded Plover [895]		Roosting known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Roosting known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area
Charadrius ruficapillus Red-capped Plover [881]		Roosting known to occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Roosting known to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea gibsoni Gibson's Albatross [64466]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Eudyptula minor Little Penguin [1085]		Breeding known to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat known to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat known to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Roosting known to occur within area

Name	Threatened	Type of Presence
Gallinago megala Swinhoe's Snipe [864]		Roosting likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Roosting likely to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Heteroscelus brevipes Grey-tailed Tattler [59311]		Roosting known to occur within area
Heteroscelus incanus Wandering Tattler [59547]		Roosting known to occur within area
Himantopus himantopus Pied Stilt, Black-winged Stilt [870]		Roosting known to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
Larus novaehollandiae Silver Gull [810]		Breeding known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area
Limicola falcinellus Broad-billed Sandpiper [842]		Roosting known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Roosting known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat likely to occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Breeding known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Numenius minutus Little Curlew, Little Whimbrel [848]		Roosting known to occur within area
Numenius phaeopus Whimbrel [849]		Roosting known to occur within area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Philomachus pugnax Ruff (Reeve) [850]		Roosting known to occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Roosting known to occur within area
Pluvialis squatarola Grey Plover [865]		Roosting known to occur within area
Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Species or species habitat known to occur within area
Puffinus pacificus Wedge-tailed Shearwater [1027]		Breeding known to occur within area
Recurvirostra novaehollandiae Red-necked Avocet [871]		Species or species habitat known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area
Sterna albifrons Little Tern [813]		Breeding known to occur within area
Sterna bergii Crested Tern [816]		Breeding known to occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta Tasmanian Shy Albatross [89224]	Vulnerable*	Species or species habitat may occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area

Name	Threatened	Type of Presence
[Thalassarche salvini] Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
[Thalassarche sp. nov.] Pacific Albatross [66511]	Vulnerable*	Species or species habitat may occur within area
[Thalassarche steadi] White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
[Tringa glareola] Wood Sandpiper [829]		Roosting known to occur within area
[Tringa nebularia] Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
[Tringa stagnatilis] Marsh Sandpiper, Little Greenshank [833]		Roosting known to occur within area
[Xenus cinereus] Terek Sandpiper [59300]		Roosting known to occur within area
Fish		
[Acentronura tentaculata] Shortpouch Pygmy Pipehorse [66187]		Species or species habitat may occur within area
[Campichthys tryoni] Tryon's Pipefish [66193]		Species or species habitat may occur within area
[Corythoichthys amplexus] Fijian Banded Pipefish, Brown-banded Pipefish [66199]		Species or species habitat may occur within area
[Corythoichthys ocellatus] Orange-spotted Pipefish, Ocellated Pipefish [66203]		Species or species habitat may occur within area
[Festucalex cinctus] Girdled Pipefish [66214]		Species or species habitat may occur within area
[Filicampus tigris] Tiger Pipefish [66217]		Species or species habitat may occur within area
[Halicampus grayi] Mud Pipefish, Gray's Pipefish [66221]		Species or species habitat may occur within area
[Hippichthys cyanospilos] Blue-speckled Pipefish, Blue-spotted Pipefish [66228]		Species or species habitat may occur within area
[Hippichthys heptagonus] Madura Pipefish, Reticulated Freshwater Pipefish [66229]		Species or species habitat may occur within area
[Hippichthys penicillus] Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area
[Hippocampus kelloggi] Kellogg's Seahorse, Great Seahorse [66723]		Species or species habitat may occur within area
[Hippocampus kuda] Spotted Seahorse, Yellow Seahorse [66237]		Species or species habitat may occur within

Name	Threatened	Type of Presence
		area
[Hippocampus planifrons](#) Flat-face Seahorse [66238]		Species or species habitat may occur within area
[Hippocampus trimaculatus](#) Three-spot Seahorse, Low-crowned Seahorse, Flat-faced Seahorse [66720]		Species or species habitat may occur within area
[Hippocampus whitei](#) White's Seahorse, Crowned Seahorse, Sydney Seahorse [66240]		Species or species habitat known to occur within area
[Lissocampus runa](#) Javelin Pipefish [66251]		Species or species habitat may occur within area
[Maroubra perserrata](#) Sawtooth Pipefish [66252]		Species or species habitat may occur within area
[Micrognathus andersonii](#) Anderson's Pipefish, Shortnose Pipefish [66253]		Species or species habitat may occur within area
[Micrognathus brevirostris](#) thorntail Pipefish, Thorn-tailed Pipefish [66254]		Species or species habitat may occur within area
[Microphis manadensis](#) Manado Pipefish, Manado River Pipefish [66258]		Species or species habitat may occur within area
[Solegnathus dunckeri](#) Duncker's Pipehorse [66271]		Species or species habitat may occur within area
[Solegnathus hardwickii](#) Pallid Pipehorse, Hardwick's Pipehorse [66272]		Species or species habitat may occur within area
[Solegnathus spinosissimus](#) Spiny Pipehorse, Australian Spiny Pipehorse [66275]		Species or species habitat may occur within area
[Solenostomus cyanopterus](#) Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
[Solenostomus paradoxus](#) Ornate Ghostpipefish, Harlequin Ghost Pipefish, Ornate Ghost Pipefish [66184]		Species or species habitat may occur within area
[Stigmatopora nigra](#) Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area
[Syngnathoides biaculeatus](#) Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
[Trachyrhamphus bicoarctatus](#) Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
[Urocampus carinirostris](#) Hairy Pipefish [66282]		Species or species habitat may occur within area
[Vanacampus margaritifer](#) Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Mammals		
Dugong dugon Dugong [28]		Species or species habitat may occur within area
Reptiles		
Astrotia stokesii Stokes' Seasnake [1122]		Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Hydrophis elegans Elegant Seasnake [1104]		Species or species habitat may occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Breeding likely to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Pelamis platurus Yellow-bellied Seasnake [1091]		Species or species habitat may occur within area

Whales and other Cetaceans [Resource Information]

Name	Status	Type of Presence
Mammals		
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera bonaerensis Antarctic Minke Whale, Dark-shoulder Minke Whale [67812]		Species or species habitat likely to occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Delphinus delphis Common Dophin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area

Name	Status	Type of Presence
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Feresa attenuata Pygmy Killer Whale [61]		Species or species habitat may occur within area
Globicephala macrorhynchus Short-finned Pilot Whale [62]		Species or species habitat may occur within area
Globicephala melas Long-finned Pilot Whale [59282]		Species or species habitat may occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Hyperoodon planifrons Southern Bottlenose Whale [71]		Species or species habitat may occur within area
Kogia breviceps Pygmy Sperm Whale [57]		Species or species habitat may occur within area
Kogia simus Dwarf Sperm Whale [58]		Species or species habitat may occur within area
Lagenodelphis hosei Fraser's Dolphin, Sarawak Dolphin [41]		Species or species habitat may occur within area
Lissodelphis peronii Southern Right Whale Dolphin [44]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Congregation or aggregation known to occur within area
Mesoplodon bowdoini Andrew's Beaked Whale [73]		Species or species habitat may occur within area
Mesoplodon densirostris Blainville's Beaked Whale, Dense-beaked Whale [74]		Species or species habitat may occur within area
Mesoplodon ginkgodens Gingko-toothed Beaked Whale, Gingko-toothed Whale, Gingko Beaked Whale [59564]		Species or species habitat may occur within area
Mesoplodon grayi Gray's Beaked Whale, Scamperdown Whale [75]		Species or species habitat may occur within area
Mesoplodon layardii Strap-toothed Beaked Whale, Strap-toothed Whale, Layard's Beaked Whale [25556]		Species or species habitat may occur within area
Orcaella brevirostris Irrawaddy Dolphin [45]		Species or species habitat likely to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area

Name	Status	Type of Presence
Peponocephala electra Melon-headed Whale [47]		Species or species habitat may occur within area
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area
Pseudorca crassidens False Killer Whale [48]		Species or species habitat likely to occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Species or species habitat known to occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Stenella coeruleoalba Striped Dolphin, Euphrosyne Dolphin [52]		Species or species habitat may occur within area
Stenella longirostris Long-snouted Spinner Dolphin [29]		Species or species habitat may occur within area
Steno bredanensis Rough-toothed Dolphin [30]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area
Ziphius cavirostris Cuvier's Beaked Whale, Goose-beaked Whale [56]		Species or species habitat may occur within area

Australian Marine Parks [Resource Information]

Name	Label
Central Eastern	Habitat Protection Zone (IUCN IV)
Central Eastern	Multiple Use Zone (IUCN VI)
Central Eastern	National Park Zone (IUCN II)
Lord Howe	Multiple Use Zone (IUCN VI)
Lord Howe	National Park Zone (IUCN II)
Lord Howe	Recreational Use Zone (IUCN IV)
Solitary Islands	Multiple Use Zone (IUCN VI)
Solitary Islands	National Park Zone (IUCN II)
Solitary Islands	Special Purpose Zone (Trawl) (IUCN VI)

Extra Information

State and Territory Reserves [Resource Information]

Name	State
Billinudgel	NSW
Broadwater	NSW
Brunswick Heads	NSW
Bundjalung	NSW
Cape Byron	NSW
Coffs Coast	NSW
Julian Rocks Nguthungulli	NSW
Marshalls Creek	NSW
Moonee Beach	NSW

Name	State
North Rock	NSW
North Solitary Island	NSW
North-West Solitary Island	NSW
South West Solitary Island	NSW
Split Solitary Island	NSW
Yuraygir	NSW

Regional Forest Agreements [Resource Information]

Note that all areas with completed RFAs have been included.

Name	State
North East NSW RFA	New South Wales

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Lonchura punctulata Nutmeg Mannikin [399]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Pycnonotus jocosus Red-whiskered Bulbul [631]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Frogs		
Rhinella marina Cane Toad [83218]		Species or species habitat known to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Equus caballus Horse [5]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Alternanthera philoxeroides Alligator Weed [11620]		Species or species habitat likely to occur within area
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
Asparagus aethiopicus Asparagus Fern, Ground Asparagus, Basket Fern, Sprengi's Fern, Bushy Asparagus, Emerald Asparagus [62425]		Species or species habitat likely to occur within area
Asparagus africanus Climbing Asparagus, Climbing Asparagus Fern [66907]		Species or species habitat likely to occur within area
Asparagus plumosus Climbing Asparagus-fern [48993]		Species or species habitat likely to occur within area
Cabomba caroliniana Cabomba, Fanwort, Carolina Watershield, Fish Grass, Washington Grass, Watershield, Carolina Fanwort, Common Cabomba [5171]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Chrysanthemoides monilifera subsp. rotundata Bitou Bush [16332]		Species or species habitat likely to occur within area
Dolichandra unguis-cati Cat's Claw Vine, Yellow Trumpet Vine, Cat's Claw Creeper, Funnel Creeper [85119]		Species or species habitat likely to occur within area
Eichhornia crassipes Water Hyacinth, Water Orchid, Nile Lily [13466]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Sagittaria platyphylla Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Senecio madagascariensis Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area
Reptiles		
Hemidactylus frenatus Asian House Gecko [1708]		Species or species habitat likely to occur within area

Nationally Important Wetlands [Resource Information]

Name	State
Bundjalung National Park	NSW
Elizabeth and Middleton Reefs	EXT
Solitary Islands Marine Park	NSW

Key Ecological Features (Marine) [Resource Information]

Key Ecological Features are the parts of the marine ecosystem that are considered to be important for the biodiversity or ecosystem functioning and integrity of the Commonwealth Marine Area.

Name	Region
Canyons on the eastern continental slope	Temperate east
Elizabeth and Middleton reefs	Temperate east
Lord Howe seamount chain	Temperate east
Shelf rocky reefs	Temperate east

Name	Region
Tasman Front and eddy field	Temperate east
Tasmantid seamount chain	Temperate east

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-30.263753 153.204456,-30.263753 153.207168,-30.256636 153.157729,-30.190186 153.218154,-30.12369 153.215407,-30.040508 153.223647,-29.890603 153.308791,-29.871552 153.289565,-29.666517 153.35823,-29.64981 153.336257,-29.484975 153.388442,-29.465846 153.377456,-29.365362 153.399428,-29.305502 153.355483,-29.111316 153.498305,-29.084917 153.443374,-28.86867 153.621902,-28.639919 153.654861,-28.52415 153.564223,-28.258365 153.610915,-28.21481 153.580703,-28.212389 153.665881,-28.251107 163.553577,-30.377556 163.619495,-30.263753 153.204456

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- -Office of Environment and Heritage, New South Wales
- -Department of Environment and Primary Industries, Victoria
- -Department of Primary Industries, Parks, Water and Environment, Tasmania
- -Department of Environment, Water and Natural Resources, South Australia
- -Department of Land and Resource Management, Northern Territory
- -Department of Environmental and Heritage Protection, Queensland
- -Department of Parks and Wildlife, Western Australia
- -Environment and Planning Directorate, ACT
- -Birdlife Australia
- -Australian Bird and Bat Banding Scheme
- -Australian National Wildlife Collection
- -Natural history museums of Australia
- -Museum Victoria
- -Australian Museum
- -South Australian Museum
- -Queensland Museum
- -Online Zoological Collections of Australian Museums
- -Queensland Herbarium
- -National Herbarium of NSW
- -Royal Botanic Gardens and National Herbarium of Victoria
- -Tasmanian Herbarium
- -State Herbarium of South Australia
- -Northern Territory Herbarium
- -Western Australian Herbarium
- -Australian National Herbarium, Canberra
- -University of New England
- -Ocean Biogeographic Information System
- -Australian Government, Department of Defence
- Forestry Corporation, NSW
- -Geoscience Australia
- -CSIRO
- -Australian Tropical Herbarium, Cairns
- -eBird Australia
- -Australian Government – Australian Antarctic Data Centre
- -Museum and Art Gallery of the Northern Territory
- -Australian Government National Environmental Science Program
- -Australian Institute of Marine Science
- -Reef Life Survey Australia
- -American Museum of Natural History
- -Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
- -Tasmanian Museum and Art Gallery, Hobart, Tasmania
- -Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

Department of the Environment
GPO Box 787
Canberra ACT 2601 Australia
+61 2 6274 1111

Australian Government

Department of the Environment and Energy

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

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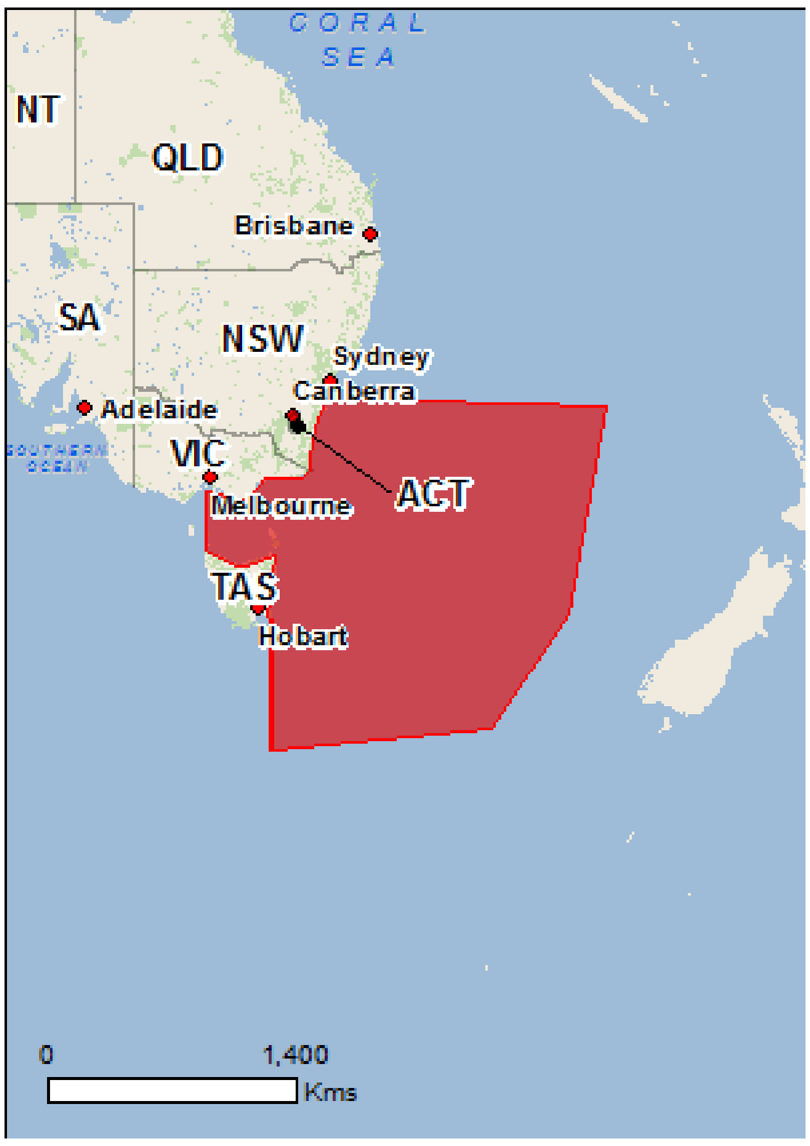
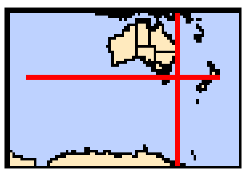


Coordinates

Buffer: 1.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	2
National Heritage Places:	4
Wetlands of International Importance:	11
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	2
Listed Threatened Ecological Communities:	17
Listed Threatened Species:	213
Listed Migratory Species:	91

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	29
Commonwealth Heritage Places:	20
Listed Marine Species:	143
Whales and Other Cetaceans:	38
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	13

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	615
Regional Forest Agreements:	5
Invasive Species:	64
Nationally Important Wetlands:	93
Key Ecological Features (Marine)	5

Details

Matters of National Environmental Significance

World Heritage Properties [Resource Information]

Name	State	Status
Australian Convict Sites (Darlington Probation Station Buffer Zone)	TAS	Buffer zone
Australian Convict Sites (Darlington Probation Station)	TAS	Declared property

National Heritage Properties [Resource Information]

Name	State	Status
Historic		
Darlington Probation Station	TAS	Listed place
Point Nepean Defence Sites and Quarantine Station Area	VIC	Listed place
Port Arthur Historic Site	TAS	Listed place
Quarantine Station and Surrounds	VIC	Within listed place

Wetlands of International Importance (Ramsar) [Resource Information]

Name	Proximity
Apsley marshes	Within Ramsar site
Corner inlet	Within Ramsar site
East coast cape barren island lagoons	Within Ramsar site
Flood plain lower ringarooma river	Within Ramsar site
Gippsland lakes	Within Ramsar site
Jocks lagoon	Within Ramsar site
Little waterhouse lake	Within Ramsar site
Logan lagoon	Within Ramsar site
Moulting lagoon	Within Ramsar site
Port phillip bay (western shoreline) and bellarine peninsula	Within 10km of Ramsar
Western port	Within Ramsar site

Commonwealth Marine Area [Resource Information]

Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside the Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area. Generally the Commonwealth Marine Area stretches from three nautical miles to two hundred nautical miles from the coast.

Name
EEZ and Territorial Sea
Extended Continental Shelf

Marine Regions [Resource Information]

If you are planning to undertake action in an area in or close to the Commonwealth Marine Area, and a marine bioregional plan has been prepared for the Commonwealth Marine Area in that area, the marine bioregional plan may inform your decision as to whether to refer your proposed action under the EPBC Act.

Name
South-east
Temperate East

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Alpine Sphagnum Bogs and Associated Fens	Endangered	Community likely to occur within area
Assemblages of species associated with open-coast salt-wedge estuaries of western and central Victoria ecological community	Endangered	Community likely to occur within area
Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community	Endangered	Community likely to occur within area

Name	Status	Type of Presence
Eucalyptus ovata - Callitris oblonga Forest	Vulnerable	Community likely to occur within area
Giant Kelp Marine Forests of South East Australia	Endangered	Community likely to occur within area
Gippsland Red Gum (Eucalyptus tereticornis subsp. mediana) Grassy Woodland and Associated Native Grassland	Critically Endangered	Community likely to occur within area
Illawarra and south coast lowland forest and woodland ecological community	Critically Endangered	Community likely to occur within area
Littoral Rainforest and Coastal Vine Thickets of Eastern Australia	Critically Endangered	Community likely to occur within area
Lowland Grassy Woodland in the South East Corner Bioregion	Critically Endangered	Community likely to occur within area
Lowland Native Grasslands of Tasmania	Critically Endangered	Community likely to occur within area
Natural Damp Grassland of the Victorian Coastal Plains	Critically Endangered	Community likely to occur within area
Natural Temperate Grassland of the South Eastern Highlands	Critically Endangered	Community may occur within area
Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains	Critically Endangered	Community likely to occur within area
Southern Highlands Shale Forest and Woodland in the Sydney Basin Bioregion	Critically Endangered	Community likely to occur within area
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area
Upland Basalt Eucalypt Forests of the Sydney Basin Bioregion	Endangered	Community may occur within area
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Community may occur within area

Listed Threatened Species

[Resource Information]

Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Species or species habitat known to occur within area
Aquila audax fleayi Tasmanian Wedge-tailed Eagle, Wedge-tailed Eagle (Tasmanian) [64435]	Endangered	Breeding likely to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Roosting known to occur within area
Ceyx azureus diemenensis Tasmanian Azure Kingfisher [25977]	Endangered	Breeding known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Roosting known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area
Dasyornis brachypterus Eastern Bristlebird [533]	Endangered	Species or species habitat known to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area

Name	Status	Type of Presence
Diomedea antipodensis gibsoni Gibson's Albatross [82270]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Fregetta grallaria grallaria White-bellied Storm-Petrel (Tasman Sea), White-bellied Storm-Petrel (Australasian) [64438]	Vulnerable	Species or species habitat likely to occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Breeding known to occur within area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Breeding known to occur within area
Limosa lapponica baueri Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat known to occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Bar-tailed Godwit (menzbieri) [86432]	Critically Endangered	Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Neophema chrysogaster Orange-bellied Parrot [747]	Critically Endangered	Migration route known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat known to occur within area
Pardalotus quadragintus Forty-spotted Pardalote [418]	Endangered	Species or species habitat known to occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area
Pterodroma heraldica Herald Petrel [66973]	Critically Endangered	Species or species habitat likely to occur within area
Pterodroma leucoptera leucoptera Gould's Petrel, Australian Gould's Petrel [26033]	Endangered	Breeding known to occur within area

Name	Status	Type of Presence
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Species or species habitat may occur within area
Pterodroma neglecta neglecta Kermadec Petrel (western) [64450]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Rostratula australis Australian Painted-snipe, Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Breeding known to occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche bulleri platei Northern Buller's Albatross, Pacific Albatross [82273]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche cauta cauta Shy Albatross, Tasmanian Shy Albatross [82345]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche cauta steadi White-capped Albatross [82344]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche chrysostoma Grey-headed Albatross [66491]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thinornis rubricollis rubricollis Hooded Plover (eastern) [66726]	Vulnerable	Species or species habitat known to occur within area
Tyto novaehollandiae castanops (Tasmanian population) Masked Owl (Tasmanian) [67051]	Vulnerable	Breeding known to occur within area
Crustaceans		
Astacopsis gouldi Giant Freshwater Crayfish, Tasmanian Giant Freshwater Lobster [64415]	Vulnerable	Species or species habitat known to occur within area
Engaeus granulatus Central North Burrowing Crayfish [78959]	Endangered	Species or species habitat known to occur within area
Engaeus martigener Furneaux Burrowing Crayfish [67220]	Endangered	Species or species habitat known to occur within area
Engaeus yabbimunna Burnie Burrowing Crayfish [66781]	Vulnerable	Species or species

Name	Status	Type of Presence
		habitat known to occur within area
Fish		
Brachionichthys hirsutus		
Spotted Handfish [64418]	Critically Endangered	Species or species habitat may occur within area
Brachiopsilus ziebelli		
Ziebell's Handfish, Waterfall Bay Handfish [83757]	Vulnerable	Species or species habitat likely to occur within area
Epinephelus daemelii		
Black Rockcod, Black Cod, Saddled Rockcod [68449]	Vulnerable	Species or species habitat likely to occur within area
Galaxias fontanus		
Swan Galaxias [26167]	Endangered	Species or species habitat likely to occur within area
Galaxiella pusilla		
Eastern Dwarf Galaxias, Dwarf Galaxias [56790]	Vulnerable	Species or species habitat known to occur within area
Maccullochella peelii		
Murray Cod [66633]	Vulnerable	Species or species habitat may occur within area
Macquaria australasica		
Macquarie Perch [66632]	Endangered	Species or species habitat may occur within area
Prototroctes maraena		
Australian Grayling [26179]	Vulnerable	Species or species habitat known to occur within area
Thymichthys politus		
Red Handfish [83756]	Critically Endangered	Species or species habitat likely to occur within area
Frogs		
Heleioporus australiacus		
Giant Burrowing Frog [1973]	Vulnerable	Species or species habitat known to occur within area
Litoria aurea		
Green and Golden Bell Frog [1870]	Vulnerable	Species or species habitat known to occur within area
Litoria littlejohni		
Littlejohn's Tree Frog, Heath Frog [64733]	Vulnerable	Species or species habitat known to occur within area
Litoria raniformis		
Growling Grass Frog, Southern Bell Frog, Green and Golden Frog, Warty Swamp Frog [1828]	Vulnerable	Species or species habitat known to occur within area
Mixophyes balbus		
Stuttering Frog, Southern Barred Frog (in Victoria) [1942]	Vulnerable	Species or species habitat likely to occur within area
Insects		
Antipodia chaostola leucophaea		
Tasmanian Chaostola Skipper, Heath-sand Skipper [77672]	Endangered	Species or species habitat known to occur within area
Hoplogonus bornemisszai		
Bornemissza's Stag Beetle [66754]	Critically Endangered	Species or species habitat known to occur within area
Hoplogonus simsoni		
Simson's Stag Beetle [66796]	Vulnerable	Species or species habitat known to occur within area

Name	Status	Type of Presence
Lissotes latidens Broad-toothed Stag Beetle, Wielangta Stag Beetle [66760]	Endangered	Species or species habitat known to occur within area
Oreixenica ptunarra Ptunarra Brown, Ptunarra Brown Butterfly, Ptunarra Xenica [26327]	Endangered	Species or species habitat may occur within area
Synemon plana Golden Sun Moth [25234]	Critically Endangered	Species or species habitat may occur within area
Mammals		
Antechinus minimus maritimus Swamp Antechinus (mainland) [83086]	Vulnerable	Species or species habitat known to occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat known to occur within area
Dasyurus maculatus maculatus (SE mainland population) Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat known to occur within area
Dasyurus maculatus maculatus (Tasmanian population) Spotted-tail Quoll, Spot-tailed Quoll, Tiger Quoll (Tasmanian population) [75183]	Vulnerable	Species or species habitat known to occur within area
Dasyurus viverrinus Eastern Quoll, Luaner [333]	Endangered	Species or species habitat known to occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat known to occur within area
Isoodon obesulus obesulus Southern Brown Bandicoot (eastern), Southern Brown Bandicoot (south-eastern) [68050]	Endangered	Species or species habitat known to occur within area
Mastacomys fuscus mordicus Broad-toothed Rat (mainland), Tooarrana [87617]	Vulnerable	Species or species habitat known to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Perameles gunnii gunnii Eastern Barred Bandicoot (Tasmania) [66651]	Vulnerable	Species or species habitat known to occur within area
Petauroides volans Greater Glider [254]	Vulnerable	Species or species habitat known to occur within area
Petrogale penicillata Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)		
Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
Potorous longipes		
Long-footed Potoroo [217]	Endangered	Species or species habitat known to occur within area
Potorous tridactylus tridactylus		
Long-nosed Potoroo (SE mainland) [66645]	Vulnerable	Species or species habitat known to occur within area
Pseudomys fumeus		
Smoky Mouse, Konoom [88]	Endangered	Species or species habitat likely to occur within area
Pseudomys novaehollandiae		
New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat known to occur within area
Pteropus poliocephalus		
Grey-headed Flying-fox [186]	Vulnerable	Roosting known to occur within area
Sarcophilus harrisii		
Tasmanian Devil [299]	Endangered	Translocated population known to occur within area
Other		
Megascolides australis		
Giant Gippsland Earthworm [64420]	Vulnerable	Species or species habitat likely to occur within area
Parvulastra vivipara		
Tasmanian Live-bearing Seastar [85451]	Vulnerable	Species or species habitat likely to occur within area
Tasmanipatus anophthalmus		
Blind Velvet Worm [66773]	Endangered	Species or species habitat known to occur within area
Plants		
Acacia axillaris		
Midlands Mimosa, Midlands Wattle [13563]	Vulnerable	Species or species habitat known to occur within area
Acacia bynoeana		
Bynoe's Wattle, Tiny Wattle [8575]	Vulnerable	Species or species habitat may occur within area
Acacia caerulescens		
Limestone Blue Wattle, Buchan Blue, Buchan Blue Wattle [21883]	Vulnerable	Species or species habitat known to occur within area
Acacia constablei		
Narrabarba Wattle [10798]	Vulnerable	Species or species habitat known to occur within area
Acacia georgensis		
Bega Wattle [9848]	Vulnerable	Species or species habitat known to occur within area
Amphibromus fluitans		
River Swamp Wallaby-grass, Floating Swamp Wallaby-grass [19215]	Vulnerable	Species or species habitat known to occur within area
Astrotricha crassifolia		
Thick-leaf Star-hair [10352]	Vulnerable	Species or species habitat may occur within area
Banksia vincentia		
[88276]	Critically Endangered	Species or species habitat known to occur within area

Name	Status	Type of Presence
Barbarea australis Native Wintercress, Riverbed Wintercress [12540]	Endangered	Species or species habitat likely to occur within area
Bertya tasmanica subsp. tasmanica Tasmanian Bertya [78359]	Endangered	Species or species habitat known to occur within area
Boronia deanei Deane's Boronia [8397]	Vulnerable	Species or species habitat known to occur within area
Boronia gunnii Gunn's Boronia, Cataract Gorge Boronia [29394]	Vulnerable	Species or species habitat known to occur within area
Boronia hippopala Velvet Boronia [78925]	Vulnerable	Species or species habitat known to occur within area
Budawangia gnidioides Budawangs Cliff-heath [55850]	Vulnerable	Species or species habitat may occur within area
Caladenia campbellii Thick-stem Caladenia [64857]	Critically Endangered	Species or species habitat known to occur within area
Caladenia caudata Tailed Spider-orchid [17067]	Vulnerable	Species or species habitat known to occur within area
Caladenia dienema Windswept Spider-orchid [64858]	Endangered	Species or species habitat may occur within area
Caladenia lindleyana Lindley's Spider-orchid [9305]	Critically Endangered	Species or species habitat may occur within area
Caladenia orientalis Eastern Spider Orchid [83410]	Endangered	Species or species habitat known to occur within area
Caladenia robinsonii Frankston Spider-orchid [24375]	Endangered	Species or species habitat likely to occur within area
Caladenia tessellata Thick-lipped Spider-orchid, Daddy Long-legs [2119]	Vulnerable	Species or species habitat known to occur within area
Caladenia tonellii Robust Fingers [64861]	Critically Endangered	Species or species habitat known to occur within area
Callitris oblonga Pygmy Cypress-pine, Pigmy Cypress-pine, Dwarf Cypress-pine [66687]	Vulnerable	Species or species habitat likely to occur within area
Callitris oblonga subsp. oblonga South Esk Pine [64864]	Endangered	Species or species habitat known to occur within area
Cassinia rugata Wrinkled Cassinia, Wrinkled Dollybush [21885]	Vulnerable	Species or species habitat may occur within area
Colobanthus curtisiae Curtis' Colobanth [23961]	Vulnerable	Species or species habitat known to occur within area

Name	Status	Type of Presence
Commersonia prostrata Dwarf Kerrawang [87152]	Endangered	Species or species habitat known to occur within area
Conospermum hookeri Variable Smoke-bush [68161]	Vulnerable	Species or species habitat likely to occur within area
Correa baeuerlenii Chef's Cap [17007]	Vulnerable	Species or species habitat likely to occur within area
Corunastylis brachystachya Short-spiked Midge-orchid [76410]	Endangered	Species or species habitat known to occur within area
Corunastylis firthii Firth's Midge-orchid [76411]	Critically Endangered	Species or species habitat known to occur within area
Cryptostylis hunteriana Leafless Tongue-orchid [19533]	Vulnerable	Species or species habitat known to occur within area
Cynanchum elegans White-flowered Wax Plant [12533]	Endangered	Species or species habitat known to occur within area
Daphnandra johnsonii Illawarra Socketwood [67186]	Endangered	Species or species habitat likely to occur within area
Dianella amoena Matted Flax-lily [64886]	Endangered	Species or species habitat known to occur within area
Diuris lanceolata Snake Orchid [10231]	Endangered	Species or species habitat known to occur within area
Dodonaea procumbens Trailing Hop-bush [12149]	Vulnerable	Species or species habitat known to occur within area
Epacris apsleyensis Apsley Heath [15428]	Endangered	Species or species habitat likely to occur within area
Epacris barbata Bearded Heath, Freycinet Heath [17625]	Endangered	Species or species habitat likely to occur within area
Epacris exserta South Esk Heath [19879]	Endangered	Species or species habitat known to occur within area
Epacris grandis Grand Heath, Tall Heath [18719]	Endangered	Species or species habitat known to occur within area
Epacris limbata Border Heath, Bordered Heath [24011]	Critically Endangered	Species or species habitat known to occur within area
Epacris virgata Pretty Heath, Dan Hill Heath [20375]	Endangered	Species or species habitat known to occur within area
Eucalyptus langleyi Albatross Mallee [56224]	Vulnerable	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Eucalyptus strzeleckii Strzelecki Gum [55400]	Vulnerable	Species or species habitat likely to occur within area
Euphrasia amphisysepala Shiny Cliff Eyebright [4534]	Vulnerable	Species or species habitat likely to occur within area
Euphrasia collina subsp. muelleri Purple Eyebright, Mueller's Eyebright [16151]	Endangered	Species or species habitat known to occur within area
Euphrasia phragmostoma Buftons Eyebright, Hairy Cliff Eyebright [7720]	Vulnerable	Species or species habitat likely to occur within area
Euphrasia semipicta Peninsula Eyebright [9986]	Endangered	Species or species habitat likely to occur within area
Euphrasia sp. Bivouac Bay (W.R.Barker 7626 et al.) Masked Eyebright, Masked Cliff Eyebright [82044]	Endangered	Species or species habitat known to occur within area
Genoplesium baueri Yellow Gnat-orchid [7528]	Endangered	Species or species habitat known to occur within area
Genoplesium vernale East Lynne Midge-orchid [68379]	Vulnerable	Species or species habitat known to occur within area
Glycine latrobeana Clover Glycine, Purple Clover [13910]	Vulnerable	Species or species habitat known to occur within area
Grevillea celata Colquhoun Grevillea, Nowa Nowa Grevillea [64907]	Vulnerable	Species or species habitat likely to occur within area
Grevillea parviflora subsp. parviflora Small-flower Grevillea [64910]	Vulnerable	Species or species habitat known to occur within area
Haloragis exalata subsp. exalata Wingless Raspwort, Square Raspwort [24636]	Vulnerable	Species or species habitat known to occur within area
Irenepharsus trypherus Delicate Cress, Illawarra Irene [14664]	Endangered	Species or species habitat known to occur within area
Leionema ralstonii [64926]	Vulnerable	Species or species habitat likely to occur within area
Lepidium hyssopifolium Basalt Pepper-cress, Peppercress, Rubble Pepper-cress, Pepperweed [16542]	Endangered	Species or species habitat known to occur within area
Leucochrysum albicans var. tricolor Hoary Sunray, Grassland Paper-daisy [56204]	Endangered	Species or species habitat known to occur within area
Limonium australe var. baudinii Baudin's Sea-lavender [86369]	Vulnerable	Species or species habitat likely to occur within area
Melaleuca biconvexa Biconvex Paperbark [5583]	Vulnerable	Species or species habitat known to occur within area

Name	Status	Type of Presence
Persicaria elatior Knotweed, Tall Knotweed [5831]	Vulnerable	Species or species habitat likely to occur within area
Persoonia hirsuta Hairy Geebung, Hairy Persoonia [19006]	Endangered	Species or species habitat may occur within area
Phebalium daviesii Davies' Waxflower, St Helens Waxflower [16959]	Critically Endangered	Species or species habitat known to occur within area
Philotheca freyciana Freycinet Waxflower [68227]	Endangered	Species or species habitat known to occur within area
Pimelea spicata Spiked Rice-flower [20834]	Endangered	Species or species habitat known to occur within area
Pomaderris brunnea Rufous Pomaderris [16845]	Vulnerable	Species or species habitat likely to occur within area
Pomaderris parrisiae Parris' Pomaderris [22119]	Vulnerable	Species or species habitat likely to occur within area
Prasophyllum affine Jervis Bay Leek Orchid, Culburra Leek-orchid, Kinghorn Point Leek-orchid [2210]	Endangered	Species or species habitat likely to occur within area
Prasophyllum apoxychilum Tapered Leek-orchid [64947]	Endangered	Species or species habitat known to occur within area
Prasophyllum atratum Three Hummock Leek-orchid [82677]	Critically Endangered	Species or species habitat known to occur within area
Prasophyllum castaneum Chestnut Leek-orchid [64948]	Critically Endangered	Species or species habitat likely to occur within area
Prasophyllum correctum Gaping Leek-orchid [64533]	Endangered	Species or species habitat likely to occur within area
Prasophyllum frenchii Maroon Leek-orchid, Slaty Leek-orchid, Stout Leek-orchid, French's Leek-orchid, Swamp Leek-orchid [9704]	Endangered	Species or species habitat likely to occur within area
Prasophyllum incorrectum Golfers Leek-orchid [78898]	Critically Endangered	Species or species habitat may occur within area
Prasophyllum limnetes Marsh Leek-orchid [82678]	Critically Endangered	Species or species habitat may occur within area
Prasophyllum pulchellum Pretty Leek-orchid [64953]	Critically Endangered	Species or species habitat known to occur within area
Prasophyllum secutum Northern Leek-orchid [64954]	Endangered	Species or species habitat likely to occur within area
Prasophyllum spicatum Dense Leek-orchid [55146]	Vulnerable	Species or species habitat known to occur within area

Name	Status	Type of Presence
Prostanthera densa Villous Mintbush [12233]	Vulnerable	Species or species habitat likely to occur within area
Prostanthera galbraithiae Wellington Mintbush [64959]	Vulnerable	Species or species habitat known to occur within area
Pterostylis chlorogramma Green-striped Greenhood [56510]	Vulnerable	Species or species habitat known to occur within area
Pterostylis commutata Midland Greenhood [64535]	Critically Endangered	Species or species habitat may occur within area
Pterostylis cucullata Leafy Greenhood [15459]	Vulnerable	Species or species habitat known to occur within area
Pterostylis gibbosa Illawarra Greenhood, Rufa Greenhood, Pouched Greenhood [4562]	Endangered	Species or species habitat known to occur within area
Pterostylis pulchella Pretty Greenhood [6448]	Vulnerable	Species or species habitat known to occur within area
Pterostylis tenuissima Swamp Greenhood, Dainty Swamp Orchid [13139]	Vulnerable	Species or species habitat known to occur within area
Pterostylis vernalis Halbury Rustyhood [84711]	Critically Endangered	Species or species habitat known to occur within area
Pterostylis ziegeleri Grassland Greenhood, Cape Portland Greenhood [64971]	Vulnerable	Species or species habitat likely to occur within area
Pultenaea aristata [18062]	Vulnerable	Species or species habitat may occur within area
Rhizanthella slateri Eastern Underground Orchid [11768]	Endangered	Species or species habitat known to occur within area
Senecio psilocarpus Swamp Fireweed, Smooth-fruited Groundsel [64976]	Vulnerable	Species or species habitat may occur within area
Spyridium lawrencei Small-leaf Spyridium [27036]	Endangered	Species or species habitat likely to occur within area
Spyridium obcordatum Creeping Dusty Miller [17447]	Vulnerable	Species or species habitat likely to occur within area
Stenanthemum pimeleoides Spreading Stenanthemum, Propellor Plant [15450]	Vulnerable	Species or species habitat may occur within area
Stonesiella selaginoides Clubmoss Bush-pea [68100]	Endangered	Species or species habitat likely to occur within area
Syzygium paniculatum Magenta Lilly Pilly, Magenta Cherry, Daguba, Scrub Cherry, Creek Lilly Pilly, Brush Cherry [20307]	Vulnerable	Species or species habitat known to occur within area

Name	Status	Type of Presence
Thelymitra epipactoides Metallic Sun-orchid [11896]	Endangered	Species or species habitat known to occur within area
Thelymitra jonesii Sky-blue Sun-orchid [76352]	Endangered	Species or species habitat known to occur within area
Thelymitra kangaloonica Kangaloon Sun Orchid [81861]	Critically Endangered	Species or species habitat likely to occur within area
Thelymitra matthewsii Spiral Sun-orchid [4168]	Vulnerable	Species or species habitat may occur within area
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat known to occur within area
Triplarina nowraensis Nowra Heath-myrtle [64544]	Endangered	Species or species habitat known to occur within area
Xanthorrhoea arenaria Sand Grasstree [21603]	Vulnerable	Species or species habitat likely to occur within area
Xanthorrhoea bracteata Shiny Grasstree [7950]	Endangered	Species or species habitat known to occur within area
Xerochrysum palustre Swamp Everlasting, Swamp Paper Daisy [76215]	Vulnerable	Species or species habitat known to occur within area
Zieria baeuerlenii Bomaderry Zieria, Bomaderry Creek Zieria [56781]	Endangered	Species or species habitat known to occur within area
Zieria granulata Hill Zieria, Hilly Zieria, Illawarra Zieria [17147]	Endangered	Species or species habitat likely to occur within area
Zieria tuberculata Warty Zieria [56736]	Vulnerable	Species or species habitat known to occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Hoplocephalus bungaroides Broad-headed Snake [1182]	Vulnerable	Species or species habitat known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area

Name	Status	Type of Presence
Sharks		
Carcharias taurus (east coast population) Grey Nurse Shark (east coast population) [68751]	Critically Endangered	Species or species habitat known to occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Breeding known to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Anous stolidus Common Noddy [825]		Species or species habitat likely to occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardenna carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Foraging, feeding or related behaviour likely to occur within area
Ardenna grisea Sooty Shearwater [82651]		Breeding known to occur within area
Ardenna pacifica Wedge-tailed Shearwater [84292]		Breeding known to occur within area
Ardenna tenuirostris Short-tailed Shearwater [82652]		Breeding known to occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat known to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat may occur within area
Hydroprogne caspia Caspian Tern [808]		Breeding known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Foraging, feeding or related behaviour likely

Name	Threatened	Type of Presence
		to occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area
Sternula albifrons Little Tern [82849]		Breeding known to occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche cauta Tasmanian Shy Albatross [89224]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thalassarche chrysostoma Grey-headed Albatross [66491]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Migratory Marine Species		
Balaena glacialis australis Southern Right Whale [75529]	Endangered*	Species or species habitat known to occur within area
Balaenoptera bonaerensis Antarctic Minke Whale, Dark-shoulder Minke Whale [67812]		Species or species habitat likely to occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Caperea marginata Pygmy Right Whale [39]		Foraging, feeding or related behaviour likely to occur within area

Name	Threatened	Type of Presence
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Breeding known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Dugong dugon Dugong [28]		Species or species habitat may occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Isurus oxyrinchus Shortfin Mako, Mako Shark [79073]		Species or species habitat likely to occur within area
Isurus paucus Longfin Mako [82947]		Species or species habitat likely to occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat likely to occur within area
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat likely to occur within area
Manta birostris Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat known to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat likely to occur within area
Phocoena dioptrica Spectacled Porpoise [66728]		Species or species habitat may occur within area
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Migratory Terrestrial Species		
Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat known to occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Breeding known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Arenaria interpres Ruddy Turnstone [872]		Roosting known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Roosting known to occur within area
Calidris alba Sanderling [875]		Roosting known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area
Calidris ruficollis Red-necked Stint [860]		Roosting known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Roosting known to occur within area
Charadrius bicinctus Double-banded Plover [895]		Roosting known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Roosting known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Foraging, feeding or related behaviour known to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Roosting known to occur within area

Name	Threatened	Type of Presence
Gallinago megala Swinhoe's Snipe [864]		Species or species habitat known to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Roosting known to occur within area
Limicola falcinellus Broad-billed Sandpiper [842]		Roosting known to occur within area
Limnodromus semipalmatus Asian Dowitcher [843]		Roosting known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Roosting known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Roosting known to occur within area
Numenius phaeopus Whimbrel [849]		Roosting known to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Philomachus pugnax Ruff (Reeve) [850]		Roosting known to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Roosting known to occur within area
Pluvialis squatarola Grey Plover [865]		Roosting known to occur within area
Thalasseus bergii Crested Tern [83000]		Breeding known to occur within area
Tringa brevipes Grey-tailed Tattler [851]		Roosting known to occur within area
Tringa glareola Wood Sandpiper [829]		Roosting known to occur within area
Tringa incana Wandering Tattler [831]		Roosting known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Roosting known to occur within area
Xenus cinereus Terek Sandpiper [59300]		Roosting known to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land -
Commonwealth Land - Australian Academy of Science
Commonwealth Land - Australian National University
Commonwealth Land - Australian Postal Commission
Commonwealth Land - Australian Postal Corporation
Commonwealth Land - Australian Telecommunications Commission
Commonwealth Land - Booderee National Park
Commonwealth Land - Commonwealth Trading Bank of Australia
Commonwealth Land - Defence Housing Authority
Commonwealth Land - Defence Service Homes Corporation
Commonwealth Land - Director of War Service Homes
Commonwealth Land - Royal Australian Navy Central Canteens Board
Commonwealth Land - Telstra Corporation Limited
Defence - BAIRNSDALE TRAINING DEPOT
Defence - BEECROFT RAPIER RANGE
Defence - BUCKLAND TRAINING AREA
Defence - BURNIE TRAINING DEPOT
Defence - DCO NOWRA
Defence - DEVONPORT TRAINING DEPOT
Defence - DUTSON BOMBING RANGE
Defence - HMAS ALBATROSS
Defence - PARACHUTE DROPPING ZONE (PARACHUTE TRAINING SCHOOL) ; NOWRA - PTS
Defence - STONYHEAD TRAINING AREA
Defence - SUSSEX INLET - DEFENCE RESERVE
Defence - Shop 3
Defence - Suite 18, Holt Centre
Defence - TRAINING CENTRE (Norris Barracks) - Portsea
Defence - TS Leven
Defence - WEST HEAD GUNNERY RANGE

Commonwealth Heritage Places [Resource Information]

Name	State	Status
Natural		
Beecroft Peninsula	NSW	Listed place
Indigenous		
Jervis Bay Territory	ACT	Listed place
Crocodile Head Area	NSW	Within listed place
Currarong Rockshelters Area	NSW	Within listed place
Historic		
Cape St George Lighthouse Ruins & Curtilage	ACT	Listed place
Christians Minde Settlement	ACT	Listed place
Eddystone Lighthouse	TAS	Listed place
Gabo Island Lighthouse	VIC	Listed place
Goose Island Lighthouse	TAS	Listed place
Jervis Bay Botanic Gardens	ACT	Listed place
Kiama Post Office	NSW	Listed place
Mersey Bluff Lighthouse	TAS	Listed place
Montague Island Lighthouse	NSW	Listed place
Point Perpendicular Lightstation	NSW	Listed place
Royal Australian Naval College	ACT	Listed place
Sorrento Post Office	VIC	Listed place
Swan Island Lighthouse	TAS	Listed place
Table Cape Lighthouse	TAS	Listed place
Tasman Island Lighthouse	TAS	Listed place
Wilsons Promontory Lighthouse	VIC	Listed place

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Anous stolidus Common Noddy [825]		Species or species habitat likely to occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Breeding known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Arenaria interpres Ruddy Turnstone [872]		Roosting known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Roosting known to occur within area
Calidris alba Sanderling [875]		Roosting known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area
Calidris ruficollis Red-necked Stint [860]		Roosting known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Roosting known to occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat known to occur within area
Catharacta skua Great Skua [59472]		Species or species habitat may occur within area
Charadrius bicinctus Double-banded Plover [895]		Roosting known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Roosting known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area
Charadrius ruficapillus Red-capped Plover [881]		Roosting known to occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Foraging, feeding or related behaviour known to occur within area

Name	Threatened	Type of Presence
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat known to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea gibsoni Gibson's Albatross [64466]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Eudyptula minor Little Penguin [1085]		Breeding known to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat may occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Roosting known to occur within area
Gallinago megala Swinhoe's Snipe [864]		Species or species habitat known to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Roosting known to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Breeding known to occur within area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area
Heteroscelus brevipes Grey-tailed Tattler [59311]		Roosting known to occur within area
Heteroscelus incanus Wandering Tattler [59547]		Roosting known to occur within area
Himantopus himantopus Pied Stilt, Black-winged Stilt [870]		Roosting known to occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat known to occur within area
Larus dominicanus Kelp Gull [809]		Breeding known to occur within area
Larus novaehollandiae Silver Gull [810]		Breeding known to occur within area

Name	Threatened	Type of Presence
Larus pacificus Pacific Gull [811]		Breeding known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Breeding known to occur within area
Limicola falcinellus Broad-billed Sandpiper [842]		Roosting known to occur within area
Limnodromus semipalmatus Asian Dowitcher [843]		Roosting known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Roosting known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat known to occur within area
Morus serrator Australasian Gannet [1020]		Breeding known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Breeding known to occur within area
Neophema chrysogaster Orange-bellied Parrot [747]	Critically Endangered	Migration route known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Roosting known to occur within area
Numenius phaeopus Whimbrel [849]		Roosting known to occur within area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Pelagodroma marina White-faced Storm-Petrel [1016]		Breeding known to occur within area

Name	Threatened	Type of Presence
Pelecanoides urinatrix Common Diving-Petrel [1018]		Breeding known to occur within area
Phalacrocorax fuscescens Black-faced Cormorant [59660]		Breeding known to occur within area
Philomachus pugnax Ruff (Reeve) [850]		Roosting known to occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Roosting known to occur within area
Pluvialis squatarola Grey Plover [865]		Roosting known to occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Species or species habitat may occur within area
Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Foraging, feeding or related behaviour likely to occur within area
Puffinus griseus Sooty Shearwater [1024]		Breeding known to occur within area
Puffinus pacificus Wedge-tailed Shearwater [1027]		Breeding known to occur within area
Puffinus tenuirostris Short-tailed Shearwater [1029]		Breeding known to occur within area
Recurvirostra novaehollandiae Red-necked Avocet [871]		Roosting known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area
Sterna albifrons Little Tern [813]		Breeding known to occur within area
Sterna bergii Crested Tern [816]		Breeding known to occur within area
Sterna caspia Caspian Tern [59467]		Breeding known to occur within area
Sterna fuscata Sooty Tern [794]		Breeding known to occur within area
Sterna nereis Fairy Tern [796]		Breeding known to occur within area
Sterna striata White-fronted Tern [799]		Breeding known to occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche cauta Tasmanian Shy Albatross [89224]	Vulnerable*	Foraging, feeding or related behaviour likely

Name	Threatened	Type of Presence
		to occur within area
Thalassarche chrysostoma Grey-headed Albatross [66491]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche sp. nov. Pacific Albatross [66511]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thinornis rubricollis Hooded Plover [59510]		Species or species habitat known to occur within area
Thinornis rubricollis rubricollis Hooded Plover (eastern) [66726]	Vulnerable	Species or species habitat known to occur within area
Tringa glareola Wood Sandpiper [829]		Roosting known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Roosting known to occur within area
Xenus cinereus Terek Sandpiper [59300]		Roosting known to occur within area
Fish		
Acentronura tentaculata Shortpouch Pygmy Pipehorse [66187]		Species or species habitat may occur within area
Cosmocampus howensis Lord Howe Pipefish [66208]		Species or species habitat may occur within area
Festucalex cinctus Girdled Pipefish [66214]		Species or species habitat may occur within area
Filicampus tigris Tiger Pipefish [66217]		Species or species habitat may occur within area
Heraldia nocturna Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species

Name	Threatened	Type of Presence
		habitat may occur within area
Hippocampus abdominalis Big-belly Seahorse, Eastern Potbelly Seahorse, New Zealand Potbelly Seahorse [66233]		Species or species habitat may occur within area
Hippocampus breviceps Short-head Seahorse, Short-snouted Seahorse [66235]		Species or species habitat may occur within area
Hippocampus minotaur Bullneck Seahorse [66705]		Species or species habitat may occur within area
Hippocampus whitei White's Seahorse, Crowned Seahorse, Sydney Seahorse [66240]		Species or species habitat known to occur within area
Histiogamphelus briggsii Crested Pipefish, Briggs' Crested Pipefish, Briggs' Pipefish [66242]		Species or species habitat may occur within area
Histiogamphelus cristatus Rhino Pipefish, Macleay's Crested Pipefish, Ring-back Pipefish [66243]		Species or species habitat may occur within area
Hypselognathus rostratus Knifesnout Pipefish, Knife-snouted Pipefish [66245]		Species or species habitat may occur within area
Kaupus costatus Deepbody Pipefish, Deep-bodied Pipefish [66246]		Species or species habitat may occur within area
Kimblaeus bassensis Trawl Pipefish, Bass Strait Pipefish [66247]		Species or species habitat may occur within area
Leptoichthys fistularius Brushtail Pipefish [66248]		Species or species habitat may occur within area
Lissocampus caudalis Australian Smooth Pipefish, Smooth Pipefish [66249]		Species or species habitat may occur within area
Lissocampus runa Javelin Pipefish [66251]		Species or species habitat may occur within area
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area
Mitotichthys mollisoni Mollison's Pipefish [66260]		Species or species habitat may occur within area
Mitotichthys semistriatus Halfbanded Pipefish [66261]		Species or species habitat may occur within area
Mitotichthys tuckeri Tucker's Pipefish [66262]		Species or species habitat may occur within area
Notiocampus ruber Red Pipefish [66265]		Species or species habitat may occur within area
Phycodurus eques Leafy Seadragon [66267]		Species or species habitat may occur within

Name	Threatened	Type of Presence
		area
[Phyllopteryx taeniolatus](#) Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area
[Pugnaso curtirostris](#) Pugnose Pipefish, Pug-nosed Pipefish [66269]		Species or species habitat may occur within area
[Solegnathus robustus](#) Robust Pipehorse, Robust Spiny Pipehorse [66274]		Species or species habitat may occur within area
[Solegnathus spinosissimus](#) Spiny Pipehorse, Australian Spiny Pipehorse [66275]		Species or species habitat may occur within area
[Solenostomus cyanopterus](#) Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
[Solenostomus paradoxus](#) Ornate Ghostpipefish, Harlequin Ghost Pipefish, Ornate Ghost Pipefish [66184]		Species or species habitat may occur within area
[Stigmatopora argus](#) Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area
[Stigmatopora nigra](#) Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area
[Stipecampus cristatus](#) Ringback Pipefish, Ring-backed Pipefish [66278]		Species or species habitat may occur within area
[Syngnathoides biaculeatus](#) Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
[Trachyrhamphus bicoarctatus](#) Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
[Urocampus carinirostris](#) Hairy Pipefish [66282]		Species or species habitat may occur within area
[Vanacampus margaritifer](#) Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area
[Vanacampus phillipi](#) Port Phillip Pipefish [66284]		Species or species habitat may occur within area
[Vanacampus poecilolaemus](#) Longsnout Pipefish, Australian Long-snout Pipefish, Long-snouted Pipefish [66285]		Species or species habitat may occur within area
Mammals		
[Arctocephalus forsteri](#) Long-nosed Fur-seal, New Zealand Fur-seal [20]		Species or species habitat may occur within area
[Arctocephalus pusillus](#) Australian Fur-seal, Australo-African Fur-seal [21]		Breeding known to occur within area
[Dugong dugon](#) Dugong [28]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area

Whales and other Cetaceans

[Resource Information]

Name	Status	Type of Presence
Mammals		
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera bonaerensis Antarctic Minke Whale, Dark-shoulder Minke Whale [67812]		Species or species habitat likely to occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Berardius arnuxii Arnoux's Beaked Whale [70]		Species or species habitat may occur within area
Caperea marginata Pygmy Right Whale [39]		Foraging, feeding or related behaviour likely to occur within area
Delphinus delphis Common Dophin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat known to occur within area
Feresa attenuata Pygmy Killer Whale [61]		Species or species habitat may occur within area
Globicephala macrorhynchus Short-finned Pilot Whale [62]		Species or species habitat may occur within area

Name	Status	Type of Presence
Globicephala melas Long-finned Pilot Whale [59282]		Species or species habitat may occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Hyperoodon planifrons Southern Bottlenose Whale [71]		Species or species habitat may occur within area
Kogia breviceps Pygmy Sperm Whale [57]		Species or species habitat may occur within area
Kogia simus Dwarf Sperm Whale [58]		Species or species habitat may occur within area
Lagenorhynchus cruciger Hourglass Dolphin [42]		Species or species habitat may occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat likely to occur within area
Lissodelphis peronii Southern Right Whale Dolphin [44]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Mesoplodon bowdoini Andrew's Beaked Whale [73]		Species or species habitat may occur within area
Mesoplodon densirostris Blainville's Beaked Whale, Dense-beaked Whale [74]		Species or species habitat may occur within area
Mesoplodon ginkgodens Gingko-toothed Beaked Whale, Gingko-toothed Whale, Gingko Beaked Whale [59564]		Species or species habitat may occur within area
Mesoplodon grayi Gray's Beaked Whale, Scamperdown Whale [75]		Species or species habitat may occur within area
Mesoplodon hectori Hector's Beaked Whale [76]		Species or species habitat may occur within area
Mesoplodon layardii Strap-toothed Beaked Whale, Strap-toothed Whale, Layard's Beaked Whale [25556]		Species or species habitat may occur within area
Mesoplodon mirus True's Beaked Whale [54]		Species or species habitat may occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat likely to occur within area
Peponocephala electra Melon-headed Whale [47]		Species or species habitat may occur within area

Name	Status	Type of Presence
Phocoena dioptrica Spectacled Porpoise [66728]		Species or species habitat may occur within area
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area
Pseudorca crassidens False Killer Whale [48]		Species or species habitat likely to occur within area
Steno bredanensis Rough-toothed Dolphin [30]		Species or species habitat may occur within area
Tasmacetus shepherdi Shepherd's Beaked Whale, Tasman Beaked Whale [55]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area
Ziphius cavirostris Cuvier's Beaked Whale, Goose-beaked Whale [56]		Species or species habitat may occur within area

Australian Marine Parks [Resource Information]

Name	Label
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)
Flinders	Multiple Use Zone (IUCN VI)
Freycinet	Marine National Park Zone (IUCN II)
Freycinet	Multiple Use Zone (IUCN VI)
Freycinet	Recreational Use Zone (IUCN IV)
Huon	Multiple Use Zone (IUCN VI)
Jervis	Habitat Protection Zone (IUCN IV)
Jervis	Special Purpose Zone (Trawl) (IUCN VI)
Lord Howe	Habitat Protection Zone (IUCN IV)
South Tasman Rise	Special Purpose Zone (IUCN VI)

Extra Information

State and Territory Reserves [Resource Information]

Name	State
Africa Gully	TAS
Alma Tier	TAS
Anderson Islands	TAS
Anser Island	VIC
Ansons Bay	TAS
Ansons River	TAS
Ansons River	TAS
Ansons Road Gladstone	TAS
Apslawn	TAS
Apslawn #1	TAS
Apslawn #2	TAS
Apsley	TAS

Name	State
Apsley River	TAS
Arthurs Seat	VIC
Avenue River	TAS
Baawang	VIC
Babel Island	TAS
Backwater Morass G.L.R.	VIC
Badger Corner	TAS
Badger Head	TAS
Badger Island	TAS
Bairnsdale F.R.	VIC
Bald Hills B.R.	VIC
Bancroft Bay - Kalimna G.L.R.	VIC
Bangor	TAS
Bangor #2	TAS
Bangor - Bobs Gully	TAS
Bangor - Jacks Gully	TAS
Bangor - Musk Gully	TAS
Barga	VIC
Barren Grounds	NSW
Bass River SS.R.	VIC
Baxter Island G.L.R.	VIC
Bay of Fires	TAS
Baynes Island	TAS
Bell Bird Creek	NSW
Bellettes Bay	TAS
Bellingham	TAS
Bellingham Vineyard	TAS
Bells Marsh	TAS
Belmont	TAS
Belowla Island	NSW
Bemm, Goolengook, Arte and Errinundra Rivers	VIC
Ben Boyd	NSW
Benedore River	VIC
Bengworden N.C.R.	VIC
Bermaguee	NSW
Bermagui	NSW
Berwicks Flats	TAS
Biamanga	NSW
Big Green Island	TAS
Big Silver	TAS
Binalongtime	TAS
Binns Creek - North Sister	TAS
Bird Island	TAS
Black River	TAS
Black River Bridge	TAS
Blindburn Creek	TAS
Blond Bay G.L.R.	VIC
Blond Bay W.R.	VIC
Blowhole Road #1	TAS
Blowhole Road #2	TAS
Blowhole Road #3	TAS
Blowhole Road #4	TAS
Blue Hills #2	TAS
Blue Tier	TAS
Bluemans Creek	TAS
Bluemans Run	TAS
Blyth Point	TAS
Blythe River	TAS
Boat Harbour Road	TAS
Boggy Creek	TAS
Boltons Beach	TAS
Bomaderry Creek	NSW
Boobyalla	TAS
Boobyalla Downs	TAS
Booderee	JBT
Booderee	JBT

Name	State
Boot Bay	TAS
Bournda	NSW
Bournda	NSW
Boxen Island	TAS
Brashton Dairies	TAS
Break O'Day	TAS
Bream Creek	TAS
Bresnehans Rd	TAS
Briggs	TAS
Briggs Islet	TAS
Brodribb River F.F.R	VIC
Brougham Sugarloaf	TAS
Broulee Island	NSW
Brundee Swamp	NSW
Brush Island	NSW
Budderoo	NSW
Bull Rock	TAS
Bun Beetons Point	TAS
Butlers Ridge	TAS
Buxton River	TAS
Cam River	TAS
Cambewarra Range	NSW
Cambria #1	TAS
Cambria #2	TAS
Cameron	TAS
Cape Bernier	TAS
Cape Conran Coastal Park	VIC
Cape Howe	VIC
Cape Liptrap Coastal Park	VIC
Cape Patterson N.C.R	VIC
Cape Portland	TAS
Carisbrook	TAS
Cat Island	TAS
Catos Creek	TAS
Chalky Island	TAS
Chasm Creek	TAS
Cheeseberry Hill	TAS
Cherry Tree Hill	TAS
Chronicle Point	TAS
Clovelly	TAS
Clyde River	NSW
Coles Bay	TAS
Coles Bay Road	TAS
Comerong Island	NSW
Cone Islet	TAS
Conjola	NSW
Connemara	TAS
Corramy	NSW
Coswell Beach	TAS
Craggy Island	TAS
Cranbrook House	TAS
Crayfish Creek	TAS
Cressy Beach	TAS
Croajingolong National Park	VIC
Cullendulla Creek	NSW
Curtis Island	TAS
Curtis Road St Marys	TAS
Cusicks Hill	TAS
Cygnet River	TAS
Dalmayne Road Gray	TAS
Darling Range	TAS
Darriman H29 B.R	VIC
Dart Island	TAS
Dead Dog Hill	TAS
Denison Rivulet	TAS
Denneys Road	TAS

Name	State
Devils Tower	TAS
Diamond Island	TAS
Dickies Ridge	TAS
Dip Range	TAS
Doctors Peak	TAS
Doctors Rocks	TAS
Don Heads	TAS
Double Sandy Point	TAS
Doughboy Island	TAS
Douglas River 1	TAS
Douglas River 2	TAS
Douglas-Apsley	TAS
Drumdlemara H1 B.R	VIC
Drumdlemara H2 B.R	VIC
Drumdlemara H4 B.R	VIC
Dry Creek East	TAS
Dry Creek South	TAS
Dry Creek West	TAS
Eagle Point G.L.R.	VIC
Eaglehawk Bay	TAS
Eaglehawk Bay-Flinders Bay	TAS
Eaglehawk Neck	TAS
Eagles Claw	NSW
East Gippsland Coastal streams	VIC
East Kangaroo Island	TAS
East Moncoeur Island	TAS
Eastern Tiers	TAS
Eddystone Point Lighthouse	TAS
Eden Region	NSW
Edgcumbe Beach	TAS
Elephant Farm Elephant Pass	TAS
Emita	TAS
Emu River	TAS
Enstone Park	TAS
Entrance Point	VIC
Ericksons Road	TAS
Esmerelda Enterprises	TAS
Eurobodalla	NSW
Ewing Morass W.R	VIC
Fannys Bay	TAS
Fingal B.R	VIC
Fingal Rivulet	TAS
First and Second Islands F.R.	VIC
Five Mile Bluff	TAS
Flacks Road Coles Bay	TAS
Flannagan Island G.L.R.	VIC
Flinders G234 B.R.	VIC
Flinders N.F.R.	VIC
Foochow	TAS
Forestry Management Areas in Batemans Bay	NSW
Forestry Management Areas in Eden	NSW
Forestry Management Areas in Narooma	NSW
Forestry Management Areas in Nowra	NSW
Forsyth Island	TAS
Forwards Beach	TAS
Fossil Bluff	TAS
Foster Islands	TAS
Fotheringate Bay	TAS
Four Mile Creek	TAS
Four Mile Creek #1	TAS
Four Mile Creek #2	TAS
Fozards	TAS
Fraser Island G.L.R.	VIC
Fresh-water Swamp, Woodside Beach W.R	VIC
Freycinet	TAS
Friendly Beaches	TAS

Name	State
Friendly Beaches	TAS
Friendly Beaches #2	TAS
Friendly Beaches #3	TAS
Friendly Beaches #4	TAS
Gala Estates	TAS
Gala Estates - Bluemans Creek	TAS
German Town	TAS
Giffard (Rifle Range) F.R.	VIC
Giffard H30 B.R	VIC
Giffard H31 B.R	VIC
Gippsland Lakes Coastal Park	VIC
Girl Guides	TAS
Goose Island	TAS
Grahams Run	TAS
Grahams Run Forest	TAS
Granite Point	TAS
Gravelly Hill	TAS
Gray #1	TAS
Gray #2	TAS
Great Dog Island	TAS
Greens Beach	TAS
Gulaga	NSW
Gull Island	TAS
Harbour Islets	TAS
Hardings Falls	TAS
Hawks Hill	TAS
Hawley	TAS
Henderson Park	TAS
Heybridge	TAS
Highfield	TAS
Hogan Group	TAS
Hollands Landing G.L.R.	VIC
Holts Point	TAS
Honeysuckle Avenue	TAS
Hospital Creek	TAS
Humbug Point	TAS
Hunter Island	TAS
Huntsmans Cap	TAS
Ile des Phoques	TAS
Illawong	NSW
Isabella Island	TAS
Jack Smith Lake W.R	VIC
Jacksons Cove	TAS
Jenwood	TAS
Jerrawangala	NSW
Jervis Bay	NSW
Jones Bay G.L.R	VIC
Jones Bay W.R	VIC
Kelvedon	TAS
Kelvedon Beach	TAS
Kilcunda N.C.R.	VIC
Killiecrankie	TAS
Killymoon	TAS
King George Island	TAS
Kings Flat F.R	VIC
Koonya	TAS
Lachlan Island	TAS
Lackrana	TAS
Lagoons Beach	TAS
Lake Coleman W.R	VIC
Lake Coleman West W.R	VIC
Lake Corringle W.R	VIC
Lake Curlip W.R.	VIC
Lake Denison W.R	VIC
Lake Leake	TAS
Lake Tyers	VIC

Name	State
Lanark Farm #1	TAS
Lanark Farm #2	TAS
Lanark Farm #3	TAS
Lanark Farm #4	TAS
Lanark Farm #5	TAS
Lanark Farm #6	TAS
Lands End	TAS
Lefroy	TAS
Lewis Hill	TAS
Lewis Hill #2	TAS
Liitle Swanport River	TAS
Lilla Villa	TAS
Lime Pit Road	TAS
Lisdillon	TAS
Lisdillon Rivulet	TAS
Little Beach	TAS
Little Beach	TAS
Little Christmas Island	TAS
Little Dog Island	TAS
Little Green Island	TAS
Little Island	TAS
Little Peggs Beach	TAS
Little Pipers River	TAS
Little Silver	TAS
Little Swan Island	TAS
Little Swanport	TAS
Little Swanport #2	TAS
Little Swanport #4	TAS
Little Waterhouse Island	TAS
Llechwedd-y-Creigiogg Apslawn	TAS
Logan Lagoon	TAS
Logan Lagoon	TAS
Logans Lagoon	TAS
Long Bay	TAS
Long Island	TAS
Long Point Reserve	TAS
Long Reach	TAS
Long Reach	TAS
Long Spit	TAS
Lookout Rock	TAS
Low Head	TAS
Low Head	TAS
Low Point	TAS
Lower German Town Road St Marys #1	TAS
Lower German Town Road St Marys #2	TAS
Lower German Town Road St Marys #3	TAS
Lower German Town Road St Marys #4	TAS
Lower German Town Road St Marys #5	TAS
Lower Marsh Creek	TAS
Lughrata	TAS
Lyall Road Binalong Bay	TAS
Lyons Cottage	TAS
MacLaines Creek	TAS
Macleod Morass W.R.	VIC
Main Ridge N.C.R.	VIC
Mallacoota B.R.	VIC
Marchwiel #3	TAS
Marchwiel #4	TAS
Marchwiel #5	TAS
Marchwiel #6	TAS
Marchwiel Bream Creek	TAS
Marchwiel Cockle Bay	TAS
Marchwiel Falls Festival #1	TAS
Marchwiel Falls Festival #2	TAS
Maria Island	TAS
Marshall Beach	TAS

Name	State
Marthvale	TAS
Maxwells	NSW
Mayfield	TAS
Mayfield Bay	TAS
McDonalds Point	TAS
Medeas Cove	TAS
Memana	TAS
Meroo	NSW
Mersey Bluff	TAS
Metung B.R.	VIC
Mile Island	TAS
Millingtons Beach	TAS
Mimosa Rocks	NSW
Mitchell River Silt Jetties G.L.R.	VIC
Mitchell River water reserve G.L.R.	VIC
Mitchell and Wonnangatta Rivers	VIC
Montague Island	NSW
Moormurng F.F.R.	VIC
Morielle (Bellingham)	TAS
Morley Swamp G.L.R.	VIC
Mornington Peninsula National Park	VIC
Mortimers Paddock B.R.	VIC
Morton	NSW
Moulting Lagoon	TAS
Mount Elephant	TAS
Mount Montgomery	TAS
Mount Montgomery	TAS
Mount Pearson	TAS
Mount Puzzler	TAS
Mount Tanner	TAS
Mount Vereker Creek	VIC
Mount William	TAS
Mount William	TAS
Mt Chappell Island	TAS
Mt Murray	TAS
Mulligans Hill	TAS
Mulligans Hill	TAS
Mumbulla	NSW
Murrah	NSW
Murramarang	NSW
Musselroe Bay	TAS
Musselroe Bay	TAS
Nadgee	NSW
Nameless Sylvan	NSW
Narawntapu	TAS
Narrawallee Creek	NSW
Neds Reef	TAS
Newmans Beach	TAS
Newmans Creek	TAS
Newmans Creek Koonya	TAS
Nicholas Range	TAS
Nicholson floodplain G.L.R	VIC
Ninth Island	TAS
Norfolk Bay	TAS
North East Islet	TAS
North East River	TAS
Nungurner B.R.	VIC
Nyerimilang Park G.L.R.	VIC
Oak Bank Little Swanport River	TAS
Okehampton	TAS
Old Billys Creek	TAS
Oyster Rocks	TAS
Paddys Island	TAS
Palana Beach	TAS
Parma Creek	NSW
Parnella	TAS

Name	State
Pasco Group	TAS
Passage Island	TAS
Patriarchs	TAS
Patriarchs	TAS
Peggs Beach	TAS
Penguin Islet	TAS
Petrel Islands	TAS
Phillip Island Nature Park	VIC
Pirates Bay	TAS
Poddy Bay G.L.R	VIC
Point Bailly	TAS
Point Fullarton G.L.R.	VIC
Point Nepean National Park	VIC
Port Sorell	TAS
Possums Place	TAS
Powers Rivulet	TAS
Premaydena Point	TAS
Prime Seal Island	TAS
Ram Island	TAS
Rame Head	VIC
Raspins Beach	TAS
Ravensdale #1	TAS
Ravensdale #2	TAS
Raymond Island G.L.R.	VIC
Rayners Hill	TAS
Red Morass G.L.R.	VIC
Red Rock	TAS
Redbanks	TAS
Redbanks Sisters Creek	TAS
Redbill Point	TAS
Reedy Lagoon	TAS
Reef Island and Bass River Mouth N.C.R	VIC
Rigby Island G.L.R.	VIC
Ringarooma Tier	TAS
River of Peace	TAS
Rocky Cape	TAS
Rocky Hills #1	TAS
Rocky Hills #2	TAS
Rocky Hills #2	TAS
Rocky Hills #3	TAS
Rocky Hills #4	TAS
Rocky Hills #5	TAS
Rocky Hills #6	TAS
Rocky Hills - North	TAS
Rodondo Island	TAS
Rodway	NSW
Rosebud B.R.	VIC
Roseneath Peninsula (1) G.L.R.	VIC
Roseneath Peninsula (2) G.L.R.	VIC
Roydon Island	TAS
Rudds Hill	TAS
Rudds Hill Orford	TAS
Salt Lake - Backwater Morass G.L.R.	VIC
Saltwater Swamp	NSW
Sandpatch	VIC
Sandridge	TAS
Sandspit River	TAS
Sandspit River	TAS
Sassafras Gully	TAS
Scamander	TAS
Scamander	TAS
Screw Creek N.C.R.	VIC
Seacrow Islet	TAS
Seaford	TAS
Seal Creek	VIC
Seal Islands W.R.	VIC

Name	State
Seaview Farm	TAS
Sellars Lagoon	TAS
Sentinel Island	TAS
Settlement Point	TAS
Seven Mile Beach	NSW
Seymour	TAS
Seymour #1	TAS
Seymour #2	TAS
Seymour #3	TAS
Seymour #4	TAS
Shag Lagoon	TAS
Shingle Hill	TAS
Shiny Grasstrees	TAS
Single Tree Plain	TAS
Sister Islands	TAS
Sisters Beach	TAS
Slaughterhouse Creek G.L.R	VIC
Snowy River	VIC
South Coast Subregion of Southern Region	NSW
South Esk Pine	TAS
South Esk Pine	TAS
South Pats River	TAS
Southern Wilsons Promontory	VIC
Spike Island	TAS
Spiky Beach	TAS
Spring Beach Orford	TAS
St Helens	TAS
St Helens 1 Marthavale	TAS
St Helens 2	TAS
St Marys Pass	TAS
St Patricks Head	TAS
St Patricks Head	TAS
Stack Island	TAS
Stanley	TAS
Steel Bay - Newland Backwater G.L.R.	VIC
Stewarts Bay	TAS
Storehouse Island	TAS
Strzelecki	TAS
Sugarloaf Rock	TAS
Summer Camp	TAS
Summerhill Drive Port Sorell	TAS
Swan Reach Bay G.L.R.	VIC
Swan River	TAS
Swansea	TAS
Swell Point - Roseneath Point G.L.R.	VIC
Sydney Cove	TAS
Sympathy Hills	TAS
Table Cape	TAS
Table Cape	TAS
Tamar Crescent	TAS
Tambo Delta - Metung G.L.R.	VIC
Tambo floodplain G.L.R.	VIC
Tanja	NSW
Tarra Tarra B.R	VIC
Tarwin Lower F.R.	VIC
Tasman	TAS
Tasman Monument	TAS
Tatlows Beach	TAS
Tessellated Pavement	TAS
The Dock	TAS
The Dutchman	TAS
The Grange #1	TAS
The Grange #2	TAS
The Lakes National Park	VIC
The Nut	TAS
Three Hummock Island	TAS

Name	State
Three Thumbs	TAS
Tippogoree Hills	TAS
Tollgate Islands	NSW
Township Hill	TAS
Toxteth Park #1	TAS
Toxteth Park #2	TAS
Toxteth Park #3	TAS
Toxteth Park #4	TAS
Triplarina	NSW
Trousers Point Beach	TAS
Tucker Swamp G.L.R	VIC
Tullochgorum #1a	TAS
Two Mile Creek	TAS
Umtali	TAS
Unnamed (Badger Head Road)	TAS
Unnamed (Fern Glade)	TAS
Unnamed (Pipers Brook)	TAS
Unnamed (Sandspit River)	TAS
Unnamed P0155	VIC
Vansittart Island	TAS
Ventnor B.R.	VIC
Vereker Creek	VIC
Victoria Lagoon G.L.R.	VIC
Waratah B.R	VIC
Wardlaws Creek	TAS
Warrigal Creek SS.R.	VIC
Waterfall Bay Road	TAS
Waterhouse	TAS
Waterhouse Island	TAS
Waters Meeting	TAS
Waters Meeting Cranbrook	TAS
Watershed	TAS
Wattle Point G.L.R.	VIC
Waubadebars Grave	TAS
Welshpool H17 B.R	VIC
West Arm	TAS
West Moncoeur Island	TAS
Whalers Lookout	TAS
White Beach	TAS
Whites Gully	TAS
Wielangta	TAS
Wildbird	TAS
William Hunter F.R	VIC
Wilsons Promontory	VIC
Wilsons Promontory Islands	VIC
Wilsons Promontory National Park	VIC
Wind Song	TAS
Wingaroo	TAS
Winifred Curtis Trust Scamander	TAS
Wonthaggi G237 B.R.	VIC
Wonthaggi G238 B.R.	VIC
Wonthaggi G239 B.R.	VIC
Wonthaggi G240 B.R.	VIC
Wonthaggi G241 B.R.	VIC
Wonthaggi G242 B.R.	VIC
Wonthaggi G243 B.R.	VIC
Wonthaggi G244 B.R.	VIC
Wonthaggi G245 B.R.	VIC
Wonthaggi G246 B.R	VIC
Wonthaggi Heathlands N.C.R	VIC
Woodside H27 B.R	VIC
Woodside H28 B.R	VIC
Woodspen Farm	TAS
Woollamia	NSW
Woolpack Hill	TAS
Worrigee	NSW

Name	State
Wybalenna Island	TAS
Wye River	TAS
Wye River	TAS
Yanakie F.R	VIC
Yatteyattah	NSW
Yellow Bluff Creek	TAS
Yorktown	TAS
Youngs Creek	TAS
lungatalanana	TAS

Regional Forest Agreements [Resource Information]

Note that all areas with completed RFAs have been included.

Name	State
East Gippsland RFA	Victoria
Eden RFA	New South Wales
Gippsland RFA	Victoria
Southern RFA	New South Wales
Tasmania RFA	Tasmania

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Alauda arvensis Skylark [656]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Callipepla californica California Quail [59451]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Carduelis chloris European Greenfinch [404]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Gallus gallus Red Junglefowl, Domestic Fowl [917]		Species or species habitat likely to occur within area
Lonchura punctulata Nutmeg Mannikin [399]		Species or species habitat likely to occur within area
Meleagris gallopavo Wild Turkey [64380]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur

Name	Status	Type of Presence
		within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Pavo cristatus Indian Peafowl, Peacock [919]		Species or species habitat likely to occur within area
Phasianus colchicus Common Pheasant [920]		Species or species habitat likely to occur within area
Pycnonotus jocosus Red-whiskered Bulbul [631]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Turdus philomelos Song Thrush [597]		Species or species habitat likely to occur within area
Frogs		
Rhinella marina Cane Toad [83218]		Species or species habitat may occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Equus caballus Horse [5]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species

Name	Status	Type of Presence
		habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Alternanthera philoxeroides Alligator Weed [11620]		Species or species habitat likely to occur within area
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
Asparagus aethiopicus Asparagus Fern, Ground Asparagus, Basket Fern, Sprengi's Fern, Bushy Asparagus, Emerald Asparagus [62425]		Species or species habitat likely to occur within area
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Asparagus plumosus Climbing Asparagus-fern [48993]		Species or species habitat likely to occur within area
Asparagus scandens Asparagus Fern, Climbing Asparagus Fern [23255]		Species or species habitat likely to occur within area
Austrocylindropuntia spp. Prickly Pears [85132]		Species or species habitat likely to occur within area
Cabomba caroliniana Cabomba, Fanwort, Carolina Watershield, Fish Grass, Washington Grass, Watershield, Carolina Fanwort, Common Cabomba [5171]		Species or species habitat likely to occur within area
Carrichtera annua Ward's Weed [9511]		Species or species habitat may occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera subsp. rotundata Bitou Bush [16332]		Species or species habitat likely to occur within area
Cytisus scoparius Broom, English Broom, Scotch Broom, Common Broom, Scottish Broom, Spanish Broom [5934]		Species or species habitat likely to occur within area
Eichhornia crassipes Water Hyacinth, Water Orchid, Nile Lily [13466]		Species or species

Name	Status	Type of Presence
		habitat likely to occur within area
Genista linifolia		
Flax-leaved Broom, Mediterranean Broom, Flax Broom [2800]		Species or species habitat likely to occur within area
Genista monspessulana		
Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana		
Broom [67538]		Species or species habitat may occur within area
Lantana camara		
Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Lycium ferocissimum		
African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Nassella neesiana		
Chilean Needle grass [67699]		Species or species habitat likely to occur within area
Nassella trichotoma		
Serrated Tussock, Yass River Tussock, Yass Tussock, Nassella Tussock (NZ) [18884]		Species or species habitat likely to occur within area
Olea europaea		
Olive, Common Olive [9160]		Species or species habitat may occur within area
Opuntia spp.		
Prickly Pears [82753]		Species or species habitat likely to occur within area
Pinus radiata		
Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate		
Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Sagittaria platyphylla		
Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii		
Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta		
Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Senecio madagascariensis		
Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area
Ulex europaeus		
Gorse, Furze [7693]		Species or species habitat likely to occur within area
Reptiles		
Hemidactylus frenatus		
Asian House Gecko [1708]		Species or species habitat likely to occur within area

Nationally Important Wetlands	[Resource Information]
Name	State
Anderson Inlet	VIC
Aspley Marshes	TAS
Beecroft Peninsula	NSW
Bemm, Goolengook, Arte and Errinundra Rivers	VIC
Benedore River	VIC
Blackmans Lagoon	TAS
Bondi Lake	NSW
Bosses/Nebbor Swamp	VIC
Boulanger Bay - Robbins Passage	TAS
Clyde River Estuary	NSW
Coila Creek Delta	NSW
Coomonderry Swamp	NSW
Cormorant Beach	NSW
Corner Inlet	VIC
Cullendulla Creek and Embayment	NSW
Douglas River	TAS
Durras Lake	NSW
Earlham Lagoon	TAS
Ewing's Marsh (Morass)	VIC
Fergusons Lagoon	TAS
Flyover Lagoon 1	TAS
Flyover Lagoon 2	TAS
Freshwater Lagoon	TAS
Hardings Falls Forest Reserve	TAS
Hogans Lagoon	TAS
Jack Smith Lake State Game Reserve	VIC
Jervis Bay	NSW
Jervis Bay Sea Cliffs	NSW
Jocks Lagoon	TAS
Killalea Lagoon	NSW
Lagoon Head	NSW
Lake Bunga	VIC
Lake Illawarra	NSW
Lake King Wetlands	VIC
Lake Tyers	VIC
Lake Victoria Wetlands	VIC
Lake Wellington Wetlands	VIC
Little Thirsty Lagoon	TAS
Little Waterhouse Lake	TAS
Logan Lagoon	TAS
Lower Snowy River Wetlands System	VIC
Macleod Morass	VIC
Mallacoota Inlet Wetlands	VIC
Maria Island Marine Reserve	TAS
Merimbula Lake	NSW
Meroo Lake Wetland Complex	NSW
Minnamurra River Estuary	NSW
Moruya River Estuary Saltmarshes	NSW
Moulting Lagoon	TAS
Nadgee Lake and tributary wetlands	NSW
Nargal Lake	NSW
Nelson Lagoon	NSW
Pambula Estuarine Wetlands	NSW
Powlett River Mouth	VIC
Rocky Cape Marine Area	TAS
Russells Swamp	VIC
Sellars Lagoon	TAS
Shallow Inlet Marine & Coastal Park	VIC
Shoalhaven/Crookhaven Estuary	NSW
Snowy River	VIC
St Georges Basin	NSW
Stans Lagoon	TAS
Swan Lagoon	NSW
Sydenham Inlet Wetlands	VIC
Syndicate Lagoon	TAS

Name	State
Tabourie Lake	NSW
Tambo River (Lower Reaches) East Swamps	VIC
Tamboon Inlet Wetlands	VIC
Termeil Lake Wetland Complex	NSW
Thompsons Lagoon	TAS
Thurra River	VIC
Tregaron Lagoons 1	TAS
Tregaron Lagoons 2	TAS
Tuross River Estuary	NSW
Twofold Bay	NSW
Unnamed Wetland	TAS
Unnamed Wetland	TAS
Unnamed Wetland	TAS
Unnamed Wetland	TAS
Unnamed Wetland	TAS
Unnamed Wetland	TAS
Unnamed Wetland	TAS
Unnamed Wetland	TAS
Unnamed Wetland	TAS
Unnamed Wetland	TAS
Unnamed Wetland	TAS
Unnamed Wetland	TAS
Unnamed wetland	TAS
Waldrons Swamp	NSW
Wallaga Lake	NSW
Wallagoot Lagoon (Wallagoot Lake)	NSW
Western Port	VIC
Wollumboola Lake	NSW

Key Ecological Features (Marine) [Resource Information]

Key Ecological Features are the parts of the marine ecosystem that are considered to be important for the biodiversity or ecosystem functioning and integrity of the Commonwealth Marine Area.

Name	Region
Big Horseshoe Canyon	South-east
Seamounts South and east of Tasmania	South-east
Upwelling East of Eden	South-east
Canyons on the eastern continental slope	Temperate east
Shelf rocky reefs	Temperate east

Caveat
The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates
-34.511027 150.765611,-34.511027 150.765611,-34.511027 150.765611,-34.854327 164.828111,-43.008614 162.894517,-47.103738 159.049302,-47.83155 147.953111,-46.833845 147.953111,-43.201122 147.953111,-43.056798 147.77733,-40.817915 148.150865,-41.166198 146.700669,-41.166198 146.12938,-40.618071 144.701158,-38.311438 144.657212,-38.552408 145.79979,-38.758314 145.909654,-38.792574 146.151353,-38.706893 146.173326,-38.552408 146.876451,-37.827088 147.579576,-37.74026 149.469224,-37.426834 149.842759,-37.147128 149.952623,-37.04197 149.842759,-35.733081 150.150376,-34.511027 150.765611

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-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
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-Geoscience Australia
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-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

Department of the Environment
GPO Box 787
Canberra ACT 2601 Australia
+61 2 6274 1111

Esso Australia Resources Pty Ltd

IMPACTS AND RISKS

JUR DRILLING ENVIRONMENT PLAN

Volume 2a

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Rev 0	Name	Position	Signature	Date
Prepared by:	JA	Env & Reg. Advisor		
Endorsed By:	Carolyn Thomas	Offshore RER Supervisor	On file	
Document Owner:	Carolyn Thomas	Offshore RER Supervisor		
Endorsed By:	Alex Bolzan	Wells Engineering Manager	On file	
Approved By:	Kathy Belton	Project Manager	On file	

Endorsed / approved by Esso Australia Pty Ltd, for and on behalf of Esso Australia Resources Pty Ltd.

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The Document Owner is responsible for maintaining and controlling changes to this document in accordance with the Document Management Manual (AUGO-PO-DMM-001). In the course of using this document, users may identify opportunities to improve its content. They are requested to provide suggestions to the Document Owner.

This document should be reviewed for accuracy and currency on a 5 yearly basis commencing from the original formal issue date. Major revisions to this manual are to comply with the OIMS System Manual/Process Management of Change procedures.

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Abbreviations

AHS	Australian Hydrographic Service
AHTS	Anchor Handling Tow and Support
ALARP	As Low As Reasonably Practicable
AMP	Australian Marine Park
AMSA	Australian Maritime Safety Authority
ANZECC	Australian and New Zealand Environment and Conservation Council
ASOG	Activity Specific Operating Guidelines
ATBA	Area To Be Avoided
bbl	Standard barrel
BBMT	Barry Beach Marine Terminal
BHPB	BHP Billiton Petroleum (Bass Strait) Pty Ltd
BIA	Biologically Important Area
BOD	Biological Oxygen Demand
BOM	Bureau of Meteorology
BOP	Blowout Preventer
BTA	Barracouta
BTW	West Barracouta
^{o}C	Celcius degrees
CAMO	Critical Activity Mode
CASA	Civil Aviation Safety Authority
CHARM	Chemical Hazard and Risk Management
CHFL	Chemical / Hydraulic Flying Lead
CFSR	Climate Forecast System Reanalysis
DAWR	Department of Agriculture and Water Resources
dB	Decibel
DE	Diatomaceous Earth
DELWP	Department of Environment, Land, Water and Planning Victoria
DP	Dynamic Positioning
DWH	Deep Water Horizon
EBTA	East Barracouta
ECD	Ecological Character Description
EEZ	Exclusive Economic Zone
EFL	Electrical Flying Lead
EIAPP	Engine International Air Pollution Prevention

EP	Environment Plan
EPA	Environment Protection Authority
EPBC	Environment Protection and Biodiversity Conservation
EPO	Environmental Performance Objectives
EPS	Environmental Performance Standards
ESD	Ecologically Sustainable Development
ETS	Environmental Tag System
FIT	Formation Integrity Test
FLEM	Flowline End Manifold
g	gram
GBJV	Gippsland Basin Joint Venture
GBJVOA	Gippsland Basin Joint Venture Operating Agreement
GHG	Greenhouse Gases
GoM	Gulf of Mexico
HFL	Hydraulic Flying Lead
HMCS	OSPAR Harmonised Mandatory Control Scheme (HMCS)
HP	High Pressure
HPWHH	High Pressure Wellhead Housing
Hz	Hertz
HXT	Horizontal Tree
IACS	International Association of Classification Societies
IADC	International Association of Drilling Contractors
IAPP	International Air Pollution Prevention
IMO	International Maritime Organisation
IMS	Invasive Marine Species
IOPP	International Oil Pollution Prevention certificate
JRCC	Joint Rescue Coordination Centre
JSA	Job Safety Analysis
JUR	Jack-up Rig
kb/d	Thousand barrels/day
KEF	Key Ecological Feature
kg	Kilogram
KTT	Kipper Tuna Turrum
km	Kilometre
km^2	Square kilometre
km^3	Cubic kilometre
KPA	Kipper

KUJV	Kipper Unit Joint Venture
KUJVOA	Kipper Unit Joint Venture Operating Agreement
L	Litre
LOC	Loss Of Containment
LOWC	Loss of Well Control
LPWHH	Low Pressure Wellhead Housing
LWD	Logging While Drilling
m	Metre
m^2	Square metre
m^3	Cubic metre
Mscf	Thousand standard cubic feet
MARPOL	International Convention for the Prevention of Pollution from Ships
MAH	Mono Aromatic Hydrocarbon
MDO	Marine Diesel Oil
mg	Milligram
MEG	Mono-ethylene Glycol
µg	Microgram
µPa	Micropascal
MODU	Mobile Offshore Drilling Unit
MPSV	Multipurpose Support Vessel
MSL	Mean Sea Level
MT	Metric Ton
NAF	Non Aqueous Fluids
NCEP	National Centre for Environmental Prediction
NEPM	National Environment Protection Measure
NM	Nautical Mile
NMFS	National Marine Fisheries Service
NOEC	No Observed Effect Concentration
NOPSEMA	National Offshore Petroleum Safety and Environmental Management Authority
OA	Operational Area
OCNS	Offshore Chemical Notification Scheme
OGUK	Oil and Gas UK
OHGP	Open Hole Gravel Pack
OI	Operations Integrity
OIMS	Operations Integrity Management System
OIW	Oil-In-Water
OPEP	Oil Pollution Emergency Plan

OPGGS Act	Offshore Petroleum and Greenhouse Gas Storage Act 2006
OPGGS(E)R	Offshore Petroleum and Greenhouse Gas Storage Environment Regulations 2009
OSMP	Oil Spill Monitoring Plan
OSR	Oil Spill Response
OWS	Oily water separator
PAH	Poly Aromatic Hydrocarbon
PEA	Potentially Exposed Area
PLONOR	Poses Little Or No Risk
PMS	Planned Maintenance System
PNEC	Predicted No Effect Concentration
ppg	Pounds Per Gallon
ppb	Parts Per Billion
PSV	Platform Supply Vessel
PSZ	Petroleum Safety Zone
PTW	Permit To Work
P/U	Pick-up
RA	Risk Assessment
RMS	Root Mean Squared
ROC	Oil Retained On Cuttings
ROV	Remotely Operated Vehicle
RU	Rig Up
SBM	Synthetic Based Mud
SCSSSV	Surface Controlled Subsurface Control Valve
SEL	Sound Energy Level
SHA	Seahorse
SIMAP	Spill Impact Mapping Analysis Program
SMPEP	Shipboard Marine Pollution Emergency Plan
SOLAS	Safety of Life At Sea
SPL	Sound Power Level
SSHE	Safety, Security, Health, Environment
STP	Sewage Treatment Plant
TD	Total Depth
TWA	Tarwhine
UTA	Umbilical Termination Assembly
VSP	Vertical Seismic Profiling
WBM	Water Based Mud

WCDS	Worst Credible Discharge Scenario
WOMP	Well Operations Management Plan
WTN	West Tuna

1 Introduction

The West Barracouta (BTW) Project plans to further develop the Barracouta gas field, located in VIC/L1 as shown in Figure 2-1, by drilling and installing a further two subsea wells (BTW W1 and BTW W2). The subsea wells will be connected via an approximately 6km long flowline into the existing Barracouta (BTA) - Shore450 gas export pipeline. Installation of the BTW W1 and BTW W2 subsea trees, flowline, flowline end manifold (FLEM) and jumpers, umbilical termination assembly (UTA), electrical flying leads (EFLs), hydraulic flying leads (HFLs) and control umbilical (connected to the BTA platform) will be conducted after the jack-up rig (JUR) has departed and will be covered under a separate Environment Plan (EP). As a contingency, it is possible that the JUR will have to be remobilised to the BTW location should a post facility-installation well intervention be required, this will also be covered under this EP.

Esso has agreement from NOPSEMA that the proposed development activities do not trigger the requirement for submission of an Offshore Project Proposal. As outlined in the letter from Esso to NOPSEMA dated 13 November 2017, the West Barracouta development is considered to be a significant modification or new stage of activity at Barracouta (and not as a ‘new activity’ in accordance with Regulations 17(1) and 17 (2) of the Offshore Petroleum and Greenhouse Gas (Environment) Regulations 2009 (OPGGS(E)R)) because:

1. Esso has been producing petroleum from the Barracouta Reservoir since 1969;
2. The proposed wells are to be drilled into the Barracouta reservoir approximately 6 km from the BTA platform. It would be possible to drill them using extended reach drilling from the platform, however this is not the preferred option due to the structure of the reservoir;
3. There are other subsea facilities (Tarwhine (TWA) in VIC/L1 and Seahorse (SHA) in VIC/L18) tied back to the BTA platform and covered by the same operations EP.
4. The BTW Project will tie into existing pipelines and will be “hosted” by BTA platform via an umbilical supplying power, communications, hydraulic fluid and chemicals. The proposed development will result in an expansion of the existing BTA facility.

The Kipper (KPA) Stage 1B Project plans to deliver the next stage of development of the KPA gas field, located in VIC/L25 as shown in Figure 2-1. Two subsea wells (KPA-A2 and KPA-A4) were installed during KPA Stage 1A and Stage 1B plans to install a further two subsea wells on existing flowbases (KPA-A1 and KPA-A3) at the Kipper Subsea Facility. Production from the KPA Stage 1B wells will be cooled in the pre-installed coolers prior to being exported from the KPA manifold to the West Tuna (WTN) platform via the two existing pipelines, KPA-WTN350N/S. Connection of chemical/hydraulic flying leads (CHFLs) and EFLs to interface with the KPA manifold (shown in Figure 2-3) is also covered under this EP.

1.1 Titleholder Details

Production Licence VIC/L1 is held by Esso Australia Resources Pty Ltd (Esso) and BHP Billiton Petroleum (Bass Strait) Pty Ltd (BHBP) as 50:50 co-venturers in the Gippsland Basin Joint Venture (GBJV) for the exploration, development and production of oil and gas in the Bass Strait. Production Licence VIC/L25 is held by Esso (32.5 %), BHPB (32.5 %) and Mitsui E&P Australia Pty Ltd (35%) as co-venturers in the Kipper Unit Joint Venture (KUJV).

Esso is the designated operator under the Gippsland Basin Joint Venture Operating Agreement (GBJVOA) and under the Kipper Unit Joint Venture Operating Agreement (KUJVOA). Esso receives services, including personnel, from its wholly owned subsidiary, Esso Australia Pty Ltd.

The nominated registered office for the proponent is as follows:

Esso Australia Resources Pty Ltd (ACN 091 829 819)

Level 9, 664 Collins Street
Docklands VIC 3008

The environmental contact for this activity is:

Carolyn Thomas
Offshore Risk, Environment and Regulatory Supervisor
Esso Australia Pty Ltd for and on behalf of Esso Australia Resources Pty Ltd
Telephone: (03) 9261 0000
Email: carolyn.y.thomas@exxonmobil.com

The Regulator will be notified of a change in titleholder, a change in the environmental contact or a change in the contact details for either the titleholder or the environmental contact in accordance with Regulation 15(3) of the (OPGGS(E)R).

1.2 Scope

Esso has developed this EP to manage the environmental impacts and risks associated with the BTW and KPA Stage 1B production drilling campaigns to be completed by a JUR within the 500m petroleum safety zones (PSZ) around the drilling locations.

The BTW operational area for the purposes of this EP lies within Production Licence VIC/L1 and consists of the 500 m PSZ around the drilling location. Activities included in the scope of this EP are described in detail in Section 2 and include rig jack-up, drilling, completion installation, well suspension, well re-entry and intervention, support vessels, ROV activities and use of helicopters.

The KPA Stage 1B operational area for the purposes of this EP lies within Production Licence VIC/L25 and consists of the 500 m PSZ around the Kipper Subsea Facility. Activities included in the scope of this EP are described in detail in Section 2 and include rig jack-up, drilling, completion installation, subsea tree installation, flying lead installation, support vessels, ROV activities and use of helicopters.

Activities excluded from the scope of this EP are vessels (including the JUR) transiting to or from the operational area. These vessels are deemed to be operating under the Commonwealth Navigation Act 2012 and not performing a petroleum activity.

2 Description of the Activity

2.1 Overview and Location

2.1.1 BTW Project

The BTW production drilling campaign will utilise the Noble Tom Prosser JUR to batch drill two subsea production gas wells (BTW W1 and W2). As part of the BTW W2 well a separate pilot hole will also be drilled as part of the campaign. The BTW drilling campaign will take place in Production Licence VIC/PL1 located in the Gippsland Basin of eastern Bass Strait as shown in Figure 2-1.

Table 2-1 Location details

Location	Licence area	Latitude	Longitude	Water depth (m)
BTW Drill Centre	VIC/L1	38° 19’ 06” S	147° 36’ 53” E	45.5
KPA Subsea Facility	VIC/L25	38°10' 53" S	148° 35' 35” E	95

The BTW drill centre is located 6 km south west of the BTA platform, approximately 30 km off the Gippsland coast in 45.5 m of water depth. The coordinates for the drill centre are provided in Table 2-1. The two wells, located approximately 15 m apart, are planned to be batch drilled by skidding the drilling package between wells eliminating the need to reposition the JUR.

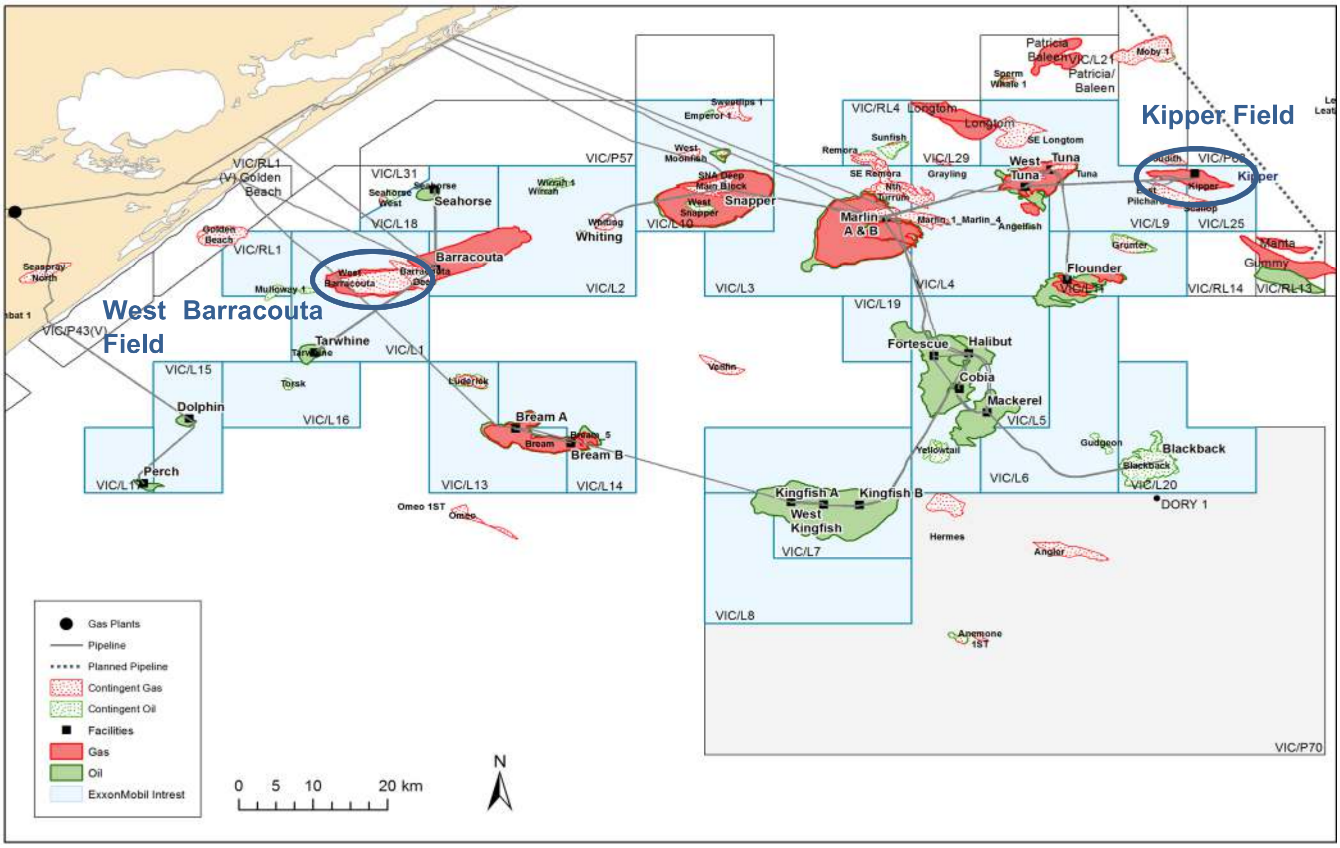

Figure 2-1 Overview of Gippsland Basin field locations

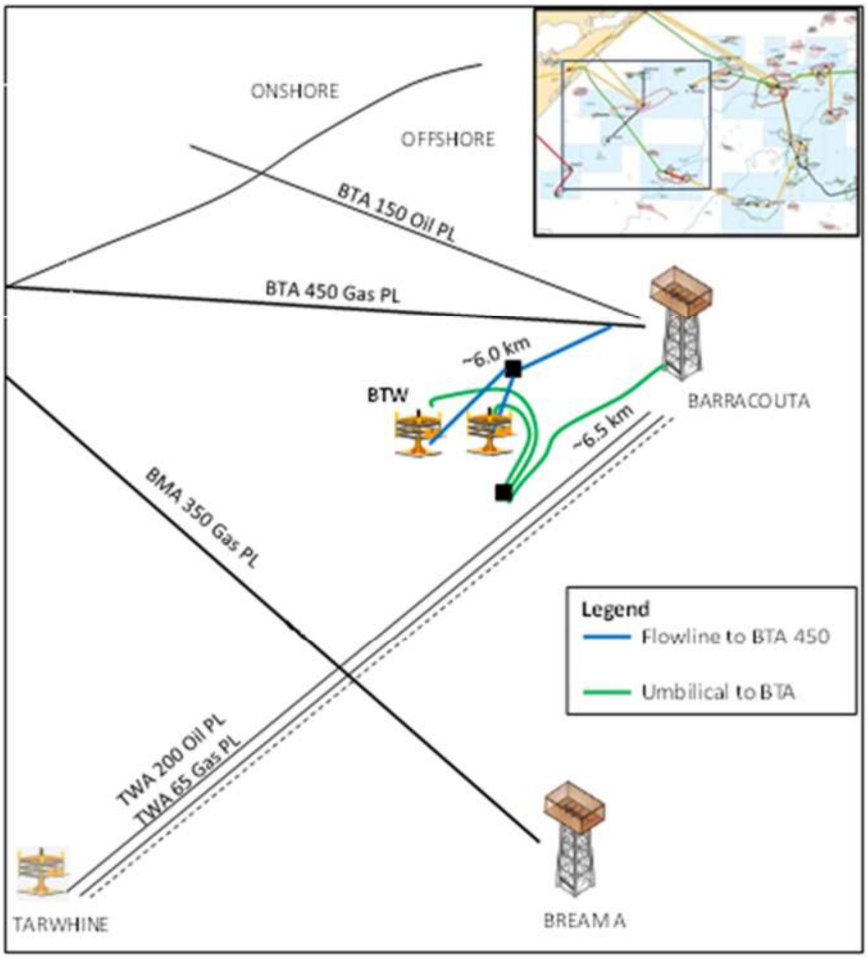

Figure 2-2 BTW Well Locations, Existing and Planned Infrastructure

2.1.2 KPA Stage 1B Project

The KPA Stage 1B drilling campaign will utilise the Noble Tom Prosser JUR to drill two subsea gas production wells (KPA-A1 and KPA-A3). The drilling campaign will take place at the KPA Subsea Facility in Production Licence VIC/L25 located in the Gippsland Basin of eastern Bass Strait as shown in Figure 2-1.

The KPA Subsea Facility is located approximately 15 km north west of the West Tuna (WTN) platform, approximately 45 km off the Gippsland coast in 95 m of water depth. The co-ordinates for the subsea facility are provided in Table 2-1. The layout of the KPA Subsea Facilities is shown in Figure 2-3.

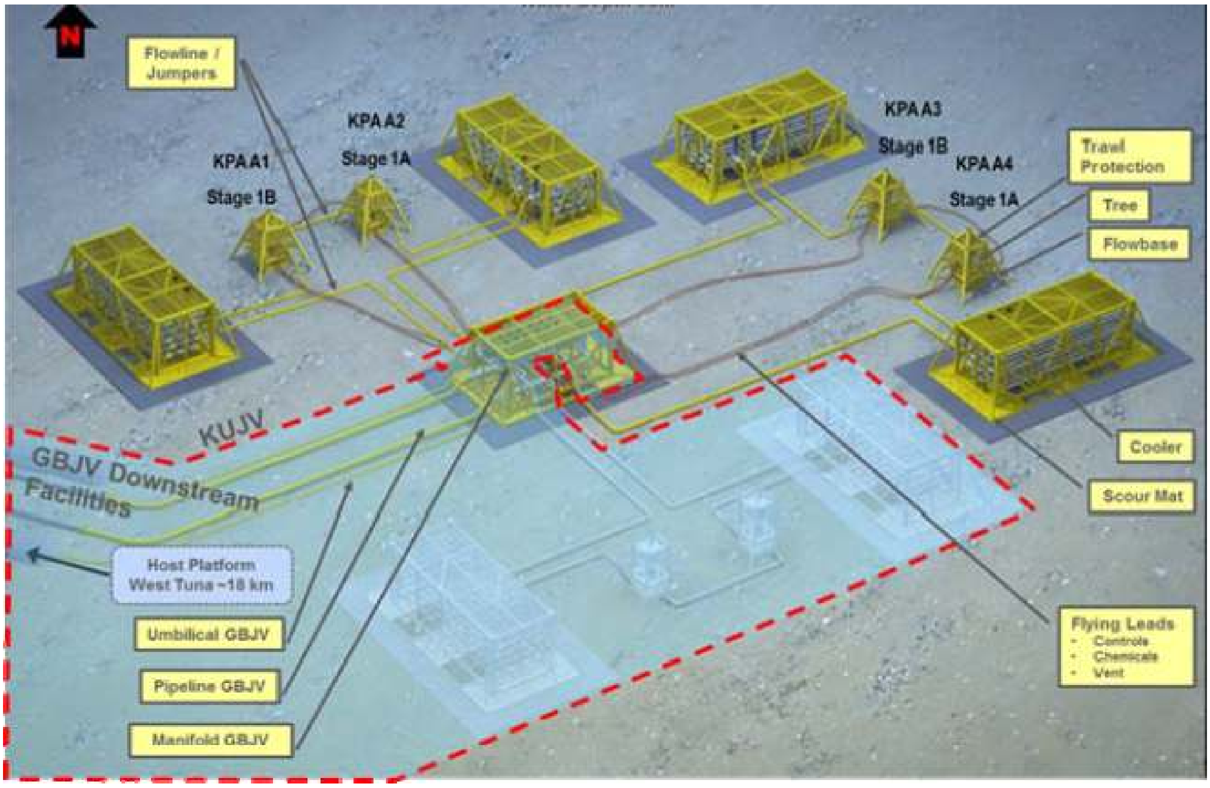

Figure 2-3 KPA Subsea Facilities

2.2 Timing of the Activity

The earliest date of commencement of the drilling campaign is start Q1 2020 with all activity scheduled to be completed no later than end Q4 2021. Activities will be conducted 24 hours per day, seven days per week. It is expected to take approximately 50 days to drill and complete each of the BTW wells (inclusive of JUR positioning activities) and a further 80 days for each of the KPA Stage 1B wells (inclusive of JUR positioning activities), dependent on weather, scheduling and well conditions. If, as a contingency, the JUR has to be remobilised to the BTW location for a post facility-installation well intervention it is estimated this would take approximately 15 - 20 days to complete. To account for potential weather and operational delays or schedule changes, the environmental assessment accounts for petroleum activities over a full year.

2.3 KPA Subsea Facility Infrastructure

The Kipper Turrum Tuna (KTT) project – Phase 1A, and the KPA subsea facilities commenced production in March, 2017. The installed KPA Phase 1A subsea facilities (shown in Figure 2-3) comprise:

- Six slot subsea manifold with a piggable loop – four slots for KPA and two spare slots
- Structural casing and flowbases installed at four locations – KPA-A1, KPA-A2, KPA-A3 and KPA-A4
- Two 7” horizontal subsea trees installed on flowbases at KPA-A2 and KPA-A4 locations have been drilled and cased with open hole gravel pack (OHGP) installed.
- Four subsea coolers (one for each well, all installed)

- Two 350 mm diameter WTN-KPA pipelines, designed to allow round trip pigging from WTN platform
- One electric umbilical – sized for up to six wells
- One fluid umbilical - Mono-ethylene glycol (MEG), methanol and hydraulic fluid – sized for up to six wells
- CHFLs and EFLs to provide control functions to the installed trees and flowbases.

Note: The subsea facilities from the Kipper manifold to the wells, (including jumpers and flying leads) as shown in Figure 2-3 are owned by Kipper Unit Joint Venture (KUJV), all other subsea facilities at KPA are owned and operated by the Gippsland Basin Joint Venture (GBJV).

2.4 Hydrocarbon System Overview

2.4.1 BTW Fluid Composition and Flow Rate

There are currently 8 active BTA gas production wells, each producing from the East Barracouta N1 reservoir, these are located on the BTA platform. The Barracouta-3 exploration well, drilled in 1969, is the only well drilled through the BTW reservoir. Based on the current geologic interpretation of East Barracouta and BTW being local crests of the same gas accumulation, the bulk gas composition is assumed to be consistent between the two entities. The gas from this reservoir is a 'wet' gas (defined as natural gas that contains less methane (typically less than 85%) and more ethane and other more complex hydrocarbons) resulting in liquid drop-out in the form of light condensate.

Table 2-2 BTW Fluid Composition

Composition	Mol %
CO_2	0.60
H_2S	*
N_2	1.80
C_1	85.67
C_2	5.74
C_3	2.95
C_4	1.82
C_5	0.78
C_{6+}	0.64

*100ppm

As outlined in the BTW Well Operations Management Plan (WOMP), reservoir simulation has been conducted to identify the maximum credible discharge rates for the field. The maximum release rate for

BTW is approximately 255 Mscf/d gas and 3.8 kb/d condensate based on surface blowout preventer (BOP) failure at Total Depth (TD) (10-3/4" production casing, 9-1/2" hole through the reservoir, 5-1/2" drill pipe in the hole). This scenario is one of a number that were tested via well kill modelling to determine the worst-case credible release rate for the BTW drilling campaign.

2.4.2 KPA Fluid Composition and Flow Rate

The following table provides a high level overview of the KPA fluids composition (based on Stage 1A fluids analysis). The gas from this reservoir is also a 'wet' gas. The produced fluid composition is expected to become leaner (i.e. increased methane content) with production due to retrograde condensation in the reservoir as pressure declines in the absence of strong water drive. From thermodynamic modelling, liquid (C_3+) yield is expected to decrease from approximately 58bbl/Mscf at start-up to approximately 53bbl/Mscf towards life-end.

A range of 150 – 200 µg/m^3 of mercury is expected in the reservoir.

Table 2-3 KPA Fluid Composition

Composition	Mol %
CO_2	10.40
H_2S	0.00
N_2	0.26
C_1	77.55
C_2	5.94
C_3	2.47
C_4	1.19
C_5	0.54
C_{6+}	1.70

The KPA Stage 1A wells began production in March 2017. As at October 2018, approximately 55 Gscf of gas has been produced. This equates to 8% of the expected total field recoverable volume. On average, 54% of total production is attributed to the A4 well, with the remaining 46% of production attributed to the A2 well. The A4 well has been producing at an average of 55 Mscf/d and the A2 well has been producing at an average of 50 Mscf/day.

As outlined in the KPA WOMP, reservoir simulation has been conducted to identify the maximum credible discharge rates for the field. The maximum discharge rate for KPA is approximately 227 Mscf/d gas and 6.9 kb/d condensate based on surface BOP failure at TD (10-3/4"x9-5/8" production casing, 8-1/2"x9-1/2" hole through the reservoir, 5-1/2" drill pipe in the hole). This scenario is one of a number that were tested via well kill modelling to determine the worst-case credible release rate for the KPA drilling campaign.

2.5 Drilling Activity

2.5.1 BTW Well Design and Drilling Methodology

An indicative overview of the well design and drilling methodology is provided in this section. This process is subject to change and the detailed well design will be finalised in the WOMP for the BTW wells, which is to be accepted by NOPSEMA prior to arrival on location.

Table 2-4 summarises the operations planned to drill and complete wells BTW W1 and BTW W2. Each well is planned to be batch drilled to maximise efficiencies between the various hole sections. A separate geological pilot hole will be drilled below the BTW W2 well's surface casing to confirm water contact and provide hole section for logging at approximately 45°. This section will be drilled, logged, and plugged back prior to setting production casing on the two production wells.

Table 2-4 BTW Sequence of Operations

Well	Phase
Move	Move-in, jack-up and cantilever out over location.
BTW W1	Drill 36" structural hole to approx. 150m depth, run & cement 30" casing.
	Drill 26" conductor hole, run & cement 20" casing (if required for a shallow gas pilot hole). Install high pressure riser, BOP and surface diverter system.
	Drill 8-1/2" shallow gas pilot hole (if required).
	Open 8-1/2" pilot hole to 17-1/2" (or drill 17-1/2" surface hole), run & cement 13-3/8" casing. Suspend well. Skid drilling package to W2 well centre.
BTW W2	Drill 36" structural hole to approx. 150m depth, run & cement 30" casing.
	Drill 17-1/2" surface hole, and run and cement 13-3/8" casing.
	Run high pressure riser, install & test surface BOP.
	Displace well to NAF. Drill 9-1/2" geological pilot hole.
	Perform formation evaluation via wireline logging. Plug back pilot hole to 13-3/8" casing shoe.

Well	Phase
	Drill 14-3/4" x 12-1/4" directional hole to top of Latrobe formation and run & cement 10-3/4" casing. Suspend well. Skid drilling package to W1 well centre.
BTW W1	Re-enter well. Using NAF, drill 14-3/4" x 12-1/4" directional hole to top of Latrobe formation and run & cement 10-3/4" casing.
	Drill 9-1/2" production hole to well TD (approx. 1314 m).
	Circulate fluids to ensure wellbore is sufficiently clean for screen running operations.
	Install Open Hole Gravel Pack.
	Install Intermediate Completion and suspend well. Skid drilling package to W2 well centre.
BTW W2	Re-enter well. Using NAF, drill 9-1/2" production hole to well TD (approx. 1300 m depth).
	Circulate fluids to ensure wellbore is sufficiently clean for screen running operations.
	Install Open Hole Gravel Pack.
	Install Intermediate Completion, clean casing and conduct pressure test
	Install Upper Completion, conduct function test on all well components and install temporary abandonment cap. Skid drilling package to W1 well centre.
BTW W1	Clean casing and conduct pressure test.
	Install Upper Completion, conduct function test on all well components and install temporary abandonment cap.
	Remove BOP and high pressure riser.
Move	Move-out.

A preliminary well design and casing schematic is shown in Figure 2-4.

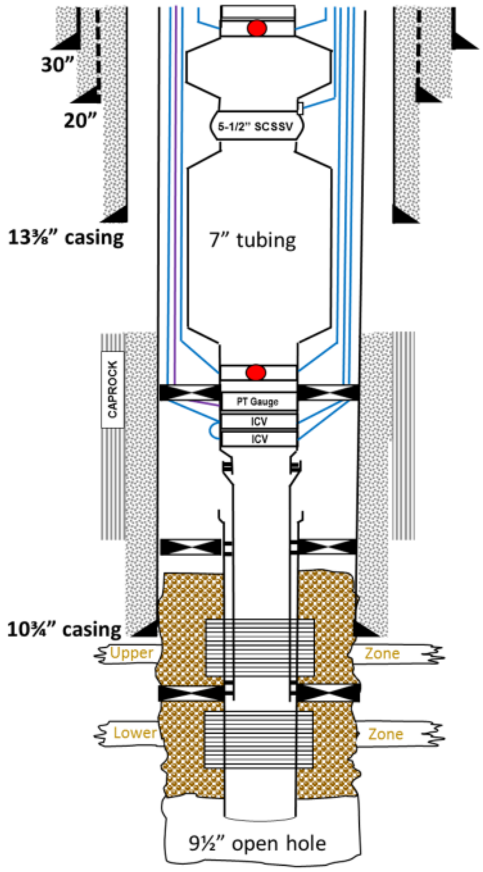

Figure 2-4 BTW Well Schematic

2.5.2 KPA Well Design and Drilling Methodology

An indicative overview of the well design and drilling methodology is provided in this section. This process is subject to change and the detailed well design will be finalised in the WOMP for the BTW wells, which is to be accepted by NOPSEMA prior to arrival on location.Table 2-5 summarises the operations planned to drill and complete wells KPA-A1 and KPA-A3. As the KPA A1 and KPA A3 wells are located approximately 65 m apart batching efficiencies from performing similar well construction activities sequentially are not feasible.

Production flowbases have been installed on both KPA A1 and KPA A3. The flowbases which are installed on the 30” Low Pressure Wellhead Housing (LPWHH) above 30” x 20” structural casing were part of the Stage 1A construction program in 2009/2010. This pre-investment allowed early installation of KPA Stage 1B coolers and flowlines at this time.

After running and cementing 13-3/8” surface casing, KPA A1 & A3 will be constructed with 10-3/4” x 9-5/8” intermediate/production casing set at the top of Golden Beach, with 7” completion into an Open Hole Gravel Pack (OHGP) installed in the Golden Beach reservoir unit.

Table 2-5 KPA Sequence of Operations

Well	Phase
KPA A1	Run anchors (if necessary). Move-in, jack-up and cantilever out over location. Recover anchors.
	Drill 20” conductor hole and run & cement 16” casing.
	Run high pressure riser, BOPs and surface diverter system.
	Drill 8-1/2” pilot hole to approx. 700m depth monitoring for shallow gas.
	Open 8-1/2” pilot hole to 17-1/2”, run & cement 13-3/8” surface casing. Test BOPs.
	Displace well to NAF. Drill 12-1/4” directional hole through Latrobe Formation to top of Golden Beach formation, run & cement 10-3/4" x 9-5/8" casing.
	Drill 8-1/2” x 9-1/2” production hole to well TD.
	Perform formation evaluation via wireline logging. Circulate fluids to ensure wellbore is sufficiently clean for screen running operations.
	Install Open Hole Gravel Pack.
	Install barriers in 10-3/4” x 9-5/8” casing, remove BOPs & high pressure riser.
	Install, connect and test horizontal subsea tree.
	Install high pressure riser & BOP and remove barriers.
	Circulate and clean wellbore.
	Install Upper Completion.
	Suspend well.
	Remove BOPs & high pressure riser.
	Move to KPA A3.
KPA A3	Run anchors (if necessary). Move-in, jack-up and cantilever out over location. Recover anchors.

Well	Phase
	Drill 17-1/2” surface hole and run & cement 13-3/8” casing.
	Install high pressure riser & surface BOP.
	Displace well to NAF. Drill 12-1/4” directional hole through Latrobe formation to top of Golden Beach formation and run & cement 10-3/4" x 9-5/8" casing
	Drill 8-1/2” x 9-1/2” production hole to well TD.
	Perform formation evaluation via wireline logging. Circulate fluids to ensure wellbore is sufficiently clean for screen running operations.
	Install Open Hole Gravel Pack.
	Install barriers in 10-3/4” x 9-5/8” casing, remove BOPs & high pressure riser.
	Install, connect and test horizontal subsea tree.
	Install high pressure riser & BOP and remove barriers.
	Circulate and clean wellbore.
	Install Upper Completion.
	Suspend well
	Remove BOP & high pressure riser.
	Move-out.

A preliminary well design and casing schematic is shown in Figure 2-4.

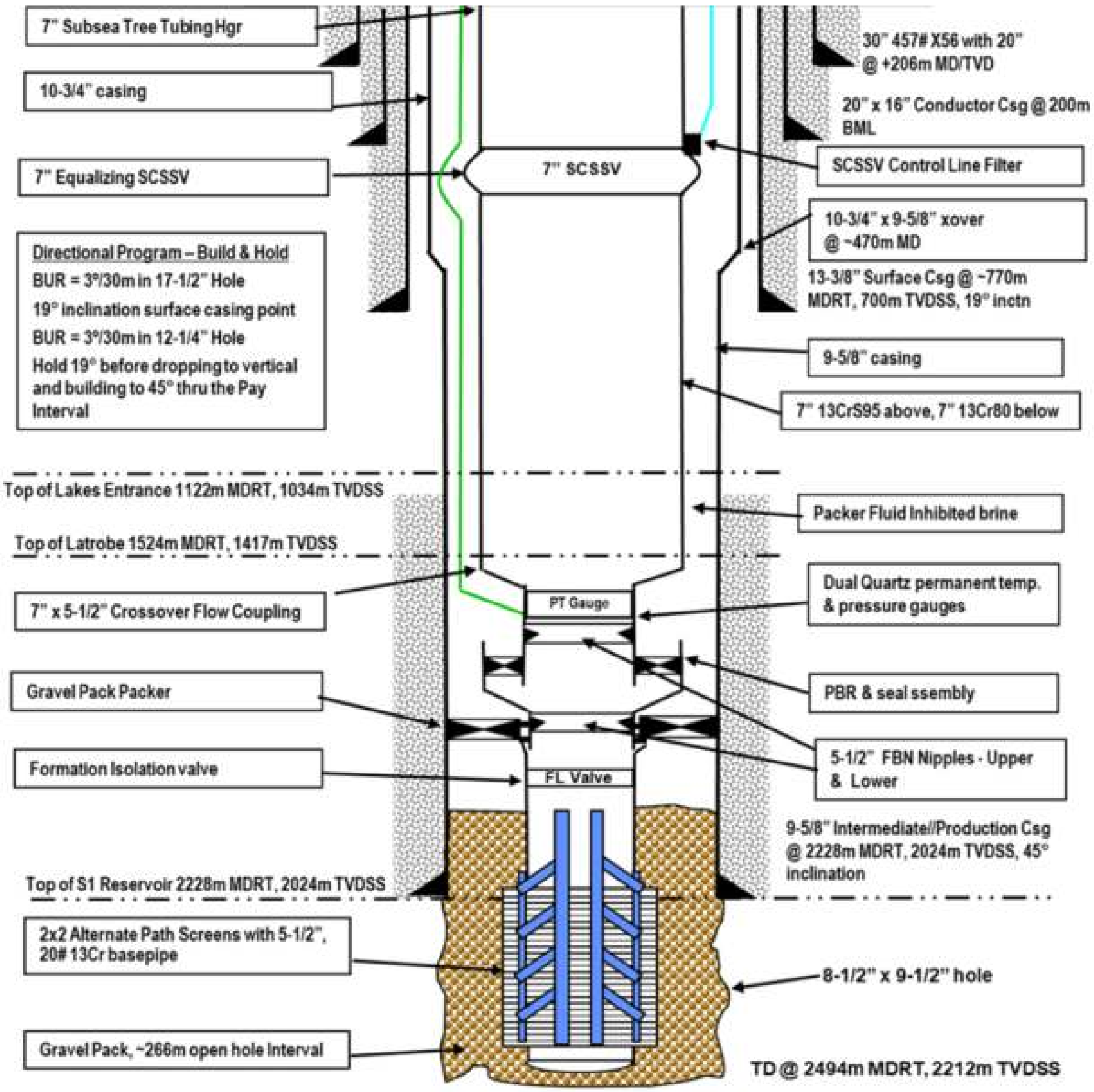

Figure 2-5 KPA Well Schematic

Drilling fluids (or muds) will be used during the drilling program to provide a range of functions, including:

- Control of formation pressures (i.e. providing a hydrostatic head by managing mud density maintains overbalance to the reservoir pressure and prevents a hydrocarbon influx into the wellbore);
- Wellbore stability through mud weight and chemical inhibition;
- Transport of drill cuttings out of the hole to seabed (riserless) and to surface via the JUR (riser installed);
- Maintenance of drill bit and assembly (i.e. lubrication, cooling and support); and
- Sealing of permeable formations to prevent formation invasion.

Water-based drilling fluids will be used wherever practicable. The base case drilling methodologies propose using a combination of seawater with high-viscosity sweeps and Non-aqueous Fluid (NAF) as outlined in Table 2-6 and Table 2-7.

Table 2-6 Summary of base case BTW drilling methodology

Hole size	Cuttings discharge location	Fluid type to drill section
36” structural	Seabed (riser-less)	Sea water with high viscosity sweeps
26” conductor (BTW W1 contingency operation) – shallow gas mitigator	Seabed (riser-less)	Sea water with high viscosity sweeps
8-1/2” pilot hole; open hole to 17-1/2” (BTW W1 contingency operation – shallow gas mitigator)	Sea surface	WBM
17-1/2” surface	Seabed (riser-less)	Sea water with high viscosity sweeps
14-3/4” x 12-1/4” intermediate	Sea surface	NAF
9-1/2” production	Sea surface	NAF
9-1/2” geological pilot hole below BTW W2	Sea surface	NAF

Table 2-7 Summary of base case KPA drilling methodology

Hole size	Cuttings discharge location	Fluid type to drill section
36” structural	N/A (pre-drilled)	N/A (pre-drilled)
16” conductor (KPA-A1 only)	Seabed (riser-less)	Sea water with high viscosity sweeps
8-1/2” pilot hole (shallow gas mitigator); open hole to 17-1/2” (KPA-A1 only)	Sea surface	WBM
17-1/2” surface	Seabed (riser-less)	Sea water with high viscosity sweeps
12-1/4” intermediate	Sea surface	NAF
8-1/2” x 9-1/2” production	Sea surface	NAF

The riser-less top-hole sections will be drilled with sea water and high-viscosity sweeps. High-viscosity sweeps consist of approximately 90% sea water, with the remaining 10% made up of drilling fluid additives that are either inert in the marine environment, are naturally occurring benign materials or are organic polymers that are readily biodegradable in the marine environment. Drilling additives typically include sodium chloride, potassium chloride, bentonite (clay), cellulose polymers, guar gum, barite and calcium carbonate.

Should an 8-1/2” pilot hole be required on BTW W1 below the 20” conductor conductor or on KPA A1 below the 16” conductor, it would be drilled with Water Based Mud (WBM). The WBM additives are either inert in the marine environment, are naturally occurring benign materials or are organic polymers that are readily biodegradable in the marine environment. Drilling additives typically include sodium chloride, potassium chloride, bentonite (clay), cellulose polymers, guar gum, barite and calcium carbonate.

Below these sections, there is a greater potential for technical challenges during drilling including clay hydration, lost circulation and hole stability issues. At both drilling locations the potential for hole instability has been recognised due to the presence of the Lakes Entrance reactive shale.

The proposed NAF would be a synthetic based mud as per Table 5-6. The blend has been shown to require less inventory than conventional drilling fluids due to a reduction in downhole mud losses and pump pressures. The proposed base oil for the drilling fluid provides greater biodegradability, lubricity and reduced toxicity than other conventional synthetic-based fluids. The preferred base oil systems have an aerobic degradability in sea water and low toxicity (e.g. Escaid 110: OCNS Non-CHARM D ranking).

The current well design includes the use of NAF to drill the intermediate, geological pilot hole (through the reservoir) and production hole sections for the following reasons:

- Ensure that a high integrity open hole gravel pack completions can be installed successfully over the entire production interval.
- Minimise future well workover operations caused by lower completion failures which could result from the screens not being run to the productive interval's total depth or completely installing sand between the screens and the reservoir sand face.
- Manage the washout and hole instability problems within the Lakes Entrance formation.

The use of NAF in the productive hole is required to install ExxonMobil's patented NAFPac completion technique. These open hole, high integrity completions must be installed in a NAF environment.

2.5.3 Cuttings Discharge

Consistent with industry practice, all cuttings generated during riser-less drilling will be returned directly to the seabed, where they will be deposited in the vicinity of the wellhead.

The lower hole sections will be drilled using a NAF mud recirculating drilling fluid system. The muds will be treated to remove formation solids and will be recycled and recovered while drilling. The fluids returned with the drilled cuttings will initially pass through a shale shaker where most of the mud will be separated from the cuttings. To minimise the retention of synthetic fluid on cuttings and allow the additional recovery of drilling fluid, a cuttings dryer system can be used to also process the cuttings prior to discharge and return the mud back to the active mud system. A centrifuge is also planned to allow the removal of entrained solids from the fluid to maximise longevity / recycle of the NAF muds.

While the majority of used NAF muds will be returned to shore for reconditioning and future use, not all the drilling fluid can be removed and a coating of residual drilling fluid remains attached to the cuttings. Discharges of NAF into Bass Strait are confined to this material adhering to the surfaces of the cuttings. Following treatment with the shakers and/or cuttings dryer the synthetic fluid retained on cuttings (ROC) will be less than 10% by dry weight averaged over each hole section. The ROC is monitored by onboard testing conducted once very twelve hours.

No bulk NAF discharges (e.g. tank dumps) will be permitted.

2.5.4 Cementing Operations

Cements are transported as dry bulk to the JUR by support vessels. The dry bulk storage tanks on the JUR vent excess compressed air to atmosphere. This venting process carries small amounts of cement which is discharged below the JUR's elevated hull.

Following completion of drilling the upper hole sections, casing is installed and the annulus between the casing and hole cemented. The final cement plan will be confirmed once a cement service provider has been selected. An outline of the cementing program is provided below:

Structural casing: The BTW well structural casings will be cemented to the sea floor. At KPA the structural casing was cemented in place during KPA Stage 1A operations. Final formulation of the cement slurry will be included in the well program.

Surface casing: Surface casing will be cemented with a 12.5 ppg or heavier lead slurry and a 15.8 ppg tail slurry, with returns to the sea floor. Final formulation of the cement slurry will be included in the well program.

Intermediate / production casing: Intermediate / production casing will be cemented to meet WOMP criteria. Specifically, designed top of cement will be near the top of Lakes Entrance formation to provide sufficient primary cement for a future rock-to-rock combination abandonment plug in excess of 150 m. A 15.8 ppg cement slurry will be placed at the shoe and a lighter lead slurry may be used depending on the required cement column height and expected equivalent circulating density (ECD) and formation strength. Final design and formulation of the cement slurry will be included in the well program.

Cement is mixed as required to ensure minimal wastage. In the event that operational issues arise during the cementation which may risk the cement barrier integrity, the partially pumped liquid cement slurry may be completely displaced from the well and discharged overboard. The cementing operation would then be repeated.

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 feasible excess dry cement remaining at the end of the campaign will be offered for sale to the next Operator however this may not be possible in which case the cement will be discharged overboard.

2.5.5 Completions Operations

Completion operations in BTW and KPA Stage 1B consist of various phases including lower (Gravel Pack), intermediate (BTW only) and upper completions.

2.5.5.1 Lower Completion (Gravel Pack)

Upon well conditioning, sand control screen will be run into the well. Following TD, an open hole gravel pack (OHGP) will be conducted. This will utilise ExxonMobil's proprietary NAFPac technique where a viscosified gel carrier fluid is used to displace NAF from the open hole / screen section, and transport the gravel pack proppant down-hole. The final step of the NAFPac process is reversing out excess gravel pack slurry / proppant with clear brine preceded by a wellbore clean-up pill train (surfactant / solvent spacers).

Prior to operations commencing, an acid pickle (dilute HCl) is used to treat the surface piping and hoses. The spent acid is discharged overboard.

Following operations, any remaining pre-mixed gel and proppant (including interfaces) is discharged overboard.

2.5.5.2 Intermediate Completion (BTW only)

Following the gravel pack installation as above, the intermediate completion which provides the inner string separation for the dual zones is installed for the BTW wells. Prior to running the intermediate completion, a wellbore clean-up run is performed.

2.5.5.3 Upper Completion

For BTW wells, prior to running in upper completion string a second wellbore clean-up run will be conducted if required.

For the KPA Stage 1B wells, a wellbore clean up run will be performed followed by running the upper completion string downhole.

2.5.6 Wellbore Clean-up

There are wellbore clean-up activities throughout the campaign. This involves running a variety of tools, such as casing scrapers, magnets and down-hole filters to provide mechanical cleaning of the casing and down-hole removal of solids from the brine fluid.

A variety of cleaning chemicals will be utilised in this process. These will include KCl/NaCl/NaBr brine, viscosified brine spacers, surfactants and solvents to remove any NAF residue from the casing and drill pipe, as well as assist with solids removal.

The wellbore clean-up operations are conducted in an all-brine environment, the well previously having been displaced to KCl/NaCl/NaBr completion brine during gravel packing operations.

In addition to down-hole fluid clean up, a surface filtration package will be utilised. This will consist of one or two diatomaceous earth (DE) filter presses, plus cartridge-type filtration pods. The completion brine will be initially filtered offline, with subsequent fluid returns to be passed through the surface filtration equipment. DE is loaded into the filter presses as dry powder – used DE will be flushed from the presses with water and discharged.

Following Intermediate/Upper Completions operations, any remaining pre-mixed spacers or inhibited packer fluid (oxygen scavenger and biocide added to base brine) will also be discharged overboard. Dependant on operations to follow, any brine remaining in tanks and effluent from rig pits/tanks cleaning will be discharged.

2.5.7 Well Evaluation

During drilling, it is necessary to gather formation information for ongoing drilling operations or to influence the effective recovery of hydrocarbons from the reservoir. Where possible this information is gathered real-time from Logging While Drilling (LWD) tools. It may be required that additional information that cannot be gathered from LWD tools be obtained using wireline conveyed or pipe conveyed logging tools.

Vertical Seismic Profiling (VSP) is not planned.

2.5.8 Subsea Tree Installation

The KPA horizontal subsea trees will be installed prior to running the upper completions. Following completion of the wells an ROV will connect the CHFLs and EFLs from the subsea trees to the KPA manifold.

2.5.9 Well Suspension

The BTW subsea trees will not be available upon the completion of these wells so temporary wellhead caps will need to be installed. These caps will not be pressure-containing as all wellbore pressures and fluids will be maintained via subsurface equipment installed and validated as part of the completions. The BTW wells will be left capped awaiting connection to the trees, flowlines and controls. Prior to moving off location the two hydraulically operated tubing isolation ball valves will be tested to confirm integrity. Installation of the subsea trees and subsequent connection to trees is anticipated within approximately five months of the completion of the drilling program.

2.5.10 Well Intervention

As a contingency, it is possible that the JUR will have to be remobilised to the BTW location should a post facility-installation well intervention be required in order to commence production. Such a circumstance would have the hydraulically-controlled tubing isolation ball valve(s) failing to open. This is an unlikely event, as the valves have a contingency mechanical override feature. The JUR would be re-positioned in the exact location as used during the drilling camapign, therefore no additional seabed disturbance. The subsea tree cap would be removed and the high pressure riser installed on the subsea tree, followed by the surface BOPs. The tubing hanger running tool / riser would be used to connect to the upper completion. A wireline mechanical shifting tool would be used to open the ball valve(s). Should this operation be unsuccessful, a milling operation would remove the valve(s) internal components. The very small quantity of valve debris (approximately 5 kg) from the milling operation would be captured at surface with nil discharge to the sea. This contingency operation would take approximately 15-20 days to complete.

2.6 Drilling Support Operations

2.6.1 JUR

The Tom Prosser jack-up rig will be used for the proposed campaign. It was built in Singapore in 2013/2014 and is owned by Noble Drilling Holding LLC and operated by Noble Contracting II GmbH (hereafter referred to as Noble). Refer to Table 2-8 for the Tom Prosser jack-up rig specifications.

As the Tom Prosser does not have any propulsion capability, it will be towed onto location by up to three support vessels and the legs then lowered into position. After the legs are lowered to the seafloor the hull can be elevated above the surface of the sea.

At the completion of drilling activities the JUR will lower itself, retract the legs and be towed away.

Figure 2-6 Noble Tom Prosser

Table 2-8 Noble Tom Prosser Specifications

Design	Friede and Goldman JU - 3000N design
Class	ABS A-1 Self Elevating Mobile Offshore Drilling Unit CDS
Registry	Republic of Liberia
Principal Dimensions	Length Overall (including Helideck): 102.59 m / 336.58 ft
	Breadth of Hull: 84.45 m / 277.066 ft
	Depth of Hull: 9.45 m / 31.00 ft
	Length of Legs (including Spud Can Tip) 169.11 m /554.83 ft
	Footing Area of Each Spud Can 254.05 m^2 / 2734.51 ft^2
	Height of Spud Can Tip (Below Base of Spud Can) 2.105 m / 6.906 ft
Leg Penetration	2 – 2.5 m
Transit Displacement	25522.49 MT
Anchors	Four 7.5 MT delta flipper type (flipper width: 3.7 m, flipper length: 2.9 m)
Accommodation	Maximum POB: 150 Typical POB during drilling operations: 66
Mud	7747 bbl (active and reserve mud pits)
Base Oil Storage	2176 bbl

2.6.2 Support Vessels

Support will be provided by two or three vessels including anchor handling tow and support (AHTS) vessels, platform supply vessels (PSV) or multipurpose support vessels (MPSV) which will operate out of the most suitable port (yet to be determined but could be Port of Melbourne or Barry Beach) . Vessel support activities could include:

- Tow the JUR to/from the drilling location;
- Position JUR on location (possibly used in conjunction with AHTS-deployed anchors);
- Supply provisions including food, bulk chemicals, liquid drilling fluids and diesel fuels to the drilling rig and remove waste to shore;
- Deployment of ROVs;
- Surveys and other subsea activities including crane operations
- Personnel transfer;
- Monitoring and maintaining the 500 m exclusion zone around the JUR; and
- Emergency response and rescue.

Although details remain to be finalised, vessels supporting the project will be specified and operated in accordance with International and Australian regulatory requirements. The vessels will be subject to a marine assurance program and will be certified as being in compliance with international maritime legislative requirements by a Classification Society registered with International Association of Classification Societies (IACS).

2.6.3 Helicopter Support

Helicopter support will be provided from Esso's Longford heliport or alternate to support the rig as follows:

- Personnel transfers between shore and the rig for crew changes; and
- Emergency response, including medivac, evacuation of the rig, and search and rescue.

Non-emergency helicopter operations will be limited to daylight hours and will usually entail one return flight each weekday.

Helicopter operations are performed in accordance with Civil Aviation Safety Authority (CASA) regulations. Helicopter type, suitability, and performance criteria are contractually controlled, as are minimum flight and engineering crew qualifications and experience levels.

2.6.4 ROVs

Remotely operated vehicles (ROV) will be used during the drilling activities. ROVs could be deployed from either the JUR or a support vessel (or ROVs deployed from both simultaneously) and can be fitted with various tools, and camera systems which can be used to capture imagery of the environment and operations.

3 Environmental Impact and Risk Assessment Methodology

Environmental Impact Assessment is concerned with activities that are reasonably certain to occur (such as planned discharges to the air or water), while Environmental Risk Assessment is concerned with unplanned events that may possibly occur (such as hydrocarbon spills, introductions of marine pests, loss of waste overboard)

Environmental Impacts result from activities that are an inherent part of the well construction activities and will result in a change to the environment or a component of the environment, whether adverse or beneficial. For example, disturbance to the seabed created by pinning the JUR legs is an impact on the environment that cannot be avoided for the activity to achieve its aims.

Environmental Risks result from unplanned activities where a change to the environment or component of the environment may occur (i.e. there may be impacts if the event actually occurs). Risk is a combination of the impact or consequence of an event and the associated likelihood of the event occurring. For example, a hydrocarbon spill may occur if a support vessel's fuel tank is punctured by a collision during the activity. The risk of this event is determined by assessing the consequence or environmental impact (using factors such as the type and volume of fuel and the nature of the receiving environment) and the likelihood of this event happening (which may be determined qualitatively or quantitatively).

Impacts and risks associated with the drilling campaign were identified in accordance with ExxonMobil's Environmental Aspects Guide (2012). This ExxonMobil Guide is consistent with the approach outlined in ISO 14001 (Environmental Management Systems), ISO 31000:2009 (Risk Management) and HB203:2012 (Environmental Risk Management – Principles and Process).

3.1 Definitions

Table 3-1 Definitions

Activity	An activity refers to a component or task within a project which results in one or more environmental aspects.
Aspect	An environmental aspect is an element or characteristic of an activity, product, or service that interacts or can interact with the environment. Environmental aspects can cause environmental impacts.
Impact (HB203:2012)	Any change to the environment or a component of the environment, whether adverse or beneficial, wholly or partly resulting from an organisation's environmental aspects.
Risk (HB203:2012)	The effect of uncertainty on objectives. The level of risk can be expressed in terms of a combination of the consequences and the likelihoods of those consequences occurring.
Receptor	The term receptor refers to a feature of the natural and human surroundings that can potentially be impacted. This includes air, water, land, flora, and fauna including people.
Consequence	The consequence of an impact is the outcome of the event on affected receptors. Consequence can be positive or negative.
Likelihood	The likelihood of an impact is the chance (probability) of the impact occurring.

3.2 Identify and Characterise Environmental Aspects

All components of the petroleum activity were identified and described in Section 2 of this EP.

After describing the petroleum activity, an assessment was carried out to identify environmental receptors and potential interactions between the petroleum activity and the receiving environment. The environmental receptors identified as occurring in the area are described in the Description of Environment. The interactions, or environmental aspects, associated with this petroleum activity were identified as shown in Table 3-2.

Based upon an understanding of the environmental aspects, impacts or risks were defined and ecological and social receptors identified enabling a systematic evaluation to be undertaken.

Esso held an environmental aspects assessment on the 18th February 2019 which focussed on validating the JUR production drilling-specific impacts and risks and associated control measures.

Table 3-2 Activity – Aspect Matrix

	Environmental Aspect															
	Aspects associated with Planned Activities									Aspects associated with Unplanned Events						
Activity	Physical Interaction - Other Marine Users	Physical Presence -Seabed Disturbance	Sound Emissions	Emissions to Air	Planned Discharge - Sewage and Foodwaste	Planned Discharge - Treated Bilge and Deck Drainage	Planned Discharge - Drilling Fluids and Cuttings	Planned Discharge - Cement	Planned Discharge - Operational (Surface)	Physical Presence - Introduction of IMS	Physical Interaction - Marine Fauna	Accidental Release - Dropped Objects	Accidental Release - LOC Hazardous Substances	Accidental Release - Waste	Accidental Release - LOC Reservoir Hydrocarbons (LOWC)	Accidental release - LOC Refined Oils (Collision)
Well Design and Drilling Methodology	N/A	N/A	Yes	N/A	N/A	N/A	Yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Yes	N/A
Cuttings Discharge	N/A	N/A	N/A	N/A	N/A	N/A	Yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cementing Operations	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Well Evaluation	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Wellbore Clean up	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Completions Operations	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Well Suspension (BTW)	Yes	Yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Well Intervention (BTW Contingency)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Yes	N/A
Subsea Tree Installation (KPA)	Yes	Yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
JUR Operations	Yes	Yes	Yes	Yes	Yes	Yes	N/A	N/A	N/A	Yes	N/A	Yes	Yes	Yes	N/A	N/A
Support Vessel Operations	Yes	N/A	Yes	Yes	Yes	Yes	N/A	N/A	N/A	Yes	Yes	Yes	Yes	Yes	N/A	Yes
ROV Operations	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Yes	Yes	N/A	N/A	N/A
Helicopter Operations	N/A	N/A	Yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

3.3 Environmental Impact Assessment

Environmental impacts, or consequences, can be evaluated in terms of the degree of the effects and the sensitivity of the environment. Esso evaluates three effects dimensions (scale, duration, and intensity) and three environmental sensitivity dimensions (irreplaceability, vulnerability, and influence).

The determination of consequence severity involves evaluating each dimension as lower, moderate, or higher based on qualitative descriptions. Once each dimension is evaluated, results for effects and sensitivity are compared against interpretive criteria to define overall consequence severity (Table 3-3).

Table 3-3 Determination of environmental consequence severity

Consequence Level	Environmental Impact	Interpretative Examples of Environmental Consequence Dimension Considerations
I	Potential Widespread, Long Term, Significant Adverse Effects	Sensitivity of receptors are higher; Effects are longer term and widespread and / or of a higher intensity.
II	Potential Localised, Medium Term, Significant Adverse Effects	Sensitivity of receptors are moderate or higher; Effects are medium to long term and / or have a moderate to higher intensity.
III	Potential Short Term, Minor Adverse Effects	Sensitivity of receptors are lower to moderate; Effects are medium term and/or moderate intensity. OR Sensitivity of receptors is lower, but Effects are longer term / higher intensity. OR Effects are localised, short-term and / or low intensity, regardless of receptor sensitivity.
IV	Inconsequential or No Adverse Effects	Sensitivity of receptors are lower; Effects are generally short term, localised and of low to moderate intensity.

3.4 Environmental Risk Assessment

3.4.1 Determination of Consequence

The potential consequence or environmental impact of an unplanned event is determined as described in Section 3.3 Environmental Impact Assessment.

3.4.1.1 Oil Spill Modelling

Acknowledging the potential large scale of an oil spill, further analysis is undertaken for unplanned oil spill consequence assessment.

Spill modelling is performed using an advanced three-dimensional trajectory and fates model, SIMAP (Spill Impact Mapping Analysis Program). The SIMAP model calculates the transport, spreading, entrainment, evaporation and decay of surface hydrocarbon slicks as well as the entrained and dissolved oil components in the water column, either from surface slicks or from oil discharged subsea. The movement and weathering of the spilled oil is calculated for specific oil types.

The modelling uses:

- a five-year dataset of currents that includes the combined influence of ocean currents and tidal currents;
- high-resolution local winds from the National Centre for Environmental Prediction (NCEP) Climate Forecast System Reanalysis (CFSR) model;
- detailed hydrocarbon characteristics relevant to the risk scenario being modelled;
- hydrocarbon density, viscosity, pour point, distillation curve (volume lost versus temperature) and the aromatic/aliphatic component ratios within given boiling point ranges

The output is a three-dimensional oil spill model (SIMAP) which simulates the drift, spread, weathering and fate of the spilled oil.

As spills can occur during any set of wind and current conditions, modelling is conducted using a stochastic (random or non-deterministic) approach, which involves running 100 spill simulations for the scenario, initiated at random start times. This ensures that each simulation is subject to different wind and current conditions and, in turn, movement and weathering of the oil.

Results from the simulations then are combined and statistically analysed to assist with understanding the potential impacts of an oil spill as discussed below.

Oil spill modelling is used to determine the total area that could be exposed to hydrocarbon, including trace concentrations of oil in the water column, as a result of any spill. This is known as the Potentially Exposed Area (PEA) and is used for planning purposes to ensure that all social and environmental sensitivities are acknowledged, described and considered in the development of the Environment Plan. Thresholds, or exposure levels used to define the PEA are shown in Table 3-4.

Table 3-4 Thresholds used to define the PEA

Exposure Level	Threshold	Description
Surface – Low Exposure	1 g/m^2	Approximates range of socio-economic effects and establishes planning area for scientific monitoring (NOPSEMA 2019)
Shoreline – Low Exposure	10 g/m^2	Predicts potential for some socio-economic impact (NOPSEMA 2019)
In-water (dissolved) – Low Exposure	10 ppb (instantaneous)	Establishes planning area which may be considered for scientific monitoring based on potential for exceedance of water quality triggers (NOPSEMA 2019).
In-water (entrained) – Low Exposure	10 ppb (instantaneous)	Establishes planning area which may be considered for scientific monitoring based on potential for exceedance of water quality triggers (NOPSEMA 2019).

Modelling is also used to inform specific impact assessments by understanding the location and extent of oil at concentrations likely to result in environmental consequences. There is no agreed exposure level below which environmental impacts will not occur so outputs should not be interpreted as a boundary. However, mapping areas which could be moderately impacted by a spill is a useful tool for impact or consequence assessment.

Note that the modelling does not take into consideration any of the spill prevention, mitigation and response capabilities that might be in place during the operations. The modelling makes no allowance for intervention following a spill to reduce volumes and/or prevent hydrocarbons from reaching sensitive areas.

Fate and weathering characteristics of spilled oil are also useful inputs for impact assessment as these provide insight into which environmental sensitivities are most likely to be affected (e.g. surface oil effects on wildlife vs. water quality effects on aquatic species) as well as the persistence and duration of exposure to oil as it weathers. Prediction of the fate and weathering of spilled oil is completed using deterministic modelling, that is, one of the 100 simulations used to complete stochastic modelling is selected for further analysis. Selection is based on the 'worst case' taking into account the fate of modelled oil.

Oil spill response operations are typically confined to those areas where oil is present in sufficient quantities to enable them to be effective. Spill modelling enables maps to be generated which define these areas to enable effective response planning and capability assessment. Further details can be found in Volume 3 and the OPEP.

3.4.2 Determination of Probability

Once the most severe environmental impact or consequence of an unplanned event is assessed, the probability of those consequences being realised is assessed. This is done by assessing the probability for each failure, event, or condition necessary to produce the impact or consequence.

The probability of lower severity consequences is also evaluated to determine whether any have sufficiently higher probability to result in a higher risk.

The five categories of probability as shown in Table 3-5.

Table 3-5 Probability categories

Probability Range	Qualitative Interpretation Guidance
A	**Very Likely** • Similar event has occurred once or more at Site in the last 10 yrs. • Has happened several times at Site or many times in Company
B	**Somewhat Likely** • Has happened once before at Site or several times in Company
C	**Unlikely** • Has not happened before at Site or has happened a few times in Company

Probability Range	Qualitative Interpretation Guidance
D	**Very Unlikely** • Have been isolated occurrences in Company or has happened several times in industry
E	**Very Highly Unlikely** • Has happened once or not at all in Company • Has happened a few times or not at all in industry

3.4.3 Determining Significance or Risk

The combination of consequence severity and probability of occurrence determines the level of risk. ExxonMobil's risk framework considers existing controls when determining risk. The overall risk category is given on the basis of the likelihood of the consequence occurring after application of the control measures. The effectiveness of control measures was considered when determining the likelihood of events with control measures in place, i.e. factors such as functionality, availability, reliability, survivability, independence and compatibility of control measures, were considered.

ExxonMobil classifies risk into four risk levels or categories. The significance of each risk category is as follows:

Category 1: A higher risk that should have specific controls established in the short term and be reduced as soon as possible.

Category 2: A medium risk that should be reduced unless it is not "reasonably practicable" to do so. Reasonably practicable is:

- The level of resource expenditure is not significantly disproportionate in relation to the resulting decrease of risk.

Category 3: A medium risk that should be reduced if "lower cost" options exist to do so. Lower cost denotes follow-up work that can be completed without:

- Allocating extensive engineering, technical, and operations manpower, or;
- The need for unit shutdowns or activities which may introduce other risks or use resources that may be more appropriately used to address higher risk category items.

Category 4: A lower risk that is expected to be effectively managed in base OIMS practices

- Typically requires "No Further Action."
- Risk mitigation measures that are in place to manage the risk to Category 4 should be continued.

3.4.4 Demonstration of ALARP

The OPGGS(E)R 13(5)(c) requires that the EP detail how the control measures will be used to reduce the impacts and risks of the activity to as low as reasonably practicable (ALARP) and to an acceptable level.

ALARP means that the cost involved in reducing the risk further would be grossly disproportionate to the benefit gained. The ALARP principle arises from the fact that infinite time, effort and money could be spent attempting to reduce a risk or impact to zero.

NOPSEMA's Environment Plan Decision Making Guideline (GL1721, Rev 5, June 2018) 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.

There is no universally accepted guidance to applying the ALARP principle to environmental assessments. In alignment with NOPSEMA's ALARP Guidance Note (N-04300-GN0166, Rev 6, June 2015), Esso has 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 3-1).

Specifically, the framework considers impact severity and several guiding factors:

- Activity type
- Risk and uncertainty
- Stakeholder influence.

Good Practice is considered sufficient demonstration of ALARP in cases where the risk is relatively well understood, the potential impacts are low, activities are well practised, and there are no conflicts with company values nor significant media interest. This is referred to as a Type A Decision.

An engineering risk assessment is required to demonstrate ALARP in cases where there is greater uncertainty or complexity around the activity and/or risk, the potential impact is moderate, it may attract local media attention and some persons may object. This is referred to as a Type B Decision.

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, engineering risk assessment is required, and the precautionary approach applied for those controls that only have a marginal cost benefit.

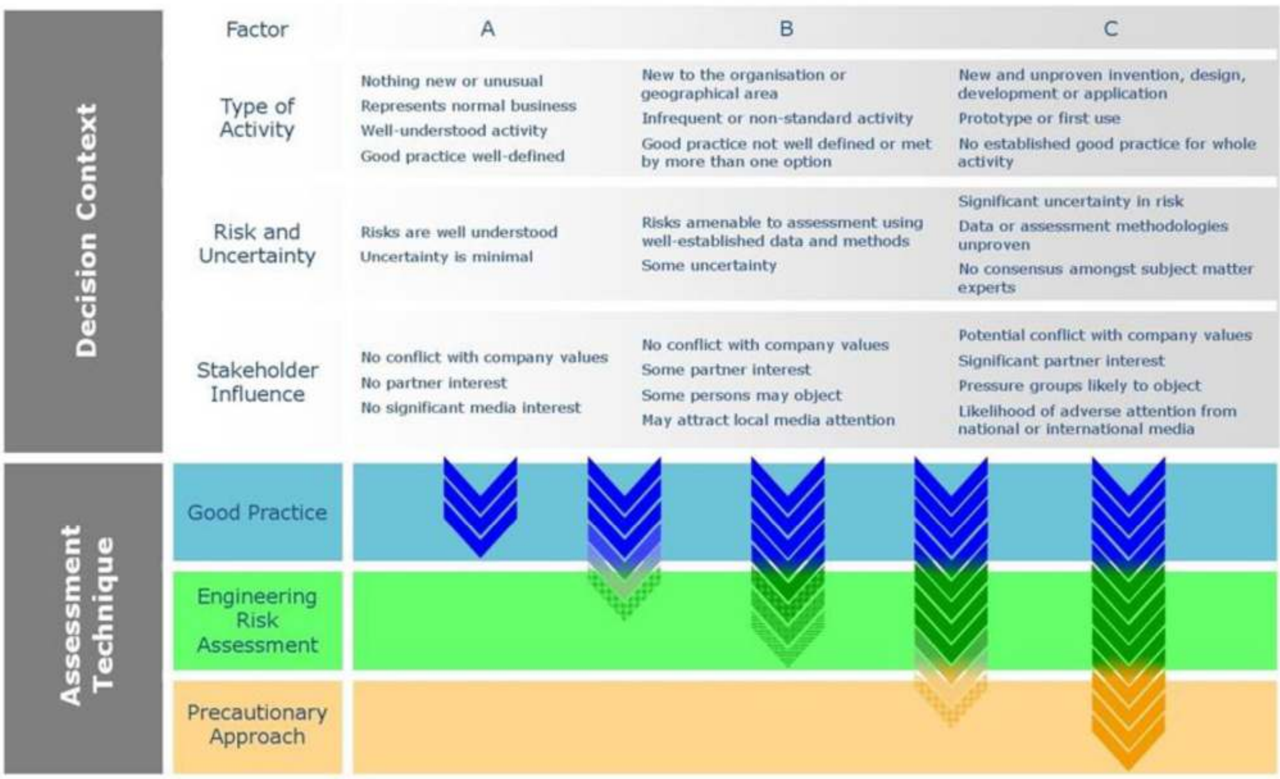

Figure 3-1 ALARP Decision Support Framework

This decision making context has been applied to each aspect in Section 4.

The assessment techniques considered include:

- Good practice
- Engineering risk assessment
- Precautionary approach.

3.4.4.1 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 hazards 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
- 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.

3.4.4.2 Engineering Risk Assessment

All impacts and risks that require further assessment are subject to an 'Engineering Risk Assessment' in which a comparative assessment of risks, costs, and environmental benefit is conducted (OGUK, 2014). The cost–benefit analysis shows the balance between the environmental benefit and the cost of implementing the identified measure.

3.4.4.3 Precautionary Approach

OGUK (2014) state that if the assessment, considering all available engineering and scientific evidence, is insufficient, inconclusive, or uncertain, then a precautionary approach to hazard management is needed.

A precautionary approach will mean that environmental considerations are expected to take precedence over economic considerations, and a control measure that may reduce environmental impact is more likely to be implemented.

3.4.5 Demonstration of Acceptable Level

Esso considers a range of factors when evaluating the acceptability of environmental impacts or risks associated with its activities. This evaluation works at several levels, as outlined in Table 3-6 and is based on NOPSEMA's Guidance Notes for Environment Plan Content Requirements (N04750-GN1344, Rev 3, April 2016) and guidance issued in Decision-making – Criterion 10A(c) Acceptable Level (N-04750-GL1637, Rev 0, Nov 2016). The acceptability evaluation for each aspect associated with this activity is undertaken in accordance with Table 3-6. These factors are used to demonstrate acceptability in Section 5.

Table 3-6 Demonstration of acceptability test

Factor	Demonstration of acceptability
Risk Assessment Process for Unplanned Event	The level of environmental risk is either Category 2, 3 or 4.

Principles of Ecologically Sustainable Development (ESD) (see below).	• No potential to affect biological diversity and ecological integrity? (i.e. Consequence Level is not I)
	• Activity does not have the potential to result in serious or irreversible environmental damage.
	    ○ Or if it does: there is no significant scientific uncertainty associated with the aspect.
	        ▪ Or if there is: the precautionary principle has been applied.

Legislative and Other Requirements	All good practice control measures have been identified for the aspect including those identified in relevant EPBC listed species recovery plans or approved conservation advices.
Internal Context	All Esso management system standards and impact or risk control processes have been identified for the aspect.

External Context	Stakeholder concerns have been considered / addressed through the consultation process.

ESD Principles are:

A. 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 assessment process. This principle is not considered separately for each acceptability evaluation.

B. 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.

An evaluation is completed to determine if the activity will result in serious or irreversible environmental damage. Where the activity has the potential to result in serious or irreversible environmental damage, further assessment is completed to determine if there is significant uncertainty in the evaluation.

C. 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.

Where the potential impacts and risk are determined to be serious or irreversible the precautionary principle is implemented to ensure the environment is maintained for the benefit of future generations.

D. The conservation of biological diversity and ecological integrity should be a fundamental consideration in decision making.

An assessment is completed to determine if there is the potential to impact biological diversity and ecological integrity

E. Improved valuation, pricing and incentive mechanisms should be promoted

Not relevant to this EP.

4 Description of Environment

The Potentially Exposed Area (PEA) is based on the maximum credible hydrocarbon spill event(s) that might occur during petroleum activities. For the activities under this EP, the PEA is based on hydrocarbon exposures above the thresholds in Table 3-4 (see Section 3.4.1) for both the accidental release of marine diesel oil (MDO) from a vessel collision (see Section 6.6) and the accidental release of condensate from a loss of well control (LOWC) (see Section 6.7).

The following tables show the presence of ecological and social receptors that may occur within the operational areas (OA) and PEA. Further descriptions of these ecological and social receptors are provided in Volume 1.

Value/Sensitivity	Receptor Type (Reference in Volume 1)	OA	PEA	Description
Protected Matter				
World Heritage	Nil			
National Heritage	Nil			
Wetlands of International Importance (Ramsar) Volume 1 (2.2.3)	Gippsland Lakes Ramsar Site (2.2.3.1)	-	Y	The Gippsland Lakes Ramsar Site, located in Victoria inland from the Esso Gippsland permit area is a series of large, shallow, coastal lagoons approximately 70 km in length and 10 km wide, separated from the sea by sand dunes • Meets six of the Ramsar criteria:1, 2, 4, 6 & 8 • Critical components include a broad range of wetland types: marine subtidal aquatic beds (C1); coastal brackish or saline lagoons (C2); freshwater (C3); brackish (C4) and saltmarsh/hypersaline wetlands (C5). • Critical wetland flora and fauna are and abundance and diversity of waterbirds (C6), presence of threatened frog species and presence of threatened wetland flora • Critical processes are the hydrological regime of freshwater and groundwater flows into the wetland system and marine inflows that affect habitat structure and condition, and waterbird breeding functions provided by the critical breeding habitats for a variety of waterbird species • Critical services /benefits: wetlands provide support for vulnerable or endangered wetland flora and fauna that contribute to biodiversity and the site supports key fisheries habitats and stocks of commercial and recreational significance
	Corner Inlet (2.2.3.2)			Corner Inlet is a wetland enclosed by barrier islands in Victoria and contains extensive intertidal mudflats. • Meets six of the Ramsar criteria : 1, 2, 4, 5, 6 and 8 • The two critical components are key wetland mega-habitat types (seagrass, intertidal sand or mud flats, mangroves, saltmarshes, permanent shallow marine water)(C1); and abundance and diversity of waterbirds (C2) • The critical process is waterbird breeding, with important sites present on the sand barrier islands

<table>
<tr><td></td><td></td><td></td><td></td><td>Critical services and benefits are that the site supports nationally threatened fauna species. The site supports outstanding fish habitat values that contribute to the health and sustainability of the bioregion.</td></tr>
<tr><td></td><td>Logan Logan (2.2.3.3)</td><td></td><td></td><td>Regionally representative example of a coastal estuarine wetland system
meets five of the Ramsar Criteria: 1, 2, 3, 4 and 6.
Critical components of the site are that it supports threatened wetland-dependent plant species and communities; and that it supports large number of birds, many with conservation significance locally, nationally, and internationally
Critical processes are surface water flow and water quality together with tidal exchange, climate (rainfall, temperature & evaporation) and the Holocene shorelines and dune systems
Critical services/benefits: Resting and breeding site for migratory birds and wetland dependant vegetation communities contribute to regional biodiversity</td></tr>
<tr><td></td><td>East Cape Barren Island (2.2.3.4)</td><td></td><td></td><td>The site is significant as it forms a representative sample of coastal, relatively undisturbed lagoons
The site meets two of the Ramsar Criteria: 1 and 3
Critical components and processes are geomorphology, hydrology and vegetation types
Critical service is the natural or near natural wetland ecosystem</td></tr>
<tr><td>Listed Threatened Species and,

Listed Migratory Species

Volume 1 (2.3.1)

and this volume Appendix B</td><td>Fauna</td><td>Y</td><td>Y</td><td><table>
<tr><td></td><td></td><td>OA</td><td>PEA</td></tr>
<tr><td>Total Threatened species</td><td></td><td>35</td><td>60</td></tr>
<tr><td>Critically endangered</td><td></td><td>2</td><td>9</td></tr>
<tr><td>Endangered</td><td></td><td>10</td><td>17</td></tr>
<tr><td>Fish – Bony</td><td>Appendix B Table 1</td><td>26</td><td>44</td></tr>
<tr><td>Fish – Cartilaginous</td><td>Appendix B Table 2</td><td>4</td><td>8</td></tr>
<tr><td>Birds</td><td>Appendix B Table 3</td><td>31</td><td>107</td></tr>
<tr><td>Mammals- Cetacean- whales</td><td>Appendix B Table 4</td><td>8</td><td>25</td></tr>
<tr><td>Mammals- Cetacean- dolphins</td><td>Appendix B Table 4</td><td>6</td><td>14</td></tr>
<tr><td>Mammals- Pinnipeds</td><td>Appendix B Table 5</td><td>2</td><td>2</td></tr>
<tr><td>Mammals- Sirenia</td><td>Appendix B Table 6</td><td>0</td><td>1</td></tr>
<tr><td>Mammals – Reptiles (turtles)</td><td>Appendix B Table 7</td><td>3</td><td>5</td></tr>
</table></td></tr>
</table>

Listed Threatened Ecological Communities Volume 1 (2.2.4)	Littoral Rainforest and Coastal Vine Thicket 2.2.4.2	-	Y	The ecological community is a complex of rainforest and coastal vine thickets influenced by its proximity to the sea; and provides habitat for over 70 threatened plants and animals and provides important stepping stones along the eastern Australian coast for various migratory and marine birds. It occurs as a series of naturally disjunct and localised stands within two kilometres of the eastern coastline of Australia or adjacent to a large saltwater body, such as an estuary on a range of landforms including dunes and flats, headlands and sea-cliffs, including offshore islands. Within the PEA these occur on the east Gippsland coast (including locations near Lakes Entrance, Marlo and Mallacoota) and communities can be found along most of the NSW coastline beginning north of Eden.
	Subtropical and Temperate Coastal Saltmarsh 2.2.4.3	-	Y	The Subtropical and Temperate Coastal Saltmarsh ecological community occurs within a narrow margin in the subtropical and temperate climatic zones; and includes coastal saltmarsh occurring on islands within these climatic zones. The physical environment for the ecological community is coastal areas under regular or intermittent tidal influence. The community consists mainly of salt-tolerant (halophytes - grasses, herbs, sedges, rushes and shrubs) and non vascular vegetation including epiphytic algae, diatoms and cyanobacterial. The ecological community is inhabited by a wide range of infaunal and epifaunal invertebrates, and temporary inhabitants such as prawns, fish and birds (and can often constitute important nursery habitat for fish and prawn species). The dominant marine residents are benthic invertebrates, including molluscs and crabs that rely on the sediments, vascular plants, and algae, as providers of food and habitat across the intertidal landscape. This community occurs sporadically on the coastline which intersects with the PEA.
	Giant Kelp Marine Forests of South East Australia 2.2.4.1	-	Y	Kelps are very large brown algae that grow on hard sub tidal substrates in cold temperate regions. Because kelps require constant water motion to provide nutrients, they are located in relatively high-energy settings. The community is characterised by a closed to semi-closed surface or subsurface canopy of *Macrocystis pyrifera*, and extends between the ocean floor and ocean surface, exhibiting a 'forest-like' structure with a diverse range of organisms occupying its benthic, pelagic and upper-canopy layers. These organisms include fish, invertebrates, and marine mammals as well as important algal communities. The high primary and secondary productivity of the giant kelp forests create and provide a number of ecosystem services to the local environment including settlement habitat for juvenile life stages of commercially important fisheries, improvements in local water quality conditions and coastal protection via buffering strong wave conditions from reaching the shore. Giant Kelp Marine Forests occur around the islands in central Bass Strait and on the far eastern Victorian Coast approximately from Wingan Inlet in the Croajingalong National Park to the NSW border.

Commonwealth Marine Areas Volume 1 (2.2.5) Australian Marine Parks Volume 1 (2.2.6)	East Gippsland Marine Park 2.2.6.1	-	Y	The East Gippsland Commonwealth Marine Reserve contains representative samples of an extensive network of canyons, continental slope and escarpment at depths from 600 m to more than 4000 m. The geomorphic features of this reserve include rocky-substrate habitat, submarine canyons, escarpments and a knoll, which juts out from the base of the continental slope. The reserve includes both warm and temperate waters, which create habitat for free-floating aquatic plants or microscopic plants (i.e. phytoplankton) communities. Complex seasonality in oceanographic patterns influences the biodiversity and local productivity. The East Australian Current brings subtropical water from the north, and around Cape Howe the current forms large eddies, with a central core of warm water. Around the outside of the eddies, cooler, nutrient-rich waters mix with the warm water creating conditions for highly productive phytoplankton growth, which supports a rich abundance of marine life. During winter, upwellings of cold water may occur and bring nutrient-rich waters to the surface, boosting productivity. Many oceanic seabirds forage in these waters, including albatrosses (e.g. Wandering, Black-browed, Yellow-nosed and Shy albatrosses), the Great- winged petrel, Wedge-tailed shearwater and Cape petrel. Humpback whales pass by during their migrations north and south along the eastern seaboard. Multiple Use Zone Major conservation values are: • Examples of ecosystems, habitats and communities associated with the Southeast Transition and associated with sea-floor features of abyssal plain/deep ocean floor, canyon, escarpment, knoll/abyssal hill and slope • Features with high biodiversity and productivity are the Bass Cascade and upwelling east of Eden • Important foraging area for the Wandering, Black-browed, Yellow-nosed and Shy albatrosses; Great-winged petrel; Wedge-tailed shearwater; and Cape petrel • Important migration area for the Humpback whale
	Beagle Marine Park 2.2.6.2	-	Y	The Beagle Commonwealth Marine Reserve lies entirely within Bass Strait and represents an area of shallow continental shelf ecosystems in depths of about 50–70 m that extends around south-eastern Australia to the east of Tasmania. The sea floor that it covers formed a land bridge between Tasmania and Victoria during the last ice age 10 000 years ago. Multiple Use Zone Major conservation values are: • Ecosystems, habitats and communities associated with the Southeast Shelf Transition and associated with sea-floor features of basin, plateau, shelf, sill.

				• Important migration and resting on migration area for the southern right whale and important foraging area for the Australian fur seal, Killer whale, Shy albatross, Australasian gannet, Short-tailed shearwater, Pacific and Silver gulls, Crested tern, Common diving petrel, Fairy prion, Black-faced cormorant and Little penguin and White shark • Maritime heritage site of the wreck of the steamship SS Cambridge and the wreck of the ketch Eliza Davies
	Flinders Marine Park 2.2.6.3	-	Y	The Flinders Commonwealth Marine Reserve is east of the north-east tip of Tasmania and Flinders Island, and extends over 400 km eastward. It covers a depth range from about 40 m on the shallow continental shelf to abyssal depths of 3000 m or more near the edge of Australia's exclusive economic zone. Multiple Use Zone / Marine National Park Zone Major conservation values are: • Ecosystems habitats and communities associated with the Tasmania Province, the Tasmanian Shelf Province, the Southeast Transition, the Southeast Shelf Transition • Associated with sea-floor features are abyssal plain/deep ocean floor, canyon, plateau, seamount/guyot and shelf slope • Features with high biodiversity and productivity are east Tasmania subtropical convergence zone • The park is an important foraging area for wandering, black-browed, yellow-nosed and shy albatrosses, northern giant petrel, Gould's petrel and cape petrel, killer whale, white shark and Harrison's dogfish • Important migration area for the humpback whale
	Freycinet Marine Park 2.2.6.4	-	Y	The Freycinet Commonwealth Marine Reserve is east of Tasmania, offshore from the Freycinet Peninsula and covers a depth range from about 40 m on the shallow continental shelf, to abyssal depths of 3000 m or more at the edge of Australia's exclusive economic zone. Multiple Use Zone / Marine National Park Zone / Recreational Use Zone Major conservation values are: • Ecosystems, habitats and communities associated with the Tasmania Province, the Tasmanian Shelf Province and the Southeast Transition • Associated with sea-floor features of abyssal plain/deep ocean floor, canyon, escarpment, knoll/abyssal hill, saddle, seamount/guyot, shelf and terrace

				• Features with high biodiversity and productivity are east Tasmania subtropical convergence zone • The park is an important foraging area for wandering, black-browed and shy albatrosses, cape petrel and fairy prion, sei whales and killer whales • It is and important migration and resting on migration area for southern right whale • It is and important migration area for humpback whale
	Central Eastern Marine Park 2.2.6.11	-	Y	Central Eastern Marine Park begins 30 kilometres east of Coffs Harbour. It covers 70,054 km², with depths from 120 m to 6000 m. Marine National Park Zone / Habitat Protection Zone / Special Purpose Zone (Trawl) Major conservation values are: • Ecosystems, habitats and communities associated with Central Eastern Province, Central Eastern Shelf Transition and Tasman Basin Province • It is an important area for foraging and breeding of seabirds and migrating humpback whales • Key ecological features of the Marine Park are the Tasmantid Seamount Chain, Canyons on the eastern continental slope and Tasman Font and eddy field • Sea country is valued for Indigenous cultural identity • Maritime heritage site for shipwrecks Amelia (1816) and Illagong (1872) • Social values are tourism, commercial fishing and recreation
	Lord Howe Marine Park 2.2.6.10	-	Y	The Lord Howe Marine Park is located approximately 550 km offshore of New South Wales, adjacent to the New South Wales Lord Howe Island Marine Park and World Heritage Area. National Park Zone / Habitat Protection Zone, Habitat Protection Zone (Lord Howe), Recreation Zone / Special Purpose Zone (Trawl) Major conservation values are: • Ecosystems, habitats and communities associated with Lord Howe Province and Tasman Basin Province • Important area for foraging and breeding of seabirds and migrating humpback whales

				• Key ecological features of the Marine Park are Lord Howe Seamount Chain, Elizabeth and Middleton Reefs and Tasman Font and Eddy Field • Cultural values are the marine environment around Lord Howe Island valued by the Islanders and sea country is valued by the Indigenous people • Lord Howe Island group (outside of PEA but within the Marine Park) is listed as a World Heritage site for its exceptional diversity of spectacular and scenic landscapes within a small area. The island groups is also listed in the National Heritage List
Commonwealth Marine Areas Key Ecological Features Volume 1 (2.2.7)	Upwelling East of Eden 2.2.7.2	Y	Y	The Upwelling east of Eden is present along the eastern Victorian and southern NSW coasts and is defined as a key ecological feature as it is an area of high productivity and aggregations of marine life. • dynamic eddies of the East Australian Current cause episodic productivity events when they interact with the continental shelf and headlands. • episodic mixing and nutrient enrichment events drive phytoplankton blooms, the basis of productive food chains including zooplankton, copepods, krill and small pelagic fish. • phytoplankton supports 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 seals, other cetaceans, sharks and seabirds.
	Big Horseshoe Canyon 2.2.7.1	-	Y	Big Horseshoe Canyon is defined as a key ecological feature as it is an area of high productivity and aggregations of marine life. • steep, rocky slopes provide hard substrate habitat for megaflora to attach • sponges and other habitat forming species provide structural refuges for benthic fishes, including the commercially important pink ling • the only known temperate location of the stalked crinoid *Metacrinus cyaneu*
	Seamounts South and East of Tasmania 2.2.7.5	-	Y	These seamounts are a chain or cluster of seamounts rising from the abyssal plain, continental rise or plateau situated 200 km or more from shore (east of Flinders Island to south east of southern Tasmania). They are an area of high productivity and aggregations of marine life. Seamounts with hard substrate summits and slopes provide attachment points for sessile invertebrates, while the soft sediments can be habitat for species that burrow into the sediments.

	Tasmantid Seamount Chain 2.2.7.5	-	Y	Tasmantid Seamount Chain are isolated, oceanic reefs formed by submerged volcanoes are thought to support a diverse range of tropical and temperate marine life, including both warm-water and cold-water corals and an abundance of fish species. This diversity is a result of the effect of the East Australian Current on the reefs as it exposes the area to its warm waters, in contrast to the surrounding cooler ocean. Note: The information on the Tasmantid Seamounts has been based on observations from some seamounts in other locations
	Lord Howe Seamount Chain 2.2.7.5	-	Y	Lord Howe Seamount Chain, on the fringe of the PEA, are isolated, oceanic reefs formed by submerged volcanoes support a diverse range of tropical and temperate marine life, including both warm-water and cold-water corals and an abundance of fish species. This diversity is a result of the effect of the East Australian Current on the reefs as it exposes the area to its warm waters, in contrast to the surrounding cooler ocean.
	Tasman Font and Eddy Field 2.2.7.10	-	Y	The Tasman Front and eddy field occurs in the Temperate East Marine Region between latitudes 19 and 33 deg south and is defined as a key ecological feature formed by complex and dynamic oceanographic processes supporting transient patches of enhanced productivity that, in turn, attract aggregations of species across trophic levels, including top predators such as tuna and sharks. It is formed by currents which cause the eddy resulting in enhanced productivity.
	Shelf Rocky Reef (Temperate East) 2.2.7.11	-	Y	The Shelf Rocky Reefs habitat occurs from offshore Narooma on the east coast of NSW and extends north to south of Wollongong. It has been identified as a key ecological feature as it is considered a unique sea-floor feature which is associated with ecological properties of regional significance • support a range of complex benthic habitats that, in turn, support diverse benthic communities such as crustaceans, molluscs, annelids and echinoderms • algal communities dominate shallower waters, shifting to attached invertebrates including dense populations of large sponges, with a mixed assemblage of moss animals and soft corals in waters greater than ~ 45 m • contribute to increased survival of juvenile fish by providing refuge from predation. • support a diverse assemblage of demersal fish, which show distinct patterns of association with shelf-reef habitats
	Canyons on the Eastern	-	Y	The Canyons on the eastern continental slope lie off the coast of NSW and are defined as a key ecological feature as they are a unique seafloor feature with enhanced ecological functioning and integrity, and biodiversity, which apply to both its benthic and pelagic habitats

	Continental Slope 2.2.7.12			• localised currents caused by the steep canyon face act to funnel nutrients and sediments into the canyon causing enhanced productivity • hard substrate provides an anchoring point and vertical relief for filter feeder benthic species (e.g. attached sponges and crinoids) thereby attracting higher trophic level species, including crustaceans, echinoderms, bivalves, cephalopods and fish
Other Protected Areas				
Social/Cultural/ Conservation	National Parks and Reserves (2.2.8)	-	Y	Victoria • Cape Howe Marine Park National (2.2.8.1) • Gabo Island Lighthouse Reserve (2.2.8.2) • Croajingolong National Park (2.2.8.5) • Point Hicks Marine Park National Park (2.2.8.6) • Beware Reef Marine Sanctuary (2.2.8.7) • Cape Conran Coastal Park (2.2.8.8) • The Lakes National Park & Gippsland Lakes Coastal Park (2.2.8.9) • Ninety Mile Beach Marine National Park (2.2.8.10) • Corner Inlet and Nooramunga Marine and Coastal Parks (2.2.8.11) • Corner Inlet Marine National Park (2.2.8.12) • Wilsons Promontory Marine Park and Wilsons Promontory National Park (2.2.8.13) • Cape Liptrap Coastal Park (2.2.8.14) Tasmania • Hogan Group National Park (2.2.8.23) • West Moncoeur Island & East Moncoeur Island (2.2.8.24) • Curtis Island Nature Reserve and Devils Tower Nature Reserve (2.2.8.25) • Kent Group National Park (2.2.8.26) • Logan Lagoon Conservation Area (2.2.8.27) • Strzelecki National Park (2.2.8.28) New South Wales • Five Islands Nature (2.2.8.60)

				• Seven Mile Beach National Park (2.2.8.61) • Jervis Bay Marine Park National Park (2.2.8.62) • Booderee National Park (2.2.8.63) • Conjola National Park (2.2.8.64) • Narrawallee Creek Nature Reserve (2.2.8.65) • South Pacific Heathland Reserve (2.2.8.66) • Meroo National Park (2.2.8.67) • Murramurrang National Park (2.2.8.68) • Batemans Marine Park (2.2.8.69) • Eurobodalla National Park (2.2.8.70) • Montague Island Nature Reserve (2.2.8.69) • Mimosa Rocks National Park (2.2.8.71) • Bournda National Park (2.2.8.72) • Ben Boyd National Park (2.2.8.73)
Cultural - Indigenous Heritage Volume 1 (2.5.1)	Indigenous Protected Areas (2.5.1)	-	Y	Five Indigenous Protected Areas occur on and around Flinders Island in central Bass Strait, they are all important rookeries for mutton birds and important cultural resource for Tasmanian Aboriginal people. They are Babel Island, Big Dog Island, Mont Chappell Island, Badger Island and Lugatalanana.
Commonwealth Heritage Listed Natural place Volume 1 (2.5.2)	Nil			
Commonwealth Heritage Listed Historic place Volume 1 (2.5.3)	Nil			
Historic Maritime Volume 1 (2.5.3)	Historic Shipwrecks (2.5.3.1)	-	Y	Historic shipwrecks are located all along the Australian coastline, 29 are located within approximately 15km of the Esso Gippsland Permit area. Two historic shipwrecks within a protected zone occur within the PEA on the south coast of

				NSW, near Eden; the Bega (1908) and the Lady Darling (1880). Within approximately 25 km from the PEA on the Victorian coast the PS Clonmel, 1841 also in a protected zone.
Environmental Values - Other				
Physical Environment	Climate and Meteorology Bass Strait (2.1.1)	Y	Y	• Bass Strait climate conditions display an average summer range of 13 to 21°C and an average winter range of 9 to 14°C. • rainfall ranges from 41 mm in January (highest 162 mm) to 78 mm in June (highest 247 mm) • Wind speeds are in the range of 10 to 30 km per hour, with maximum gusts reaching 100 km per hour • wind direction is predominately westerly during winter, westerly and easterly during spring and autumn (when wind speeds are highest) and easterly during summer • Storms with associated high wind and waves occur regularly, generally caused by low pressure systems
	Oceanography (2.1.2)	Y	Y	• Bass Strait is characterised by shallow water and tidal currents. Wind driven currents can also be caused by passing weather systems and influenced by systems passing over the Great Australian Bight. • The eastern parts of the Region are strongly influenced by the East Australian Current (EAC) that flows southward adjacent to the east coast of New South Wales, Victoria and Tasmania, carrying warm equatorial waters and forming eddies which in turn cause upwellings • At the shelf break east of Bass Strait, nutrient-rich waters rise to the surface in winter as part of the processes of the Bass Strait Water Cascade creating an area of high productivity • Further offshore currents are driven by the Sub-Antarctic Water movement, coming from the south, and the Bass Strait Water movement from the west
	Bathymetry Bass Strait 2.1.2.4	Y	Y	A steep nearshore profile (0 to 20 m water depth) extends to a less steep inner (20 to 60 m water depth) and moderate profile (60 to 120 m water depth), concluding with a flat outer shelf plain (greater than 120 m water depth) in the western part (central Bass Strait) and a steep slope into the Bass Canyon in the east.
	Benthic Habitat OA 2.3.3.1	Y	Y	The Gippsland Basin is composed of a series of massive sediment flats, interspersed with small patches of reef, bedrock and consolidated sediment. The sandy plains are only occasionally broken by low ribbons of reef; however, these reefs do not support the large brown seaweeds characteristic of many Victorian reefs, but instead are inhabited by resilient red seaweeds and encrusting animals that can survive the sandy environment. Benthic fauna present on the soft sediment can be broadly divided into two groupings:

				• epibenthos which includes sessile species such as sponges and bryozoans, hydroids, ascidians, poriferans and mobile fauna including hermit crabs, sea stars and octopus • infauna which includes a diverse range of species such as amphipods, shrimps, bivalves, tubeworms, small crustaceans, nematodes, nemerteans, seapens, polychaetes and molluscs
Economic Environment Volume 1 (2.4)	Commercial Fishing (2.4.1)	 Y - Y Y - Y - - - - - - Y - - - - - - - - - -	 Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y - Y Y Y Y Y	Commonwealth Fisheries • Bass Strait Central Zone Scallop; • Eastern Tuna and Billfish Fishery; • Small Pelagic Fishery; • Southern and Eastern Scalefish and Shark Fishery; • Southern Bluefin Tuna Fishery; and • Southern Squid Jig Fishery State Fisheries -Victoria • Abalone Fishery • Eel Fishery • Giant Crab Fishery • Pipi Fishery • Rock Lobster Fishery • Scallop Fishery • Wrasse Fishery • Sea Urchin Fishery • Commercial Bay and Inlet Fisheries State Fisheries –NSW • Abalone Fishery • Estuary General Fishery • Estuary Prawn Trawl Fishery • Lobster Fishery • Ocean Hauling Fishery • Ocean Trap and Line Fishery • Ocean Trawl Fishery • Sea Urchin and Turban Shell Restricted Fishery

	Oil and Gas (2.4.2)	-	Y	Other than the Esso permit areas in the Gippsland Basin there are nine other permit areas held by other operators: • Cooper Energy (VIC/L21, VIC/L32, VIC/RL13, VIC/L14, VIC/L15, VIC/P72) • SGH Energy (VIC/L29) • Carnarvon Hibiscus (VIC/L31, VIC/P57) • Emperor Energy/Shell Energy (VIC/P47) • Lanberis Energy (VIC/P71)
	Shipping (2.4.3)	Y	Y	The south-east and east coast of Australia have high shipping activity. This traffic includes international and coastal cargo trade, and passenger and ferry services. A shipping exclusion zone ('area to be avoided') exists around the operating oil and gas platforms in the Gippsland Basin, whereby unauthorised vessels larger than 200 gross tonnes are excluded from entry.
	Defence (2.4.4)	-	Y	Australian defence force base operates at Twofold Bay, Eden NSW. Primary training location is the East Australia Exercise Area off the south coast of New South Wales
	Tourism (2.4.5)	-	Y	In East Gippsland, primary tourist locations are the Gippsland Lakes (the largest inland waterway in Australia), Lakes Entrance, Marlo, Cape Conran and Mallacoota. The area is renowned for its nature-based tourism (e.g. Croajingalong National Park), recreational fishing and water sports (lake and beaches). The South Coast Region includes all the towns from Wollongong south to the Victorian border.
Cultural Volume 1 (2.5)	Native Title (2.5)	-	Y	Gunai-Kurnai Native Title Determination Area – this area includes most coastal regions between Marlo Victoria, through to Corner Inlet.
Social Environment Volume 1 (2.6)	Recreational fishing, boating and leisure (2.6)	-	Y	Popular coastal destinations for recreational activities occur throughout the PEA including well known places like Gippsland Lakes, Mallacoota and Marimbula in NSW. Over 90% of recreational fishing typically occurs in nearshore coastal waters (shore or inshore vessels), and within bays and estuaries.

5 Environmental Impact Assessment

Environmental impacts are a fundamental part of undertaking specific activities due to the unavoidable nature of the operations.

A discussion of the environmental impacts associated with the activity to be carried out under this EP, the predicted consequences and the control measures that will be implemented to reduce impacts to As Low As Reasonably Practicable, are presented in this section. Alternative controls identified and considered to ensure impacts are As Low As Reasonably Practicable and comply with the acceptability criteria are also covered. Environmental performance outcomes, controls, standards and measurement criteria are provided for each aspect of the planned activities.

5.1 Physical Presence – Seabed Disturbance

5.1.1 Sources of seabed disturbance

The JUR will be towed onto location by up to three support vessels. There are several methods used to position the JUR on location: 'soft pinning' followed by moving into final location or the use of the rig's mooring systems to move onto location.

In soft pinning the legs are extended to be in contact with the seabed with no jacking load on the legs approximately 100 m from final position. The tow vessels are configured to facilitate the final positioning and adjustments are made by raising and lowering the legs as required to slowly shift the rig into final position. During this time the spud can 'pins' may drag intermittently along the seabed creating shallow furrows. Once the JUR is in the desired location and stationary the legs are lowered to be in complete contact with the seabed.

The use of the anchoring method allows a more controlled operation, especially around subsea infrastructure, and may be employed at KPA. The JUR has four 7.5 MT delta flipper type anchors (flipper width = 3.7m; flipper length = 2.9 m) and four anchor winches (two forward port/starboard and two aft port/starboard). All four mooring lines will be used for positioning and one or two lines for temporary mooring. In general, the procedure for running the anchors if being used to positioning the JUR is as follows:

- Upon arrival, the legs are pinned to the bottom at a stand-by location. The lead tug stays connected to the JUR on the forward until all four anchors are deployed, tensioned and the JUR is soft pinned in its final location.
- An anchor handling vessel is then used to position the four anchors in a pre-designed pattern.
- Each anchor is pulled by the JUR's anchor winch to verify it is fixed to the sea bottom before the tug deploys the next anchor.
- Once all the anchors are in place and holding tension the JUR lifts its legs from the standby location and is positioned using the anchor winches.
- When in final position, the legs are lowered and pinned to the sea floor.
- Once the JUR is pinned, the anchors are removed by the anchor handling vessel.

The anchor locations will be approximately 300 m offset from the rig. The anchor disturbance zone will be localised (10 m diameter circle) as the loads imparted during positioning are not high. The anchors, if utilised, will be deployed over a 24 hour period whilst positioning the JUR.

Each of JUR's three triangular open truss-type legs is fitted with a spud can-type footing. The total area of disturbance is less than 0.1 ha with the spud cans penetrating the seabed.

At the completion of drilling either a temporary wellhead cap (BTW W1 and W2) or subsea tree (KPA-A1 and KPA-A3) will be installed. The footprint of each well is about 25 m^2, noting that the two KPA trees will be installed on existing flowbases.

Seabed disturbance resulting from the discharge of cement and drilling cuttings is addressed in Sections 5.7 and 5.9, respectively.

5.1.2 Impacts of seabed disturbance

Impacts of seabed disturbance on receptors, including benthic habitats and assemblages and demersal fish, considered are:

- Change in habitat; and
- Change in water quality (increased turbidity in the water column near the seabed)

5.1.3 Impact assessment

Receptors affected by seabed disturbance and that have been identified in the Description of Environment as occurring in the area are identified below.

Impacts	Receptors	
	Benthic Habitat – Bare Substrate	Fish
Change in habitat	✓	
Change in water quality		✓

5.1.3.1 Change in habitat

The benthic habitat within the operational areas is characterised by an homogenous soft sediment and shelly seabed, infauna communities and sparse epibiotic communities. There are no known sensitive seabed features (such as reefs, sponge gardens, seagrass meadows or scallop beds), so positioning of the JUR will not result in a loss of sensitive or geographically restricted habitats.

Any impact will be limited to the immediate vicinity of the JUR spud cans or well locations and thus the extent of potential impact is considered to be localised. The disturbance may result in the mortality of flora and sessile fauna within this footprint and potentially the mortality of benthic infauna associated with the habitat. However the area that will be disturbed is very small compared with the overall extent of this habitat in the region and consequently, there will be no long-term impact on the diversity and abundance of benthic fauna.

Seabed disturbance from installation of subsea infrastructure will produce a slight alteration of the local habitat and community structure due to the introduction of hard substrate in an area of otherwise uniform soft sediments. The area of hard surface will be available for colonisation.

Following removal of the JUR, the soft sediment will be left indented, until seafloor currents fill them, but will remain a viable habitat that would be expected to recolonise with benthic species within weeks to months following removal of the disturbance (Currie and Isaacs, 2005). Therefore the potential impact has been determined as **Consequence Level IV** (Inconsequential or No Adverse Effect).

5.1.3.2 Change in water quality

Turbidity may occur when seabed sediments are stirred up during jack-up and jack-down of the JUR legs. Any turbidity created is likely to be within the limits of natural variability when considering the turbidity created by currents in the open-water environment of the operational areas and is not addressed further.

5.1.4 Controls

Environmental Performance Outcome	Control	Environmental Performance Standard	Measurement Criteria
Avoid physical damage to sensitive habitats (i.e. benthic features such as reefs).	Site specific geotechnical assessment	Results of the site specific geotechnical assessment are used to inform the JUR location and confirm the proposed location is free from seabed obstacles, including benthic features.	Location Approval Certificate, confirming location is free of seabed obstacles including benthic features, obtained prior to JUR moving into the operational area.
		JUR spud can placement as per Location Approval Certificate	JUR positioning report indicates JUR spud can placement as per Location Approval Certificate

5.1.1 Demonstration of ALARP

ALARP Decision Context and Justification	**Decision Context A** Seabed disturbance from offshore activities is a common occurrence both nationally and internationally. Managing the impacts from pinning of JUR spud cans is well understood with good practice controls that are understood and well implemented by the industry. The area of disturbance is known, and the consequence level identified as **IV** (the lowest level). During stakeholder consultation, no objections or claims regarding seabed disturbance were made. Esso believes **ALARP Decision Context A** should apply.		
Good Practice	Adopted	Control	Rationale

Mobile drilling rig site survey	✓	Site specific geotechnical assessment	The International Association of Drilling Contractors (IADC) Health, Safety and Environmental Case Guidelines for Mobile Offshore Drilling Units (2015) states that location-specific seabed assessments should be undertaken to assure suitability of equipment for the operating environment and guide the placement of the rig. Esso will undertake a seabed survey to detail any obstructions in the area, including seabed conditions and anomalies. Noble will utilise this information to obtain Location Approval (from the Underwriter's Marine Warranty Surveyor), this also has the effect of identifying benthic features (such as reefs) to be avoided thereby minimising damage to sensitive habitats.
Engineering Risk Assessment			
Additional, Alternative, Improved Controls	Benefit	Cost / Feasibility	Adopted

5.1.2 Demonstration of Acceptability

Factor	Demonstration Criteria	Criteria Met	Rationale
Principles of Ecologically Sustainable Development (ESD)	No potential to affect biological diversity and ecological integrity (i.e. Consequence Level is not I)	✓	The potential impact associated with this aspect is limited to a localised short-term impact, which is not considered as having the potential to affect biological diversity and ecological integrity.
	Activity does not have the potential to result in serious or irreversible environmental damage.	✓	The activities were evaluated as having the potential to result in a Level IV consequence thus are not considered as having the potential to result in serious or irreversible environmental damage.
Legislative and Other Requirements	Legislative and other requirements have been identified and met.	✓	The proposed activities align with the requirements of the: • OPGGS Act 2006:

			○ Section 280(2) – no interference with….the conservation of the resources of the sea and seabed…..to a greater extent than is necessary for the exercise of the rights conferred by titles granted. ○ Schedule 3 Occupational health and safety and OPGGS (Safety) Regulations 2009 (OPGGS(S)R). The OPGGS(S)R require the operator of each offshore facility to prepare a safety case for submission to NOPSEMA. Activities at a facility, including positioning, anchoring and jacking operations, must be conducted in accordance with a safety case that has been accepted by NOPSEMA.
Internal Context	Consistent with Esso's Environment Policy.	✓	Proposed activities are consistent with Esso's Environment Policy, in particular, to "comply with all applicable environmental laws and regulations and apply responsible standards where laws and regulations do not exist".
	Meets ExxonMobil Environmental Standards	✓	Although there is no specific standard related to offshore (i.e. seabed) land use the activities proposed meet the requirements of the Upstream Standard on Land Use specifically to "avoid use of land within environmentally or socio-economically sensitive areas" and "site selection process considers impacts on the ecological and social environment".
	Meets ExxonMobil Operations Integrity Management System (OIMS) Objectives	✓	Proposed activities meet: OIMS System 6-5 objective to identify and assess environmental aspects; significant aspects are addressed

			and controlled consistent with policy and regulatory requirements; and OIMS System 8-1 objective to qualify, evaluate and select contractors based on their ability to perform work in a safe, secure and environmentally sound manner.
External Context	Stakeholder concerns have been considered / addressed through the consultation process.	✓	No specific stakeholder concerns have been raised concerning seabed disturbance.

5.2 Physical Interaction – Other Marine Users

5.2.1 Sources of interaction with other marine users

The movement of vessels within the operational area, and the physical presence of the JUR and support vessels has the potential to result in interactions with other marine users such as commercial fishing and shipping. Drilling locations are within PSZs and either within (BTW), or just outside (KPA Subsea Facility), the Bass Strait Area to be Avoided (ATBA) and therefore commercial vessels are unlikely to be encountered within the operational areas.

At the completion of drilling either a temporary wellhead cap (BTW W1 and W2) or horizontal subsea tree (KPA-A1 and KPA-A3) will be installed on the seabed.

Note that this section deals with displacement or interference in a socio-economic sense; collision risk (and potential diesel spill impacts) is addressed in Section 6.6.

5.2.2 Impacts of interaction with other marine users

Impacts of interaction with other marine users considered are:

- Changes to the function, interests or activities of other users through disruption to commercial activities.

Disruption to commercial activities includes:

- Diversion from navigation path (displacement of third party vessels);
- Loss of access to PSZ (exclusion from fishing grounds and subsequent loss of catch); and
- Obstacle to trawling (presence of infrastructure).

5.2.3 Impact Assessment

Other marine users that have been identified in the Description of Environment as occurring in the area are identified below.

Impacts	Receptors		
	Fisheries – Commercial (Commonwealth)	Fisheries – Commercial (State)	Industry - Shipping
Change to the function, interests or activities of other users	✓	✓	✓

5.2.3.1 Change to the function, interests or activities of other users - shipping

Displacement of third party vessels by the JUR is unlikely to occur because:

- The JUR is stationary and highly visible (due to its height above the water line and lighting), meaning vessels have sufficient time to detect the JUR (visually and by radar) and instigate an early detour around the PSZ;
- The operational areas are contained within, or just outside of, the Bass Strait Area to be Avoided; and
- The operational areas are distant from the Bass Strait Traffic Separation Scheme.

If diversion of shipping around the operational areas was to occur, it would result in a negligible increase in travel time and fuel cost at most, but in the context of an entire journey, this is not considered significant.

5.2.3.2 Change to the function, interests or activities of other users - fisheries

Fisheries which may have an active presence in the operational area include the Victorian Wrasse (Ocean) Fishery, the Commonwealth Trawl Sector, Shark Gillnet Sector and Southern Squid Jig fisheries. Fishing intensity plots for the other Commonwealth fisheries indicate low or no active presence in the area. Fishing intensity for State fisheries could not be obtained.

Based on annual fishing records and the size of the fishing grounds, the proposed activities and use of PSZs are not expected to result in a significant impact to commercial fishing operations (via loss of catches, loss of fishing grounds or damage to fishing equipment).

All subsea trees and associated infrastructure installed at the completion of drilling will be located within permanent PSZs from which commercial fishing vessels are excluded.

Based on the above assessment, any impacts would be **Consequence Level IV** (Inconsequential or No Adverse Effect), with little to no potential adverse effect on other marine users.

5.2.4 Controls

Environmental Performance Outcome	Control	Environmental Performance Standard	Measurement Criteria
Marine users are informed prior to commencement of the drilling campaign such that they are	Petroleum Safety Zone (PSZ)	PSZs established in accordance with OPGGS Act.	Government Gazette contains notice of establishment of PSZs.

able to plan their activities and avoid unexpected interference.	Pre-start notifications	AMSA JRCC notified before operations commence to enable AMSA to distribute an AUSCOAST warning.	Records confirm that information to distribute an AUSCOAST warning was provided to the JRCC before operations commenced. Issued AUSCOAST warning dated prior to, or on the date operations commenced.
		AHS notified before operations commence to allow generation of navigation warnings (including Notice to Mariners).	Issued Notice to Mariners dated prior to, or on the date operations commenced.
		Relevant stakeholders are notified of activities approximately four weeks and again one week prior to commencement.	Stakeholder consultation records confirm that information was distributed to relevant stakeholders in required timeframes.

5.2.5 Demonstration of ALARP

ALARP Decision Context and Justification	Decision Context A Offshore petroleum operations are widely undertaken both locally, nationally and internationally. The impacts associated with marine user interactions are well managed via legislative control measures. These controls are understood and well implemented by the industry. No concerns were raised during stakeholder consultation and the socio-economic consequence was identified as Level IV (the lowest level). Esso believes **ALARP Decision Context A** should apply.		
Good Practice	Adopted	Control	Rationale
Petroleum Safety Zones	✓	Petroleum Safety Zones	NOPSEMA is responsible for administration of petroleum safety zones as provided for in the OPGGS Act 2006. Petroleum safety zones are specified areas surrounding petroleum wells, structures or equipment which vessels or classes of vessel are prohibited from entering or being present in.

Pre-start Notifications	✓	Pre-start Notifications	Under the Navigation Act 2012, the Australasian Hydrographic Society is responsible for maintaining and disseminating hydrographic and other nautical information and nautical publications including: • Notices to Mariners • AUSCOAST warnings. Details of the PSZ will be published in Notices to Mariners, thus enabling other marine users to plan their activities, and minimising disruption to exclusion zones. Relevant details will be provided to the Joint Rescue Coordination Centre to enable AUSCOAST warnings to be disseminated. Pre-start notices will be provided to all relevant stakeholders approximately 4 weeks and then 1 week prior to activities commencing.

Engineering Risk Assessment			
Additional, Alternative, Improved Controls	Benefit	Cost / Feasibility	Adopted

5.2.6 Demonstration of Acceptability

Factor	Demonstration Criteria	Criteria Met	Rationale
Principles of Ecologically Sustainable Development (ESD)	No potential to affect biological diversity and ecological integrity (i.e. Consequence Level is not I)	✓	The potential impact associated with this aspect is disruption to commercial activities, which is not considered as having the potential to affect biological diversity and ecological integrity.
	Activity does not have the potential to result in	✓	The activities were evaluated as having the potential to result in a Level IV consequence thus are not considered as having the potential to

	serious or irreversible environmental damage.		result in serious or irreversible environmental damage.

Legislative and Other Requirements	Legislative and other requirements have been identified and met.	✓	Legislation and other requirements considered as relevant include:
			
			• OPGGS Act 2006 –
			  ○ Section 280 requires that a person carrying on activities in an offshore area under the permit, lease, licence, authority or consent must carry on those activities in a manner that does not interfere with navigation or fishing (among others) to a greater extent necessary than for the exercise of the rights conferred by titles granted.
			  ○ Section 619 prohibits unauthorised vessels from entering PSZ.
			
			The exclusion of fishing within the PSZ is considered an acceptable impact as for safety reasons, in particular to avoid interaction between the subsea facilities and other marine users, a PSZ is required for Esso to exercise the rights conferred by the production title.
			
			Navigation Act 2012 – Chapter 6 (Safety of Navigation) Part 6 deals with safe navigation including provisions about reporting of movement of vessels.

Internal Context	Consistent with Esso's Environment Policy.	✓	Proposed activities are consistent with Esso's Environment Policy, in particular, to "comply with all applicable environmental laws and regulations and apply responsible standards where laws and regulations do not exist"
	Meets ExxonMobil Environmental Standards	✓	The proposed activity meets the requirements of the Upstream Standard on Socioeconomic Management specifically in relation to managing community relations.

	Meets ExxonMobil Operations Integrity Management System (OIMS) Objectives	✓	Proposed activities meet: OIMS System 6-5 objective to identify and assess environmental aspects; significant aspects are addressed and controlled consistent with policy and regulatory requirements; and OIMS System 10-1 objective to maintain public awareness and confidence in the integrity of operations and facilities.
External Context	Stakeholder concerns have been considered / addressed through the consultation process.	✓	No specific stakeholder concerns have been raised concerning interference with commercial activities.

5.3 Planned Discharge – Sewage and Food Waste

5.3.1 Sources of sewage and food waste discharges

Vessels and facilities used in the oil and gas industry vary in size but often include accommodation facilities for crew and passengers. The crew and passengers will generate wastes, including food wastes (or putrescibles), and the use of ablution, laundry and galley facilities will result in the generation of sewage and grey water which are routinely discharged to the marine environment.

The average volume of putrescible waste from each vessel depends on the number of Persons on Board (POB) and is estimated at 1-2 kg/person/day (NERA, 2017). Total volumes of sewage and grey water (from the use of ablution, laundry and galley facilities) typically generated at offshore facilities ranges between 0.04 and 0.45 m^3 per person per day (NERA, 2017). Assuming 120 people working on the JUR each day and 15 people on each of the two support vessels (a total of 150 people), this equates to up to 67.5 m^3 of sewage and grey water discharged daily.

5.3.2 Impacts of sewage and food waste discharges

Impacts of the discharge of sewage or food waste considered are:

- Change in water quality (temporary and localised increase in nutrients and biological oxygen demand (BOD)); and
- Change in fauna behaviour (changing predator / prey dynamics from increased scavenging behaviours)

5.3.3 Impact Assessment

Receptors affected by discharge of sewage and food waste and that have been identified in the Description of Environment as occurring in the area are identified below.

Impacts	Receptors				
	Plankton	Fish	Marine Reptiles - Turtles	Birds	Marine Mammals
Change in water quality	✓	✓	✓	✓	✓
Change in fauna behaviour		✓	✓	✓	✓

5.3.3.1 Change in water quality

The Pygmy blue whale and a number of protected seabirds such as shearwaters, albatrosses and petrels have foraging habitat overlapping the operational areas.

Sewage will be treated through sewage treatment plants (STPs) to a tertiary level, so there are no potential impacts relating to the release of particulate matter, chemicals and pathogens in untreated sewage.

Nutrients in sewage, such as phosphorus and nitrogen, may contribute to eutrophication of receiving waters (although usually only calm, inland waters) causing algal blooms, which can degrade aquatic habitats by depleting oxygen levels, reducing light levels and producing certain toxins, some of which are harmful to marine life and humans. Given the tidal movements and currents in deep open waters, eutrophication of receiving waters will not occur.

Discharges will disperse and dilute rapidly, with concentrations of wastes significantly dropping with distance from the discharge point. The effects of sewage and sullage discharges on the water quality at Scott Reef were monitored for a drill rig operating near the edge of the deep-water lagoon area at South Reef. Monitoring at stations 50 m, 100 m and 200 m downstream of the rig and at five different water depths confirmed that the discharges were rapidly diluted in the upper 10 m water layer and no elevations in water quality monitoring parameters (e.g., total nitrogen, total phosphorous and selected metals) were recorded above background levels at any station (Woodside, 2011).

The receptors with the greatest potential to be impacted are those in the immediate vicinity of the discharge. Given that sewage discharges from vessels and facilities are at or near the surface, and are buoyant discharges, the receptors with the potential to be impacted are also those within or on surface waters; for example, plankton, fish and other marine fauna.

Plankton forms the basis of all marine ecosystems, and plankton communities have a naturally patchy distribution in both space and time (ITOPF, 2011). They are known to have naturally high mortality rates (primarily through predation), however in favourable conditions (e.g. supply of nutrients), plankton populations can rapidly increase. Once the favourable conditions cease, plankton populations will collapse and/or return to previous conditions. Plankton populations have evolved to respond to these environmental perturbations by copious production within short generation times (ITOPF, 2011). However, any potential change in phytoplankton or zooplankton abundance and composition is expected to be localised, typically returning to background conditions within tens to a few hundred metres of the discharge location (e.g. Abdellatif, 1993; Axelrad *et al.*, 1981; Parnell, 2003).

Effects on environmental receptors along the food chain, namely, fish, reptiles, birds and cetaceans are therefore not expected beyond the immediate vicinity of the discharge in deep open waters.

5.3.3.2 Change in fauna behaviour

The overboard discharge of macerated food wastes has the result of creating a localised and temporary food source for scavenging marine fauna or seabirds, whose numbers may temporarily increase as a result. This in turn can provide an increase in food source for predatory species. The rapid consumption of this food waste by scavenging fauna, and physical and microbial breakdown, ensures that the impacts of putrescible waste discharges are insignificant and temporary.

Consequently, the potential impacts from the discharge of sewage and food waste are considered to be **Consequence Level IV** (Inconsequential or No Adverse Effects) as these activities may result in localised, short term impacts to a species of conservation value (seabirds; Pygmy blue whale) through impacting their foraging habitat.

5.3.4 Controls

Environmental Performance Outcome	Control	Environmental Performance Standard	Measurement Criteria
Sewage discharges comply with MARPOL Annex IV requirements.	Class certification	Vessel compliant with MARPOL Annex IV as appropriate to vessel class	Vessels have class certification verified and issued by International Association of Classification Societies (IACS) member.
Food waste discharges comply with MARPOL Annex V requirements.	Class certification	Vessel compliant with MARPOL Annex V as appropriate to vessel class.	Vessels have class certification verified and issued by IACS member.

5.3.5 Demonstration of ALARP

ALARP Decision Context and Justification	**Decision Context A** Discharge of sewage, greywater and food waste offshore (from vessels and other facilities) is a commonly practised activity. The potential impacts are well regulated via various treaties and legislation, both nationally and internationally, which specify industry best practice control measures. These are well understood and implemented by the industry. Monitoring programs have been undertaken previously and the consequence identified as Level IV (the lowest level). No stakeholder objections or were claims raised with regards to the discharge of sewage and food waste. Esso believes **ALARP Decision Context A** should apply.

Good Practice	Adopted	Control	Rationale

MARPOL Annex IV Regulations for the Prevention of Pollution by Sewage from Ships MARPOL Annex V Regulations for the Prevention of Pollution by Garbage from Ships	✓	Class Certification	The vast majority of commercial ships are built to and surveyed for compliance with the standards (i.e. Rules) laid down by classification societies. The role of vessel classification and classification societies has been recognised by the International Maritime Organisation (IMO) across many critical areas including the International Convention for the Safety of Life at Sea, (SOLAS), the 1988 Protocol to the International Convention on Load Lines and the International Convention for the Prevention of Pollution from Ships (MARPOL). A vessel built in accordance with the applicable Rules of an IACS Member society may be assigned a class designation relevant to the IMO rules, on satisfactory completion of the relevant classification society surveys. For ships in service, the society carries out routine scheduled surveys to verify that the ship remains in compliance with those Rules. Should any defects that may affect class become apparent, or damages be sustained between the relevant surveys, the owner is required to inform the society concerned without delay. MARPOL Annex IV Regulations for the Prevention of Pollution by Sewage from Ships specifically requires vessels (as appropriate to class) to hold an International Sewage Pollution Prevention certificate. Sewage treated in a MARPOL-compliant STP may be discharged no less than 3 NM from shore, and untreated sewage no less than 12 NM. MARPOL Annex V Regulations for the Prevention of Pollution by Garbage from Ships specifically requires that food waste is macerated or ground to particle size < 25 mm. Macerated food waste may be discharged no less than 3 NM from shore and unmacerated food waste no less than 12 NM (and not within the PSZ of fixed platforms).
Engineering Risk Assessment			

Additional, Alternative, Improved Controls	Benefit	Cost / Feasibility	Adopted

5.3.6 Demonstration of Acceptability

Factor	Demonstration Criteria	Criteria Met	Rationale
Principles of Ecologically Sustainable Development (ESD)	No potential to affect biological diversity and ecological integrity (i.e. Consequence Level is not I)	✓	The potential impact associated with this aspect is limited to a localised short-term impact, which is not considered as having the potential to affect biological diversity and ecological integrity.
	Activity does not have the potential to result in serious or irreversible environmental damage.	✓	The activities were evaluated as having the potential to result in a Level IV consequence thus are not considered as having the potential to result in serious or irreversible environmental damage.
Legislative and Other Requirements	Legislative and other requirements have been identified and met.	✓	The requirements of MARPOL Annexes IV and V have been adopted. The following legislative and other requirements are considered relevant as they apply to the implementation of MARPOL in Australia: • Protection of the Sea (Prevention of Pollution from Ships) Act 1983. • Navigation Act 2012 – Chapter 4 (Prevention of Pollution). • Marine Order 96 (Marine pollution prevention – sewage) 2013 • Marine Order 95 (Marine pollution prevention - garbage) 2013.

Internal Context	Consistent with Esso's Environment Policy.	✓	Proposed activities are consistent with Esso's Environment Policy, in particular, to "comply with all applicable environmental laws and regulations and apply responsible standards where laws and regulations do not exist"
	Meets ExxonMobil Environmental Standards	✓	The proposed activity meets the requirements of the Upstream Water Management and Upstream Water Management Standards specifically "to comply with regulatory requirements and legally binding arrangements related to waste management" and "meet specified discharge criteria" including MARPOL requirements.
	Meets ExxonMobil Operations Integrity Management System (OIMS) Objectives	✓	Proposed activities meet: OIMS System 6-5 objective to identify and assess environmental aspects; significant aspects are addressed and controlled consistent with policy and regulatory requirements; and OIMS System 8-1 objective to qualify, evaluate and select contractors based on their ability to perform work in a safe, secure and environmentally sound manner.
External Context	Stakeholder concerns have been considered / addressed through the consultation process.	✓	No specific stakeholder concerns have been raised concerning sewage and food waste discharges.

5.4 Sound Emissions

5.4.1 Sources of sound emissions

Sound emissions will be generated from:

- Drilling operations (mechanical operation of the drill string and other machinery)
- Support operations (support vessel and helicopter operations)

Given the multiple metrics commonly used to express sound levels and assess potential impacts to marine fauna, it is important to ensure any comparisons between specific sound level values are made using the same measures, for example peak SPL compared with peak SPL, or RMS SPL with RMS SPL, rather than peak SPL compared to SEL. Also care must be taken when comparing dB sound levels in air with sound levels underwater.

The information in the box below describes how underwater sound is measured and referenced.

The decibel (dB) scale is a logarithmic scale that expresses the ratio of two values of a physical quantity. It is used to measure the amplitude or 'loudness' of a sound. As the dB scale is a ratio, it is denoted relative to some reference level, which must be included with dB values if they are to be meaningful. The reference pressure level in underwater acoustics is 1 micropascal (μPa). Whereas the reference pressure level used in air is 20 μPa, which was selected to match human hearing sensitivity.

As a result of these differences in reference standards, sound levels in air are not equal to underwater levels. To compare sound levels in water to sound levels in air, it is necessary to subtract 62 dB from the sound level in water to account for the difference in reference levels and absorption characteristics of the two mediums.

Underwater sound is typically measured in terms of instantaneous pressure (sound pressure level – SPL), in dB re 1μPa (Richardson *et al*., 1995). SPL for an impulsive sound is typically expressed in terms of peak or peak-to-peak SPL. SPL can also be expressed as an 'RMS' (root mean squared) measure, which is an average pressure over a duration of time. This measure is commonly associated with continuous sounds, however it is also used to characterize pulse sounds where the time duration is related to pulse duration or a percentage of energy of the pulse signal.

Source level is a measure of sound at a nominal distance of 1m from the source and is denoted in dB re 1μPa@ 1 m.

RMS SPL has historically been used to assess potential impacts to marine life. However SEL and peak SPL are increasingly used for assessing impacts to marine life. SEL accounts for the duration of a sound exposure and enables comparison between sound from different sound signals (& therefore sound sources) with different characteristic.

SEL is a metric used to describe the amount of acoustic energy that may be received by a receptor (such as a marine animal) from an event. SEL is the dB level of the time-integrated, squared sound pressure normalized to a 1 second period, and is expressed as dB re: 1 μPa2-s.

5.4.1.1 Drilling

Fixed platforms such as the JUR have lower radiated sound levels than floating platforms (NCE, 2007). Equipment operating onboard these facilities can contribute to marine environment sound however, airborne and structure-borne (vibration) pathways are considered more significant on floating platforms where equipment can be located below the water line (NCE, 2007). Underwater noise produced from platforms standing on metal jack-up legs is relatively low given the small surface areas available for sound transmission and also given the location of machinery above the waterline. It is therefore expected that the dominant pathway for sound generation is structure-borne (i.e., vibration from machinery passing through the legs) (NCE, 2007).

Gales (1982), cited in NCE (2007), reports that underwater sound measured from fixed drilling platforms did not exhibit markedly different characteristics from those engaged in production, and that none of the measured sound could be directly related to the mechanical action of the drill bits. It is therefore believed that most sound associated with drilling is created by the operation of the JUR itself. In the same study

(Gales, 1982; cited in Richardson *et al*., 1995) it was identified that platform noise was so weak that it was nearly undetectable even when alongside the platform during sea states ≥ 3. At the near-field measurement locations (ranges 9–61 m), the received sound levels were 119-127 dB re 1µPa (Richardson *et al*., 1995).

Studies performed on the Spartan 151 jack-up rig in Alaska's Cook Inlet (water depths 18-37 m) verified the underwater acoustic levels as a function of range from the JUR (Marine Acoustics, 2011). Primary sources of JUR-based acoustic energy were identified as originating from the diesel engines, mud pump, ventilation fans and electrical generators. The study identified maximum sound levels were periodic (impulsive <1 second) with received levels at approximately 127 dB re 1µPa to a maximum range of 1.2–1.4km in the frequency range 8.9- 44.7 Hz. Levels in the infrasonic band (i.e., frequencies <20 Hz) between 8.9–11.2 Hz and 11.2–14.1 Hz infrequently exceeded 120 dB re 1µPa at ranges less than 1.7 km and never more than 1 second at a time.

5.4.1.2 Support Vessels

There will be several support vessel trips per week between the JUR and the supply base, with one support vessel 'on station' close to the JUR at all times for safety purposes. The support vessels will generate low levels of sound. This is generated from propeller cavitation (the dominant sound source), hydrodynamic flow around the hull and from onboard machinery (Popper *et al*., 2014). It is unlikely that engine sound levels will be greater than that of any other similarly size vessel normally operating in the area (such as vessels supporting the offshore oil and gas operations in the area, recreational vessels, and merchant vessels.

The sound levels and frequency characteristics of underwater sound produced by vessels are related to vessel size and speed. When idle or moving at slow speed within the PSZ, vessels generally emit low-level noise. The typical sound levels generated by vessels are:

- Tugboats, crew boats, supply ships and many research vessels in the 50-100 m size class – 165-180 dB re 1µPa range (Gotz *et al*., 2009);
- Vessels up to 20 m size class – 151-156 dB re 1µPa (Richardson *et al*., 1995);
- Trawlers – peak at around 175 dB re 1µPa (Gotz *et al*., 2009); and
- Large ships – levels exceeding 190 dB re 1µPa (Gotz *et al*., 2009).

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

5.4.1.3 Helicopters

Helicopters will be used to transport personnel and freight to the JUR on a daily basis. Sound emitted from helicopter operations is typically below 500 Hz (Richardson *et al*. 1985). The peak-received level diminishes with increasing helicopter altitude, but the duration of audibility often increases with increasing altitude. Richardson *et al*. (1985) reports that helicopter sound was audible in air for four minutes before it passed over underwater hydrophones, but detectable underwater for only 38 seconds at 3 m depth and 11 seconds at 18 m depth.

5.4.2 Impacts of sound emissions

Impacts of sound emissions in the marine environment considered are:

- Injury to fauna (direct physical effects on hearing or other organs); and
- Change in fauna behaviour (localised and temporary fauna behavioural disturbance that significantly affects migration or social behaviours)

5.4.3 Impact Assessment

Receptors affected by sound emissions and that have been identified in the Description of Environment as occurring in the area are identified below.

Impacts	Receptors			
	Plankton	Fish	Marine Reptiles - Turtles	Marine Mammals
Injury to fauna	✓	✓	✓	✓
Change in fauna behaviour		✓	✓	✓

5.4.3.1 Injury to fauna

Drilling and vessels produce continuous noise. Continuous noise is a category of sound that is described by a continual non-pulsed sound. Continuous sound can be tonal, broadband, or both. Some of these non-pulse sounds can be transient signals of short duration but without the essential properties of pulses (e.g. rapid rise-time) (Southall *et al.,* 2007). Due to the continuous non-pulsed properties of continuous noise, the risk and severity of potential impact to marine fauna is lower than that of impulsive noise.

Zooplankton do not have hearing structures but can sense pressure changes Recent reports that zooplankton is affected by seismic activity (McCauley *et al*., 2017) are ambiguous and largely not applicable to this activity so while drilling activities may impact on zooplankton, these impacts would be highly localised.

Due to a lack of observational data on impacts to (bony) fish from continuous sources, Popper *et al*. (2014) proposed qualitative indicators of relative risk of effects indicating that Peak sound pressure level (SPL) (~207 dB re1µPa) has the potential to result in a recoverable injury in fish that have high or medium hearing sensitivity.

Limited research has been conducted on shark responses to noise. Myrberg (2001) stated that sharks differ from bony fish in that they have no accessory organs of hearing such as a swim bladder and therefore are unlikely to respond to acoustical pressure. Klimley and Myrberg (1979) established that an individual shark will suddenly turn and withdraw from a sound source of high intensity (more than 20 dB re 1µPa above broadband ambient SPL) when approaching within 10 m of the sound source.

Marine turtles have an auditory bandwidth of 100–800 Hz, with the greatest sensitivity between 200–400 Hz (adults) and 600–700 Hz (juveniles) (Ketten & Bartol, 2005). Electro-physical studies have indicated that the best hearing range for marine turtles is in the range of 100-700 Hz, however no definitive thresholds are known for the sensitivity to underwater sounds or the levels required to cause pathological damage (McCauley, 1994).

Seals have been observed to congregate and rest on the legs of offshore facilities, including Esso's Bass Strait platforms, and at times on the sea deck of platforms; they do not appear to be impacted by sound emissions.

Proposed injury criteria for low frequency cetaceans is estimated at 230 dB re 1 µPa (Southall *et al.*, 2007). McCauley (1998) indicates that continuous noise sources from MODU and vessel operations are expected to fall below 120 dB re1µPA within 4 km of the MODU / vessel. Hearing damage in marine mammals from shipping noise has not been widely reported (OSPAR, 2009). It is likely that whales in the vicinity of the JUR (and support vessels) will avoid the immediate area due to an aversive response to the sound (DEWHA, 2008). This aversion acts as a mitigation to prevent whales from approaching or being approached closely enough to cause acoustic injury from intense or prolonged sound exposure.

5.4.3.2 Change in fauna behaviour

Several marine mammals (e.g. whales, dolphins, seals), marine reptiles and fish including those listed as either threatened and/or migratory under the EPBC Act have the potential to occur within the operational area. The Pygmy blue whale has distribution and foraging habitat overlapping the operational areas and the Southern right whale migration BIA also overlaps the operational areas. The Great white shark breeding and distribution BIAs overlap the operational areas.

For some fish, strong 'startle' responses have been observed at sound levels of 200 to 205 dB SPLpeak (185 - 190 dB re 1µPa root mean squared (RMS), indicating that sounds at or above this level may cause fish to move away from an area (Pearson *et al*. 1992; Wardle *et al*. 2001). Other studies (McCauley *et al*., 2003; Woodside, 2008) have found that low level behavioural avoidance may occur at sound levels of greater than 170 dB re 1µPa RMS (186 - 193 SPLpeak; 140 dB re 1µPa2.s SEL). The NOAA Fisheries and the US Fish and Wildlife Service have used 150 dB re 1 µPa RMS as the threshold for behavioural effects to fish species while the Canadian Science Advisory Secretariat (DFO, 2004) identified that behavioural changes are associated with levels of 148 - 218 dB SPLpeak (~ 133 - 203 dB re 1µPa RMS). Based on these results, a conservative threshold level of 130 dB re 1µPa RMS for behavioural changes in fish has been adopted.

Limited research has been conducted on shark responses to noise. Myrberg (2001) stated that sharks differ from bony fish in that they have no accessory organs of hearing such as a swim bladder and therefore are unlikely to respond to acoustical pressure. Klimley and Myrberg (1979) established that an individual shark will suddenly turn and withdraw from a sound source of high intensity (more than 20 dB re 1µPa above broadband ambient SPL) when approaching within 10 m of the sound source.

Marine turtles have an auditory bandwidth of 100–800 Hz, with the greatest sensitivity between 200–400 Hz (adults) and 600–700 Hz (juveniles) (Ketten & Bartol, 2005). Electro-physical studies have indicated that the best hearing range for marine turtles is in the range of 100-700 Hz, however no definitive thresholds are known for the sensitivity to underwater sounds or the levels required to cause pathological damage (McCauley, 1994). Using the limited information available, it has been reported that behavioural and masking changes are likely to occur at levels above 120 dB re 1 µPa (SVT Engineering Consultants, 2009).

Seals have been observed to congregate and rest on the legs of offshore facilities, and at times on the sea deck of platforms; they do not appear to be impacted by sound emissions.

Typical changes in cetacean response to anthropogenic noise are summarized from several studies of bowhead whales as shorter surfacings, shorter dives, fewer blows per surfacing, and longer intervals between successive blows (Richardson *et al*., 1995). Using the National Marine Fisheries Service (NMFS) guidance for non-pulsed sound, such as vessel noise and drilling operational noise, a behavioural disturbance limit of 120 dB re1µPa root mean squared (RMS) is adopted (NMFPS, 2016). Richardson *et al*. (1995) and Southall *et al*. (2007) indicate that behavioural avoidance by baleen whales may onset from 140 to 160 dB re1µPa or possibly higher.

The activities may coincide with the periods when Pygmy blue, Southern right or Humpback whales are more likely to be present in south-eastern Australian waters as a result of migration however any behavioural response or avoidance behaviour is limited to individuals transiting the area. Any temporary displacements for the short duration of each of the drilling campaigns are unlikely to result in any real biological cost to the animals. Any interaction in the operational area will not interfere with the critical behaviours of breeding or resting or occur in important areas such as narrow migratory corridors, and is unlikely to significantly interfere with widespread foraging behaviour.

Sound generation and frequency bands from the operation and drilling activities associated with the JUR would be expected to be similar to the sound levels described above and to the sound levels emitted from the existing Bass Strait oil and gas production platforms. This sound level is lower than the recorded high ambient underwater sound in the area (Pelican 3DMSS sound validation study, Jasco (2018) on behalf of CarbonNet) and is therefore likely to have a negligible impact on marine fauna.

Under normal operating conditions when a support vessel is idling or moving between sites, vessel noise, as described above, would be detectable over only a short distance. Underwater sound generated by the support vessels is therefore considered to have an insignificant environmental impact.

Based on the Richardson *et al* (1995) study described above, as a conservative case, helicopter sound may be audible underwater for up to two minutes per day based on one return flight per day to the JUR. Based on this short time of audibility underwater (0.14% of a day), impacts from helicopter sound to sound sensitive marine fauna are assessed as negligible.

Consequently, the potential impacts from noise emissions are considered to be **Consequence Level IV** (Inconsequential or No Adverse Effect) as this activity may result in localised, short-term impacts to species of recognised conservation value, but is not expected to affect the population or local ecosystem functions.

5.4.4 Controls

Environmental Performance Outcome	Control	Environmental Performance Standard	Measurement Criteria

Prevent injury or harm to cetaceans from sound emissions during support vessel operations	Vessel Master	Vessel masters will implement interaction management actions consistent with the EPBC Regulations 2000 – Part 8 Division 8.1 • Vessels will not knowingly travel faster than 6 knots within 300 m of a whale or 150 m of a dolphin • Vessels will not knowingly get closer than 100 m of a whale or 50 m of a dolphin • If a cetacean approaches the vessel within the above zones, the vessel will avoid rapid changes in engine speed or direction.	Daily operations reports note when cetaceans were sighted in the caution zone and interaction management actions implemented.
Prevent injury or harm to cetaceans from noise emissions during helicopter activities	Helicopter Pilot	Interaction between helicopters and cetaceans within the operational area will be consistent with EPBC Regulations 2000 – Part 8 Division 8.1: • Helicopters will not fly lower than 1650ft when within 500m horizontal distance of a cetacean except when landing or taking off and will not approach a cetacean from head on.	Flight reports note when cetaceans were sighted in the caution zone and interaction management actions implemented.

5.4.5 Demonstration of ALARP

ALARP Decision Context and Justification	**Decision Context A** Offshore drilling activities involving rigs, support vessels and helicopters are widely undertaken both nationally and internationally. Sound emissions from drilling equipment, support vessel thrusters and helicopters are unavoidable, however will be intermittent during the activity. Other vessel operations are not unusual in this area.

	The impacts of sound emissions are well understood and the consequence level identified as IV (the lowest level). No objections or claims were identified during stakeholder consultation. Esso believes **ALARP Decision Context A** should apply.

Good Practice	Adopted	Control	Rationale
EPBC Regulations 2000 – Part 8 Division 8.1: Interacting with cetaceans (Australian National Guidelines for Whale and Dolphin Watching 2017).	✓	Vessel Master Helicopter Pilot	The Vessel Master or Helicopter Pilot has responsibility for ensuring the requirements of these Regulations and Guidelines are followed. The Guidelines describe strategies to ensure whales and dolphins are not harmed during offshore interactions with people. These Guidelines were developed jointly by all state and territory governments through the Natural Resource Management Ministerial Council and, although more relevant for tourism activities, provide a list of requirements that are generally adopted by the oil and gas industry to minimise the risk of cetacean strike occurring; this also has the effect of ensuring distance from vessel propellers and helicopter rotor blades that cause sound emissions.

Engineering Risk Assessment

Additional, Alternative, Improved Controls	Benefit	Cost / Feasibility	Adopted

5.4.6 Demonstration of Acceptability

Factor	Demonstration Criteria	Criteria Met	Rationale
Principles of Ecologically Sustainable Development (ESD)	No potential to affect biological diversity and ecological integrity (i.e. Consequence Level is not I)	✓	The potential impact associated with this aspect is limited to a localised short-term impact, which is not considered as having the potential to affect biological diversity and ecological integrity.
	Activity does not have the potential to result in serious or irreversible environmental damage.	✓	The activities were evaluated as having the potential to result in a Level IV consequence thus are not considered as having the potential to result in serious or irreversible environmental damage.
Legislative and Other Requirements	Legislative and other requirements have been identified and met.	✓	Requirements of EPBC Regulations 2000 – Part 8 Division 8.1: Interacting with cetaceans, although more relevant for tourism activities, have been adopted. The following other requirements were identified as relevant to impacts from sound emissions. Noise interference is a recognised threat to these species and proposed activity is consistent with conservation / management actions where specified: • Conservation Management Plan for the Blue Whale (DoE, 2015) • Approved Conservation Advice for the Humpback Whale (TSSC, 2015a) • Conservation Management Plan for the Southern Right Whale (DSEWPAC, 2012a) • Approved Conservation Advice for the Sei Whale (TSSC, 2015b) • Approved Conservation Advice for the Fin Whale (TSSC, 2015c)
Internal Context	Consistent with Esso's Environment Policy.	✓	Proposed activities are consistent with Esso's Environment Policy, in

			particular, to "comply with all applicable environmental laws and regulations and apply responsible standards where laws and regulations do not exist".
	Meets ExxonMobil Environmental Standards	✓	There is no standard related to sound emissions (except those associated specifically with marine geophysical operations) but the activities proposed meet the strategic objectives of the Upstream Environmental Standards.
	Meets ExxonMobil Operations Integrity Management System (OIMS) Objectives	✓	Proposed activities meet: OIMS System 6-5 objective to identify and assess environmental aspects; significant aspects are addressed and controlled consistent with policy and regulatory requirements; and OIMS System 8-1 objective to clearly define and communicate OI requirements to contractors.
External Context	Stakeholder concerns have been considered / addressed through the consultation process.	✓	No specific stakeholder concerns have been raised concerning sound emissions.

5.5 Planned Discharge – Treated Bilge Water and Deck Drainage

5.5.1 Sources of treated bilge water and deck drainage

Bilge water consists of oily water that has accumulated in the lowest part of the vessel / JUR typically from closed deck drainage and machinery spaces. Bilge water is treated onboard the vessel or JUR using the oily water separator (OWS) to reduce the discharge to below the regulated level of <15 ppm.

Deck drainage comprising seawater from waves/spray, rain water and deck wash water, may contain minor quantities of detergents, and oil and grease which has been spilled on the deck.

5.5.2 Impacts of treated bilge water and deck drainage discharge

Impacts of the discharge of treated bilge water and deck drainage considered are:

- Changes in water quality.

5.5.3 Impact Assessment

Receptors affected by the discharge of treated bilge and deck drainage and that have been identified in the Description of Environment as occurring in the area are identified below.

Impacts	Receptors	
	Plankton	Fish
Change in water quality	✓	✓

5.5.3.1 Change in water quality

A discharge of treated bilge or deck drainage is non-continuous and infrequent. Given the nature of bilge or deck washing discharges, marine fauna most susceptible to toxic impacts are mainly limited to less mobile fish embryo, larvae, and other plankton. There is potential for short-term impacts to species that rely on plankton as a food source. Any impact to prey species would be temporary as the duration of exposure would be limited, and fish larvae and other plankton are expected to rapidly recover as they are known to have high levels of natural mortality and a rapid replacement rate (UNEP, 1985).

Consequently, the potential impacts from planned discharge of treated bilge and deck drainage are considered to be localised and short-term, and have been rated as **Consequence Level IV** (Inconsequential or No Adverse Effect).

5.5.4 Controls

Environmental Performance Outcome	Control	Environmental Performance Standard	Measurement Criteria
Deck drainage discharges comply with MARPOL Annex V requirements.	Class certification	Vessel compliant with MARPOL Annex V as appropriate to vessel class.	Vessels have class certification verified and issued by IACS member.
Bilge discharges from vessels comply with MARPOL Annex I requirements.	Class certification	Vessel compliant with MARPOL Annex I as appropriate to vessel class.	Vessels have class certification verified and issued by IACS member.

5.5.5 Demonstration of ALARP

ALARP Decision Context and Justification	**Decision Context A** Discharge of treated bilge and deck drainage offshore (from vessels and other facilities) is a commonly practised activity. The potential impacts are well regulated via various treaties and legislation, both nationally and internationally, which specify industry best practice

	control measures. These are well understood and implemented by the industry. The consequence has been identified as Level IV (the lowest level). No stakeholder objections or were claims raised with regards to the discharge of treated bilge water and deck drainage. Esso believes **ALARP Decision Context A** should apply.

Good Practice	Adopted	Control	Rationale
MARPOL Annex I Regulations for the Prevention of Pollution by Oil MARPOL Annex V Regulations for the Prevention of Pollution by Garbage from Ships	✓	Class Certification	The vast majority of commercial ships are built to and surveyed for compliance with the standards (i.e. Rules) laid down by classification societies. The role of vessel classification and classification societies has been recognised by the International Maritime Organisation (IMO) across many critical areas including the International Convention for the Safety of Life at Sea, (SOLAS), the 1988 Protocol to the International Convention on Load Lines and the International Convention for the Prevention of Pollution from Ships (MARPOL). A vessel built in accordance with the applicable Rules of an IACS Member society may be assigned a class designation relevant to the IMO rules, on satisfactory completion of the relevant classification society surveys. For ships in service, the society carries out routine scheduled surveys to verify that the ship remains in compliance with those Rules. Should any defects that may affect class become apparent, or damages be sustained between the relevant surveys, the owner is required to inform the society concerned without delay. MARPOL Annex I Regulations for the Prevention of Pollution by Oil specifically require vessels (as appropriate to class) hold an International Oil Pollution Prevention (IOPP) certificate, are equipped with an approved oil discharge monitoring and control system which ensures that the oil-in-water content of treated bilge water is <15 ppm and maintain an Oil Record Book.

			MARPOL Annex V Regulations for the Prevention of Pollution by Garbage from Ships specifically require vessels (as appropriate to class) to utilise deck cleaning products which are not a “harmful substance” in accordance with criteria in Appendix to MARPOL Annex III nor contain a component that is carcinogenic, mutagenic or reprotoxic.
Engineering Risk Assessment			
Additional, Alternative, Improved Controls	Benefit	Cost / Feasibility	Adopted

5.5.6 Demonstration of Acceptability

Factor	Demonstration Criteria	Criteria Met	Rationale
Principles of Ecologically Sustainable Development (ESD)	No potential to affect biological diversity and ecological integrity (i.e. Consequence Level is not I)	✓	The potential impact associated with this aspect is limited to a localised short-term impact, which is not considered as having the potential to affect biological diversity and ecological integrity.
	Activity does not have the potential to result in serious or irreversible environmental damage.	✓	The activities were evaluated as having the potential to result in a Level IV consequence thus are not considered as having the potential to result in serious or irreversible environmental damage.
Legislative and Other Requirements	Legislative and other requirements have been identified and met.	✓	The requirements of MARPOL Annexes I and V have been adopted. The following legislative and other requirements are considered relevant as they apply to the implementation of MARPOL in Australia: • Protection of the Sea (Prevention of Pollution from Ships) Act 1983.

			• Navigation Act 2012 – Chapter 4 (Prevention of Pollution). • Marine Order 91 (Marine pollution prevention – oil) 2014 • Marine Order 95 (Marine pollution prevention - garbage) 2013.
Internal Context	Consistent with Esso's Environment Policy.	✓	Proposed activities are consistent with Esso's Environment Policy, in particular, to "comply with all applicable environmental laws and regulations and apply responsible standards where laws and regulations do not exist"
	Meets ExxonMobil Environmental Standards	✓	The proposed activity meets the requirements of the Upstream Water Management Standard specifically "to meet regulatory requirements and legally binding agreements".
	Meets ExxonMobil Operations Integrity Management System (OIMS) Objectives	✓	Proposed activities meet: OIMS System 6-5 objective to identify and assess environmental aspects; significant aspects are addressed and controlled consistent with policy and regulatory requirements; and OIMS System 8-1 objective to qualify, evaluate and select contractors based on their ability to perform work in a safe, secure and environmentally sound manner.
External Context	Stakeholder concerns have been considered / addressed through the consultation process.	✓	No specific stakeholder concerns have been raised concerning treated bilge water and deck drainage discharges.

5.6 Emissions to Air

5.6.1 Sources of emissions to air

The use of fuel (specifically marine-grade diesel (MDO)) to power engines, generators and mobile and fixed plant (e.g. ROV, cranes) will result in gaseous emissions of greenhouse gases (GHG) such as carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O), along with non-GHG such as sulphur oxides (SO_X) and nitrous oxides (NO_X).

5.6.2 Impacts of emissions to air

Impacts of atmospheric emissions considered are:

- Change in air quality (localised and temporary decrease in air quality); and
- Contribution to the global greenhouse gas (GHG) effect.

5.6.3 Impact Assessment

Receptors affected by emissions to air and that have been identified in the Description of Environment as occurring in the area are identified below.

Impacts	Receptors		
	Birds	Marine Reptiles - Turtles	Marine Mammals
Change in air quality	✓	✓	✓
Contribution to the GHG effect			

5.6.3.1 Decrease in air quality

A recent review of the National Environment Protection (Ambient Air Quality) Measure (Air NEPM) (NEPC, 1998) recommended that exposure to NO_2 on an hourly basis should be below 0.12 ppm and on an annual average <0.003 ppm. BP has modelled NO_2 emissions from MODU power generation for an offshore project (BP, 2013). NO_2 is the focus of the modelling as this considered the main (non-greenhouse) atmospheric pollutant of concern, on account of the larger predicted emission volumes compared to the other pollutants, and the potential for NO_2 to impact on human health (as a proxy for environmental receptors). Results of this modelling indicated that even the highest hourly averages (0.00039 ppm or 0.74 µg/m^3) were restricted to within approximately 5 km from the rig (BP, 2013).

Potential receptors above the sea surface within 5 km of the activity that may be exposed to reduced air quality include seabirds and marine fauna that surface for air (e.g. cetaceans and turtles). The operational area is within the foraging BIAs for the Pygmy blue whale and some seabird species however given emissions will dissipate quickly the potential for any exposure to reduced air quality is limited.

5.6.3.2 Contribution to the global GHG effect

While these emissions add to the GHG load in the atmosphere, which adds to global warming potential, they are relatively small on a global scale, and temporary in nature. The activity is similar to other industrial activities contributing to the accumulation of GHG in the atmosphere. Consequently, no further evaluation has been undertaken.

The potential impacts from atmospheric emissions are considered to be **Consequence Level IV** (Inconsequential or No Adverse Effect) as this type of activity may result in localised, short-term impacts to species of recognised conservation value, but is not expected to affect local ecosystem functions.

5.6.4 Controls

Environmental Performance Outcome	Control	Environmental Performance Standard	Measurement Criteria
Fuel combustion equipment complies with the requirements of MARPOL Annex VI	Class certification	Vessel compliant with MARPOL Annex VI as appropriate to vessel class.	Vessels have class certification verified and issued by IACS member.

5.6.5 Demonstration of ALARP

ALARP Decision Context and Justification	**Decision Context A** Emissions to air from venting and fuel combustion generated by vessels and other offshore facilities is a common occurrence both nationally and internationally. Managing the impacts from emissions to air is well understood with good practice controls that are well implemented by the industry. Emissions will dissipate rapidly and the consequence of any impact assessed as Level IV (the lowest level). No stakeholder objections or were claims raised with regards to emissions to air. Esso believes **ALARP Decision Context A** should apply.		
Good Practice	Adopted	Control	Rationale
MARPOL Annex VI Regulations for the Prevention of Air Pollution from Ships	✓	Class Certification	The vast majority of commercial ships are built to and surveyed for compliance with the standards (i.e. Rules) laid down by classification societies. The role of vessel classification and classification societies has been recognised by the International Maritime Organisation (IMO) across many critical areas including the International Convention for the Safety of Life at Sea, (SOLAS), the 1988 Protocol to the International Convention on Load Lines and the International Convention for the Prevention of Pollution from Ships (MARPOL).

			A vessel built in accordance with the applicable Rules of an IACS Member society may be assigned a class designation relevant to the IMO rules, on satisfactory completion of the relevant classification society surveys. For ships in service, the society carries out routine scheduled surveys to verify that the ship remains in compliance with those Rules. Should any defects that may affect class become apparent, or damages be sustained between the relevant surveys, the owner is required to inform the society concerned without delay. MARPOL Annex VI Regulations for the Prevention of Air Pollution from Ships specifically require vessels (as appropriate to class) hold an International Air Pollution Prevention (IAPP) certificate and one Engine International Air Pollution Prevention (EIAPP) certificate for each diesel engine of ≥130 kW; vessel engine NOx emission levels comply with Regulation 13; sulphur content of any fuel oil used on board does not exceed 5.5%; and ongoing maintenance of engines, generators and deck equipment to ensure efficient operation.

Engineering Risk Assessment			
Additional, Alternative, Improved Controls	Benefit	Cost / Feasibility	Adopted

5.6.6 Demonstration of Acceptability

Factor	Demonstration Criteria	Criteria Met	Rationale
Principles of Ecologically Sustainable Development (ESD)	No potential to affect biological diversity and ecological integrity (i.e. Consequence Level is not I)	✓	The potential impact associated with this aspect is limited to a localised short-term impact, which is not considered as having the potential to

			affect biological diversity and ecological integrity.
	Activity does not have the potential to result in serious or irreversible environmental damage.	✓	The activities were evaluated as having the potential to result in a Level IV consequence thus are not considered as having the potential to result in serious or irreversible environmental damage.
Legislative and Other Requirements	Legislative and other requirements have been identified and met.	✓	The requirements of MARPOL Annex IV have been adopted. The following legislative and other requirements are considered relevant as they apply to the implementation of MARPOL in Australia: • Protection of the Sea (Prevention of Pollution from Ships) Act 1983. • Navigation Act 2012 – Chapter 4 (Prevention of Pollution). • Marine Order 97 (Marine pollution prevention – air pollution) 2013.
Internal Context	Consistent with Esso's Environment Policy.	✓	Proposed activities are consistent with Esso's Environment Policy, in particular, to "comply with all applicable environmental laws and regulations and apply responsible standards where laws and regulations do not exist"
	Meets ExxonMobil Environmental Standards	✓	Proposed activity meets the requirements of the Upstream Air Emissions Standard.
	Meets ExxonMobil Operations Integrity Management System (OIMS) Objectives	✓	Proposed activities meet: OIMS System 6-5 objective to identify and assess environmental aspects; significant aspects are addressed and controlled consistent with policy and regulatory requirements; and OIMS System 8-1 objective to qualify, evaluate and select contractors

			based on their ability to perform work in a safe, secure and environmentally sound manner.
External Context	Stakeholder concerns have been considered / addressed through the consultation process.	✓	No specific stakeholder concerns have been raised concerning emissions to air.

5.7 Planned Discharge – Cement

5.7.1 Sources of cement discharge

Cementing the well casing strings in place (sealing the annulus) and isolating planned geologic pilot holes will result in planned discharges of cement.

The estimated volumes of cement discharged to the environment include:

- A small proportion of dry cement from the bulk transfer process may be blown overboard during transfer operations (estimated at 10 MT).
- Cement returns at seabed during riserless drilling. Typically, once quality cement returns are seen at the seabed, cement mixing will cease and displacement will commence, with a minimal quantity of cement being deposited around the wellhead during the displacement. It is estimated that in the order of 150 bbl (24 m^3) per well may be discharged during this process;
- Washing the cementing pump, piping and blending tanks with seawater to prevent curing, resulting in a release of cement / water mix (120 bbl (18m^3) per well);

The surface casing annulus cement, together with the surface casing, provides an important well barrier ensuring well integrity is maintained whilst drilling formations below the casing/BOP. The integrity of this barrier must be verified post installation and therefore the operational success of the cementing operation is critical. In the event that operational issues arise during the cementation which may risk the cement barrier integrity, the partially pumped liquid cement slurry may be completely displaced from the well and discharged overboard. It is estimated that this contingency operation would result in a maximum of 500 bbls of cement discharged to the seabed or sea surface. The cementing operation would be repeated to ensure an acceptable barrier is installed for well integrity assurance.

At the end of the JUR campaign excess dry cement remaining in the cement storage silos may be discharged overboard (estimated at the equivalent of 630 bbl of cement slurry).

5.7.2 Impacts of cement discharges

Impacts of the planned discharge of cement on marine fauna considered are:

- Change in water quality (increased turbidity of the water column and potential toxicity); and
- Change in habitat.

5.7.3 Impact Assessment

Receptors affected by discharge of cement and that have been identified in the Description of Environment as occurring in the area are identified below.

Impacts	Receptors		
	Plankton	Benthic Habitat – Bare Substrate	Fish
Change in water quality	✓	✓	✓
Change in habitat		✓	

5.7.3.1 Change in water quality

Increased turbidity in the water column

Cementing fluids are not routinely discharged to the marine environment at the surface; however, volumes of a cement-water mix may be released in surface waters during equipment washing. The cement particles will disperse under action of waves and currents, and eventually settle out of the water column; the initial discharge will generate a downwards plume, increasing the initial mixing of receiving waters.

Modelling of the release of 18 m^3 of cement wash water by de Campos *et al*. (2017) indicate an ultimate average deposition of 0.05 mg/m^2 of material on the seabed; with particulate matter deposited within the three-day simulation period. Given the low concentration of the deposition of the material, it is therefore expected that the in-water suspended solids (i.e. turbidity) created by the discharge is not likely to be high for an extended period of time, or over a wide area.

Modelling of larger cement discharges was undertaken by BP (BP, 2013), which is useful as a conservative comparison of the potential impacts from this activity. This modelling was undertaken for significantly larger discharges at surface, i.e. 480 bbls / hour (equivalent to approximately 76 m^3/hour) and intermittent surface discharge of cement (following flushing of lines and equipment) in shallower water depths. The BP modelling results provide a high level of conservatism and as such is considered appropriate to apply for this program. The modelling indicates that two hours after the start of discharge, plume concentrations are between 5-50 mg/L with the horizontal and vertical extents of the plume approximately 150 m and 10 m respectively (BP, 2013). Four hours after the start of the discharge, the modelling indicates that the plume will have completely dispersed to concentrations of less than 5 mg/L (BP, 2013).

The Pygmy blue whale has distribution and foraging habitat overlapping the operational areas and the Southern right whale migration BIA also overlaps the operational areas. Research data detailing potential impacts from suspended solids to megafauna is scarce, however such megafauna is highly mobile, transitory and able to avoid the plumes. The area of the turbidity plumes is regarded as a very small percentage of the foraging grounds of protected seabirds such as shearwaters, albatrosses and petrels.

The environmental receptors with the potential for exposure and considered to be most sensitive to an increase in turbidity include pelagic fish species and plankton found in the area around the well locations. The Great white shark breeding and distribution BIAs overlap the operational areas.

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 that levels of 100 mg/L will affect the larvae of some species if exposed for periods greater than 96 hours. Jenkins and McKinnon (2006) also indicated that levels of 100 mg/L may affect the larvae of several marine invertebrate species and that fish eggs and larvae are more vulnerable to suspended sediments than older life stages.

Neither the modelling by de Campos *et al* (2017) nor BP (2013) suggest that suspended solids concentrations from a discharge of the cement washing will be at or near levels required to cause an effect on fish or invertebrate larvae.

Based upon the estimated discharge volumes identified for this program, and the potential impact thresholds (Jenkins and McKinnon, 2006), a discharge of cement from the surface is expected to result in a very short exposure of increased turbidity such that potential impacts would be expected to be localised (i.e. within 150m) and short-term (a few hours), and consequences are considered to be **Consequence Level IV** (Inconsequential or No Adverse Effect).

Potential toxicity

The potential for toxicity is associated with chemicals that are added to the dry cement mix (cement itself is classed as Poses Little Or No Risk (PLONOR) to the environment) and as such, toxicity associated with the discharge of cement is limited to the surface discharge of cement slurry or equipment washings (not surface discharge of dry cement).

While the cementing program has not yet been finalised, cement additives will be assessed and approved for discharge in accordance with the Esso Chemical Discharge Assessment Process. The assessment process uses the Offshore Chemical Notification Scheme (OCNS) ranking in conjunction with toxicity, biodegradation and bioaccumulation data to determine potential impacts to the environment and acceptability of planned discharges. The process is described as part of the Implementation Strategy in Volume 4.

Table 5-1 Indicative Cement Additives

Product/Function	OCNS Ranking	
	CHARM	Non-CHARM
Silicate Additive		E
Cement Retarder	Gold	
Antifoam Agent	Gold	
Spacer	Gold	
Low Temperature Cement Set Enhancer	Gold	
Low Temperature Dispersant	Gold	
Surfactant	Gold	
Mutual Solvent	Gold	
Fluoro Dye	Gold	
Liquid Retarder		E
Expanding Cement Additive		E
Liquid Accelerator		E

The environmental receptors with the potential to be exposed and most at risk from an increase in toxicity include pelagic fish species and plankton.

Given exposure to in water concentrations are expected to be limited due to the rapid dispersion and dilution (as shown in previous discharge modelling (BP, 2013), the potential for acute or chronic effects although possible will be limited such that potential impacts will result in a limited local decrease in water quality with a **Level IV** consequence (Inconsequential or No Adverse Effect).

5.7.3.2 Change in habitat

Studies indicate that cement from upper hole sections displaced to the seabed may affect the seabed around the well to a radius of approximately 10 m - 50 m of the well resulting in the potential for disturbance of 0.007 km^2 per well.

The benthic habitat within the operational area is characterised by a soft sediment and shell/rubble seabed, infauna communities, and sparse epibiotic communities (typically sponges). There are no known commercial scallop beds in the vicinity of the operational areas therefore there will be no adverse effects on scallops or scallop fishing.

Once cement overspill from cementing activities hardens, the area directly adjacent to the well (within 10 – 50 m) will be altered, resulting in the destruction of seabed habitat within the footprint of the discharge. This impact on soft sediment communities is not expected to affect the diversity or ecosystem function in this area and thus is only considered a localised impact.

Cement discharges may result in localised alteration of homogenous, and not overly sensitive, benthic substrate. Furthermore, given the relatively small footprint associated with the subsea release of cement, this impact is considered to result in a **Consequence Level IV** (Inconsequential or No Adverse Effect).

5.7.4 Controls

Environmental Performance Outcome	Control	Environmental Performance Standard	Measurement Criteria
All cements and additives planned for discharge approved according to the Esso Chemical Discharge Process.	Esso Chemical Discharge Assessment Process	All cement and additives planned for discharge are evaluated as acceptable in accordance with the Chemical Discharge Assessment Process.	Chemical assessment records confirm evaluation of each component making up cement as acceptable prior to use / discharge and appropriate approvals documented.
			Daily drilling wellview reports show cement and additives used.

5.7.5 Demonstration of ALARP

ALARP Decision Context and Justification	**Decision Context A** The planned discharge of cement to the marine environment is a well understood and practised activity both nationally and internationally. The impacts associated with planned cement discharges are well managed via

	control measures that are considered industry best practice. These are well understood and implemented by the industry. The consequence of any impact associated with these discharges was assessed as Level IV (the lowest level). No stakeholder objections or were claims raised with regards to the planned discharge of cement. Esso believes **ALARP Decision Context A** should apply.

Good Practice	Adopted	Control	Rationale
Discharge of least environmentally hazardous chemical	✓	Chemical Discharge Assessment Process	This risk control practice requires that new chemicals must be approved prior to use. This practice assesses chemicals that have the potential to be discharged to the environment (i.e. not household chemicals) to ensure the lowest toxicity, most biodegradable and least accumulative chemicals are selected which meet the technical requirements of the application.
Engineering Risk Assessment			

Additional, Alternative, Improved Controls	Benefit	Cost / Feasibility	Adopted

5.7.6 Demonstration of Acceptability

Factor	Demonstration Criteria	Criteria Met	Rationale
Principles of Ecologically Sustainable Development (ESD)	No potential to affect biological diversity and ecological integrity (i.e. Consequence Level is not I)	✓	The potential impact associated with this aspect is limited to a localised short-term impact, which is not considered as having the potential to affect biological diversity and ecological integrity.

	Activity does not have the potential to result in serious or irreversible environmental damage.	✓	The activities were evaluated as having the potential to result in a Level IV consequence thus are not considered as having the potential to result in serious or irreversible environmental damage.
Legislative and Other Requirements	Legislative and other requirements have been identified and met.	✓	No environmental legislation or other requirements were deemed relevant.
Internal Context	Consistent with Esso's Environment Policy.	✓	Proposed activities are consistent with Esso's Environment Policy, in particular, to "comply with all applicable environmental laws and regulations and apply responsible standards where laws and regulations do not exist"
	Meets ExxonMobil Environmental Standards	✓	There is no standard related to the discharge of cement but the activities proposed meet the strategic objectives of the Upstream Environmental Standards.
	Meets ExxonMobil Operations Integrity Management System (OIMS) Objectives	✓	Proposed activities meet: OIMS System 6-5 objective to identify and assess environmental aspects; significant aspects are addressed and controlled consistent with policy and regulatory requirements; OIMS System 7-1 objective to evaluate change against an established set of criteria and establish endorsement / approval levels; and OIMS System 8-1 objective to clearly define and communicate operations integrity requirements to contractors.
External Context	Stakeholder concerns have been considered / addressed through the consultation process.	✓	No specific stakeholder concerns have been raised concerning planned cement discharges.

5.8 Planned Discharge – Operational (Surface)

5.8.1 Sources of surface operational discharges

The following activities have been identified as resulting in surface discharges:

- Completions operations (gravel packing)
- Wellbore clean-up

Table 5-2 Summary of Operational Discharges - Surface

Fluid Type	Nature of release (infrequent/continuous etc)	Indicative volume (per well)
Pickling acid	One off	10 bbl (1.6 m^3)
Gravel Pack carrier fluid and ceramic proppant	One off	400 bbls (65 m^3) carrier fluid 20 bbl (3.2 m^3) proppant
Wellbore clean-up pills (solvent/surfactant/viscosified brine spacers)	Infrequent	500 bbl (80 m^3)
Brine (clean-up/completion)	Infrequent	1500 bbl (240 m^3) brine
Diatomaceous earth (DE) material	One off	25 bbl (4 m^3) DE

Table 5-3 Indicative Constituents – Gravel Pack Carrier Fluid and Pickling Acid

Product	Function	OCNS Ranking	
		CHARM	Non-CHARM
Gravel Pack carrier fluid			
Xanthan Gum	Viscofier for base fluid viscosity	Used in many food products (Same as a product under a different name that was previously E rating)	
NaCl/KCl/NaBr	Borehole Stability		E
Biocide	Prevents bacteria growth in fluid	Expired, but previously Silver	
Surfactant	Surfactant to prevent emulsion	To be assessed in accordance with Esso Chemical Discharge Assessment Process	
Breaker	Reduces viscosity of the fluid	Gold or D	
Iron Chelating Agent	Binds free iron in the fluid		E
Acetic Acid	pH Control		E
Caustic Soda	pH Control		E
Pickling acid			

HCl (dilute)	Removes scale (rust) in the pipe		E
Corrosion Inhibitor	Reduces corrosion rate		E
Iron Stabilizer	Stabilise iron in acid to prevent precipitation		E
Diatomaceous earth	Filter material	PLONOR	

5.8.2 Impacts of surface operational discharges

Impacts of the planned discharge of brine, pickling acid, gravel pack carrier fluid, proppant, wellbore clean-up pills and DE material considered are:

- Changes in water quality (increased salinity and potential toxicity in the water column).

5.8.3 Impact Assessment

Receptors affected by planned operational discharges and that have been identified in the Description of Environment as occurring in the area are identified below.

Impacts	Receptors			
	Plankton	Fish	Marine Reptiles - Turtles	Marine Mammals
Change in water quality	✓	✓	✓	✓

5.8.3.1 Change in water quality

Potential toxicity

As these discharges will occur at the surface, it is anticipated that ecological receptors that have the potential to be exposed are those that use the surface waters for transit or foraging such as whales, turtles, fish and plankton. The operational area is within a foraging BIA for the Pygmy blue whale.

All chemical additives will be assessed using the Esso Chemical Discharge Assessment Process (described as part of the Implementation Strategy in Volume 4) which uses the OCNS ranking in conjunction with toxicity, biodegradation and bioaccumulation data to determine potential impacts to the environment and acceptability of planned discharges.

Discharges will be one-off or infrequent, and of small volumes which will disperse rapidly in the open ocean currents within the operational area. It is therefore expected that any exposure will be limited in duration.

Early life stages of fish (embryos, larvae) and other plankton would be most susceptible to the toxic exposure from chemicals in the brine discharges, as they are less mobile and therefore can become exposed to the plume at the outfall. However, these are expected to rapidly recover once the activity ceases, as they are known to have high levels of natural mortality and a rapid replacement rate UNEP (1985). As such, exposure of planktonic communities is not considered to result in significant impacts on population level of organisms that would affect ecological diversity or productivity within

Commonwealth marine areas and therefore is considered to result in an undetectable or limited local degradation of the environment, rapidly returning to original state by natural action.

Pelagic species are mobile; at worst, it is expected that they would be subjected to very low levels of chemicals for a very short time as they swim near the discharge plume. As such, transient species are not expected to experience any acute or chronic effects.

Increased salinity

Brine water will sink through the water column where it will be rapidly mixed with receiving waters and dispersed by ocean currents. As such, any potential impacts are expected to be limited to the source of the discharge where concentrations are highest. This is confirmed by studies that indicate effects from increased salinity on planktonic communities in areas of high mixing and dispersion are generally limited to the point of discharge only (Azis *et al*., 2003).

The receptors with the potential to be exposed to an increase in salinity include pelagic fish species and plankton found in surface waters within the operational area. Changes in salinity can affect the ecophysiology of marine organisms. Most marine species are able to tolerate short-term fluctuations in salinity in the order of 20% to 30% (Walker and McComb, 1990). However, larval stages, which are crucial transition periods for marine species, are known to be more susceptible to impacts of increased salinity (Neuparth *et al*., 2002). Mobile pelagic species may be subjected to slightly elevated salinity levels (approximately 10-15% higher than seawater) for a very short period which they are expected to be able to tolerate.

Any impacts from planned operational discharges will be localised and short-term and the consequence level of increased salinity and potential chemical toxicity has been assessed as **Consequence Level IV** (Inconsequential or No Adverse Effect).

5.8.4 Controls

Environmental Performance Outcome	Control	Environmental Performance Standard	Measurement Criteria
All operational discharges approved according to the Esso Chemical Discharge Process.	Esso Chemical Discharge Assessment Process	All planned chemical discharges are evaluated as acceptable in accordance with the Chemical Discharge Assessment Process.	Chemical assessment records confirm evaluation of chemical discharges as acceptable prior to use/ discharge and appropriate approvals documented.
			Daily drilling wellview reports show components of all planned operational discharges.

5.8.5 Demonstration of ALARP

ALARP Decision Context and Justification	**Decision Context A** The surface discharge of fluids during drilling activities is a well-practiced activity, both nationally and internationally. The release of brines, drilling and completion fluids are standard discharges and are not considered unusual in Commonwealth waters. The consequence of any impact associated with these discharges was assessed as Level IV (the lowest level). No stakeholder objections or were claims raised with regards to the planned discharge of cement. Esso believes **ALARP Decision Context A** should apply.		
Good Practice	Adopted	Control	Rationale
Discharge of least environmentally hazardous chemical	✓	Chemical Discharge Assessment Process	This risk control practice requires that new chemicals must be approved prior to use. This practice assesses chemicals that have the potential to be discharged to the environment (i.e. not household chemicals) to ensure the lowest toxicity, most biodegradable and least accumulative chemicals are selected which meet the technical requirements of the application.
Engineering Risk Assessment			
Additional, Alternative, Improved Controls	Benefit	Cost / Feasibility	Adopted

5.8.6 Demonstration of Acceptability

Factor	Demonstration Criteria	Criteria Met	Rationale
Principles of Ecologically Sustainable	No potential to affect biological diversity and ecological integrity (i.e.	✓	The potential impact associated with this aspect is limited to a localised short-term impact, which is not considered as having the potential to

Development (ESD)	Consequence Level is not I)		affect biological diversity and ecological integrity.
	Activity does not have the potential to result in serious or irreversible environmental damage.	✓	The activities were evaluated as having the potential to result in a Level IV consequence thus are not considered as having the potential to result in serious or irreversible environmental damage.
Legislative and Other Requirements	Legislative and other requirements have been identified and met.	✓	The following other requirements were identified as relevant to impacts from operational discharges. Chronic chemical pollution is a recognised threat to these species however no conservation / management actions are specified: • Conservation Management Plan for the Blue Whale (DoE, 2015) • Approved Conservation Advice for the Sei Whale (TSSC, 2015b) • Approved Conservation Advice for the Fin Whale (TSSC, 2015c)
Internal Context	Consistent with Esso's Environment Policy.	✓	Proposed activities are consistent with Esso's Environment Policy, in particular, to "comply with all applicable environmental laws and regulations and apply responsible standards where laws and regulations do not exist"
	Meets ExxonMobil Environmental Standards	✓	The Upstream Water Management Standard does not specifically address drilling related discharges (other than NAF muds) but the activities proposed meet the strategic objectives of the Upstream Environmental Standards.
	Meets ExxonMobil Operations Integrity	✓	Proposed activities meet:

	Management System (OIMS) Objectives		OIMS System 6-5 objective to identify and assess environmental aspects; significant aspects are addressed and controlled consistent with policy and regulatory requirements; OIMS System 7-1 objective to evaluate change against an established set of criteria and establish endorsement / approval levels; and OIMS System 8-1 objective to clearly define and communicate operations integrity requirements to contractors.
External Context	Stakeholder concerns have been considered / addressed through the consultation process.	✓	No specific stakeholder concerns have been raised concerning planned operational discharges.

5.9 Planned Discharge – Drilling Fluids and Cuttings

5.9.1 Sources of drilling fluid and cuttings discharges

Unrecoverable drilling fluids, non-aqueous fluids (NAF) (i.e. synthetic-based muds) and cuttings will be discharged to the sea surface / seabed during the following activities:

- During the conductor and surface hole drilling (riserless sections), drill cuttings and unrecoverable, low-toxicity fluids (sea water mixed with fine particles from the drilling, bentonite clay and natural polymers) will be discharged at the seabed; the larger particles forming a cuttings pile in the immediate vicinity of the well, with smaller particles spreading further from the source aided by ocean currents. Sea water and high viscosity pills will be used for sweeps during the initial phase of drilling. At the end of the riserless sections, any high viscosity pills remaining in the mud tanks will be discharged.
- Once the riser is installed (intermediate and production hole sections), treated drill cuttings will be discharged just below the sea surface, resulting in dispersion of the cuttings and residual muds over a larger area as they sink to the seabed.
- There will also be occasional discharges of interface fluids (generated during the displacement from WBM to NAF to brine and vice versa) and tank washings (e.g. at completion of the well to remove NAF residue) from the mud pits (approximately 100 bbls per event).

The calculated volumes of drill cuttings and associated fluids to be discharged during the campaigns are outlined in Table 5-4 and Table 5-5.

Table 5-4 Approximate BTW (per well basis) cuttings and fluid discharge volumes

Hole Interval	Fluid Type	Cuttings (bbl)	Mud Discharges		Discharge Point
			bbl	MT	
36" structural	Sea water with high viscosity sweeps	500	800	140	Seabed
20" conductor	Sea water with high viscosity sweeps	500	1200	210	Seabed
Contingency BTW W1: 8-1/2" pilot hole x 17-1/2" surface	WBM	400	1100	200	Sea surface
17-1/2" surface	Sea water with high viscosity sweeps	600	2400	420	Seabed
14-3/4" x 12-1/4" intermediate	NAF	500	150	30	Sea surface
9-1/2" production	NAF	35	15	5	Sea surface
9-1/2" pilot hole below BTW W2	NAF	250	75	15	Sea surface

Table 5-5 Approximate KPA (per well basis) cuttings and fluid discharge volumes

Hole Interval	Fluid Type	Cuttings (bbl)	Mud Discharges		Discharge Point
			bbl	MT	
36" structural	N/A (pre-drilled)	-	-	-	-
20" conductor (KPA-A1 only)	Sea water with high viscosity sweeps	400	1400	250	Seabed
Contingency KPA A1: 8-1/2" pilot hole x 17-1/2" surface	WBM	530	1300	240	Sea surface

17-1/2" surface	Sea water with high viscosity sweeps	700	2300	400	Seabed
12-1/4" intermediate	NAF	800	250	50	Sea surface
8-1/2" x 9-1/2" production	NAF	100	35	7	Sea surface

5.9.2 Impacts of drilling fluid and cuttings discharges

Impacts of the planned discharge of drill cuttings and fluids considered are:

- Change in water quality (increased turbidity of the water column, and potential toxicity and oxygen depletion); and
- Change in habitat.

5.9.3 Impact Assessment

Receptors affected by the discharge of drilling fluids and cuttings and that have been identified in the Description of Environment as occurring in the area are identified below.

Impacts	Receptors				
	Plankton	Benthic Habitat – Bare Substrate	Fish	Marine Reptiles - Turtles	Marine Mammals
Change in water quality	✓	✓	✓	✓	✓
Change in habitat		✓			

5.9.3.1 Change in water quality

Increased turbidity

The Pygmy blue whale has distribution and foraging habitat overlapping the operational areas and the Southern right whale migration BIA also overlaps the operational areas. Research data detailing potential impacts from suspended solids to megafauna is scarce, however such megafauna is highly mobile, transitory and able to avoid the plumes. The area of the turbidity plumes is regarded as a very small percentage of the foraging grounds of protected seabirds such as shearwaters, albatrosses and petrels.

The environmental receptors with the potential for exposure and considered to be most sensitive to an increase in turbidity include pelagic fish species and plankton found in the area around the well locations. The Great white shark breeding and distribution BIAs overlap the operational areas.

Marine water column organisms are at a low risk of harm from cuttings discharges because of rapid dilution and dispersal. In some cases, decreased light penetration caused by the turbidity of the cuttings plume may temporarily decrease primary production of phytoplankton. Particles may clog the gills or digestive tract of zooplankton in the immediate area surrounding the discharge. Mobile pelagic species, such as fish and larger crustaceans, usually avoid or move away from plumes of suspended cuttings, thereby minimising the risk of harm (IOGP, 2016).

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 that levels of 100 mg/L will affect the larvae of some species if exposed for periods greater than 96 hours. Jenkins and McKinnon (2006) also indicated that levels of 100 mg/L may affect the larvae of several marine invertebrate species and that fish eggs and larvae are more vulnerable to suspended sediments than older life stages. Identifiable effects on recruitment would be difficult to discern given the high natural mortality of larvae and dispersive characteristics of the open water environment.

The rapid rate of dilution and dispersal of cuttings in the water column following discharge results in brief and intermittent exposure such that potential impacts would be expected to be localised and short-term and consequences are considered to be **Consequence Level IV** (Inconsequential or No Adverse Effect)**.**

Potential chemical toxicity

WBM have been shown to have little or no toxicity to marine organisms (Jones *et al*., 1996).

NAF is comprised of a base fluid (e.g. Escaid 110), emulsified brine, soluble polymers and solids that allow the drilling fluid to have the specified engineering properties, including the correct density to maintain wellbore integrity.

Table 5-6 Indicative NAF Constituents

Product	Function	OCNS Ranking	
		CHARM	Non-CHARM
Base Oil	Continuous phase		D or E
Calcium Chloride	Borehole chemical stability and hydrate inhibition		E
Emulsifier	Surfactant to stabilize emulsion and acting as wetting agent		D
Lime	Alkalinity Control		E
Viscosifying Agent	Viscosifier to aid in hole cleaning and suspension		E
Filtration Control	Reduce filtration properties		E
Barite	Borehole stability and pressure control		E
Calcium Carbonate	Reservoir protection and filtercake		E

H_2S Scavenger	Remove H_2S	Gold	
Corrosion Inhibitor	Reduce corrosion rate	Gold	
Oxygen Scavenger	Remove oxygen	Gold	
Bridging Agent	For loss circulation control and wellbore strengthening		E

Current NAF systems typically have a low toxicity to water column and benthic organisms (IOGP 2016). All drilling fluids will be assessed using the Esso Chemical Discharge Assessment Process which uses the OCNS ranking in conjunction with toxicity, biodegradation and bioaccumulation data to determine potential impacts to the environment and acceptability of planned discharges.

Most minerals in cuttings are stable and insoluble in seawater. Barite, the the most abundant particulate solid, has a very low solubility in natural seawater and is resistant to dissolution. Modern WBMs and NAFs are prepared with high quality barite obtained from sources with much lower trace metal content than historical sources, with most metals of concern being at concentrations similar to those of fine-grained marine sediments. Several metal bioaccumulation bioassays using WBM cuttings found that metal concentrations in the tissues of exposed animals were very similar to those in the tissues of unexposed animals (IOGP, 2016). The low solubility of NAF does not make it available for uptake and bioaccumulation, this has been confirmed by the fact that these base fluids have not been detected in tissues of marine organisms near NAF cuttings discharges (IOGP, 2016).

A number of field monitoring studies to assess impacts of drilling discharges have been completed in Bass Strait and around the world. The impacts from the discharge of NAF cuttings are described in the literature with consistency across all geographical locations and depths where monitoring has occurred, and with little if any significant deviation with differences in base fluids or blends of NAF actually used (IOGP, 2003, 2016).

Biological effects of NAF cuttings discharges are mainly restricted to the benthic environment. Effects of treated Group III (negligible aromatic content) NAF cuttings accumulations in sediments are usually minor and biological recovery is often well underway within a year of completion of discharge (IOGP 2016).

While the recovery of the benthic communities is dependent upon the type of community affected, the thickness, area extent and persistence of the cuttings (due to a combination of seafloor redistribution and biodegradation), and the availability of colonising organisms, degradation of NAF and the recovery of benthic diversity is substantially advanced one year after cessation of drilling. Given this uniformity of observation, it seems most likely that smothering (see 5.9.3.2 above) and organic enrichment during the biodegradation of NAFs are the primary causes of the observed impacts, regardless of any toxicity effects.

Research on NAF (Ellis *et al.* 2012) suggests that changes in benthic communities occur primarily due to the level of organic enrichment which causes oxygen depletion due to the biodegradation of the discharged NAF. This biodegradation results in predominantly anoxic conditions in the sediment (EPA 2000). Where concentrations of NAF may be high enough to cause some toxic effect, such concentrations occur at the closest point to the discharge, mainly during discharge, when impacts of smothering and organic enrichment would also be highest.

Early lifestages of fish (embryos, larvae) and other plankton would be most susceptible to the toxic exposure from drilling fluids, as they are less mobile and therefore can become exposed to the plume at the outfall. However, these are expected to rapidly recover once the activity ceases, as they are known to have high levels of natural mortality and a rapid replacement rate UNEP (1985). As such, exposure of planktonic communities is not considered to result in significant impacts on population level of organisms that would affect ecological diversity or productivity within Commonwealth marine areas and therefore is considered to result in an undetectable or limited local degradation of the environment, rapidly returning to original state by natural action.

Pelagic species are mobile; at worst, it is expected that they would be subjected to very low levels of chemicals for a very short time as they swim near the discharge plume. As such, transient species are not expected to experience any acute or chronic effects.

Any impact from the discharge of drilling fluids will be localised and short-term and the consequence level of potential chemical toxicity and oxygen depletion has been assessed as **Consequence Level IV**.

5.9.3.2 Change in habitat

Discharges of drill cuttings can smother seabed habitat, flora and fauna, resulting in an alteration in seabed substrate. The magnitude of the impact depends on cuttings volumes, discharge location and substrate within the operational area.

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. The effects of WBM and NAF cuttings deposits on benthic communities are caused mainly by burial, changes in sediment texture, and low sediment oxygen concentrations that result from microbial degradation of organic matter (organic enrichment) (see 5.9.3.1) (IOGP 2016).

Many studies have shown that the effects on benthos from the discharge of drilling cuttings with WBM, from top hole drilling, are subtle, although the presence of drilling fluids in the seabed close to the drilling location (less than 500m) can usually be detected (e.g. Cranmer 1988, Neff *et al*. 1989, Hyland *et al*. 1994, Daan *et al*. 1996, Currie & Isaacs 2005, OSPAR 2009, Bakke *et al*. 2013).

Jones *et al*. (2006, 2012) compared pre- and post-drilling ROV surveys and documented physical smothering effects from WBM cuttings within 100 m of the well. Outside the area of smothering, fine sediment was visible on the seafloor up to at least 250 m from the well. 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 discharge of NAF to the environment is minimised by recycling the drilling fluid during operations through solids control and secondary processing equipment installed on the rig. Discharges of NAF are confined to this material adhering to the surfaces of the cuttings. Neff (2010) suggests that NAF-coated cuttings, tend to clump and settle rapidly as large particles over a small area near the discharge point and tend not to disperse rapidly indicating that when drilling with NAF, extent of dispersion is expected to decrease, but thickness of cuttings piles can be expected to increase. Water cannot penetrate the oleophyllic mass of cuttings, so they do not disperse as efficiently as cuttings from sections drilled with water based muds. NAF cuttings discharges to water less than about 300 – 400 m usually are deposited in sediments within about 100 to 200 m of the discharge (IOGP 2016).

However, there have been several previous studies on NAF cuttings dispersion around fixed platforms in the Gippsland Basin which show that the physical seabed dispersion process evident in eastern Bass Strait will assist in both reducing the extent of smothering and increasing the rate of recovery.

A seabed monitoring program (Terrens *et al.* 1998) was undertaken around the Fortescue platform (73 m water depth) by taking seabed samples at sites along a transect following the predominant ocean current and at control sites, before, during and after the period in which NAF cuttings were discharged. The seabed sediments were analysed for various chemical components, including barium, and biological changes. Results showed that:

- Impacts to benthos were observed at 100m.
- Patches of sand of normal appearance occurred between 100 and 200m from the platform.
- Patches of NAF decreased in size beyond 100m;
- NAF patches were not observed beyond 200m;
- Chemical traces of NAF were not found beyond 500m.
- Recovery of benthos was evident within four months of completion of drilling

Video taken two weeks after the completion of the drilling program at Fortescue showed settled NAF cuttings as dark grey material covering the sandy substrate, but generally only in patches and not to sufficient depth to obscure seabed ripples or protruding shell fragments. There was also some evidence of bioturbation and bottom dwelling fish, hermit crabs and some sponges. The images confirmed the lack of any significant mounding and that the cuttings were confined to within 100 to 200m of the platform.

In the Snapper platform (55 m water depth) study (Coffey 2010) visual inspection of the seabed using an ROV five months after drilling was completed concluded that the accumulation of cuttings was localised to a distance of just over 100m from the platform and that both the natural sediment and deposited cuttings had been recolonised by benthic infauna. The study showed a large number of small burrows and bioturbation mounds created by benthic infauna such as crustaceans and polychaete worms on natural sediment as well as within the cuttings.

In December 2015, Marine Solutions (2015) conducted a visual seabed investigation using an ROV around the Marlin B platform (59 m water depth) approximately six months after the drilling campaign was completed. Cuttings covered an elliptical shaped area; in the northwest and southeast extending to approximately 260m and 40m respectively however, with the prevailing current, coverage was greater in southwest and northeasterly directions, where cuttings were detectable to a maximum distance of approximately 330 and 370m, respectively. Fish, invertebrate and algal species were all observed during the survey, indicating suitable conditions for colonisation and ongoing viability of various species adjacent to the cuttings on the sediment. Large areas of the surveyed seabed exhibited bioturbation, indicative of the presence of an active infaunal community.

Apache Energy have also been monitoring the effects of discharge of NAF in shallow water (5 - 20m) platforms offshore Western Australia (Apache 2008). The findings from these studies have been consistent with the general literature in that the observed impacts occurred mainly within 100 m of Apache's platforms with substantial recovery between one and two years after drilling.

In Ellis *et al*. (2012) seven studies summarising information from wells in the North Sea and Gulf of Mexico were reviewed to assess environmental effects associated with NAF. The area of detection and scale of biological effects resulting from discharged NAF were smaller than that resulting from the release of water based fluids. Maximum concentrations of synthetic tracers from NAF in sediment were detected at distances ranging from 100 to 2000 m from the discharge location. Biological effects associated with the release of NAF cuttings were generally detected at distances of 50 to 500 m from well sites (Smith & May 1991, Candler *et al.*1995, De Blois *et al.* 2005).

In the high energy environment of Bass Strait into which the cuttings will be discharged, impacts to the seabed and benthic communities are anticipated to be limited to within approximately 200 metres of the JUR, and the benthos is likely to recover within 12 months of completion of drilling, resulting in a **Consequence Level IV** for smothering and alteration of benthic habitat.

5.9.4 Controls

Environmental Performance Outcome	Control	Environmental Performance Standard	Measurement Criteria
All drilling fluids planned for discharge approved according to the Esso Chemical Discharge Process	Esso Chemical Discharge Assessment Process	All drilling fluids planned for discharge are evaluated as acceptable in accordance with the Chemical Discharge Assessment Process.	Chemical assessment records confirm evaluation of all drilling fluids as acceptable prior to use / discharge and appropriate approvals documented.
			Daily drilling wellview reports show components of drilling fluids.
	Solids Control Equipment	Solids control equipment (shale shakers and/or dryer) will treat cuttings to a level below 10% residual oil on dry weight basis; averaged over each well section, where NAF is used.	Retort test reports document residual oil on cuttings (ROC) measured. Daily drilling wellview report shows progressive average ROC for the section being drilled. Actual average ROC per section shows required standard achieved.
		Frequency of ROC measurements will be once every twelve hours.	ROC retort test reports confirm frequency of measurements.
	Tank cleaning procedure	Retort test result for interface fluids / tank washings must be below 10% oil in water by volume to be acceptable for discharge	Retort test reports document interface fluids / tank washings oil in water content measured. Oil in water content of interface fluids / tank washings is recorded in the daily drilling wellview report, when discharge occurs.

5.9.5 Demonstration of ALARP

ALARP Decision Context and Justification	**Decision Context A** The planned release of drill cuttings and adhered fluids offshore is a well understood and practiced activity both nationally and internationally. The potential impacts are well regulated via various treaties and legislation, which specify industry best practice control measures. These are well understood and implemented by the industry. The consequence of any impact associated with these discharges was assessed as Level IV (the lowest level). No stakeholder objections or were claims raised with regards to this activity. Esso believes **ALARP Decision Context A** should apply.

Good Practice	Adopted	Control	Rationale
Discharge of least environmentally hazardous chemical	✓	Chemical Discharge Assessment Process	This risk control practice requires that new chemicals must be approved prior to use. This practice assesses chemicals that have the potential to be discharged to the environment (i.e. not household chemicals) to ensure the lowest toxicity, most biodegradable and least accumulative chemicals are selected which meet the technical requirements of the application.
Cuttings treatment to reduce ROC	✓	Solids Control Equipment	It is industry standard practice to remove NAF muds from cuttings using a combination of shale shakers, centrifuges and/or dryers.
Reduce oil in water content of interface fluids / tank washings.	✓	Tank Cleaning Procedure	The oil in water content of interface fluids / tank washings will be treated to previously accepted levels prior to discharge.

Engineering Risk Assessment			
Additional, Alternative, Improved Controls	Benefit	Cost / Feasibility	Adopted

5.9.6 Demonstration of Acceptability

Factor	Demonstration Criteria	Criteria Met	Rationale
Principles of Ecologically Sustainable Development (ESD)	No potential to affect biological diversity and ecological integrity (i.e. Consequence Level is not I)	✓	The potential impact associated with this aspect is limited to a localised short-term impact, which is not considered as having the potential to affect biological diversity and ecological integrity.
	Activity does not have the potential to result in serious or irreversible environmental damage.	✓	The activities were evaluated as having the potential to result in a Level IV consequence thus are not considered as having the potential to result in serious or irreversible environmental damage.
Legislative and Other Requirements	Legislative and other requirements have been identified and met.	✓	The following other requirements were identified as relevant to impacts from drilling fluids and cuttings. Chronic chemical pollution is a recognised threat to these species however no conservation / management actions are specified: • Conservation Management Plan for the Blue Whale (DoE, 2015) • Approved Conservation Advice for the Sei Whale (TSSC, 2015b) • Approved Conservation Advice for the Fin Whale (TSSC, 2015c)
Internal Context	Consistent with Esso's Environment Policy.	✓	Proposed activities are consistent with Esso's Environment Policy, in particular, to "comply with all applicable environmental laws and regulations and apply responsible standards where laws and regulations do not exist"

	Meets ExxonMobil Environmental Standards	✓	Proposed activity is consistent with the Upstream Waste Management Standard specifically: • Using only NAFs prepared and maintained with Oil and Gas Producers Group III Non Aqueous Base Fluids; • Using equipment capable of reducing NAF on cuttings equal to or better than a cuttings dryer; • Measuring the % ROC at 300 m intervals and at least once per day when discharging to ensure solids control and fluids recovery equipment is operating as designed; and • Never intentionally discharging whole NAF.
	Meets ExxonMobil Operations Integrity Management System (OIMS) Objectives	✓	Proposed activities meet: OIMS System 6-5 objective to identify and assess environmental aspects; significant aspects are addressed and controlled consistent with policy and regulatory requirements; OIMS System 7-1 objective to evaluate change against an established set of criteria and establish endorsement / approval levels; and OIMS System 8-1 objective to clearly define and communicate OI requirements to contractors.
External Context	Stakeholder concerns have been considered / addressed through the consultation process.	✓	No specific stakeholder concerns have been raised concerning planned discharges of drilling fluids and cuttings.

6 Environmental Risk Assessment

This section describes the outcome of the environmental risk assessment of unplanned events associated with activities described in this EP.

The risk assessment addresses the levels of predicted risk, with controls in place., to contribute to the process of ensuring risks are reduced As Low As Reasonably Practicable and of an acceptable level. Environmental performance outcomes, standards and measurement criteria are also presented.

6.1 Physical Interaction – Marine Fauna

6.1.1 Causes of physical interaction with marine fauna

The movement of support vessels has the potential to result in collision with marine fauna. Note: Within the operational area support vessels will be under the Noble Supply/Support Vessel Handling Procedure to ensure that vessel handling is undertaken in a safe and controlled manner.

6.1.2 Risks of physical interaction with marine fauna

Interaction with marine fauna has the potential to result in:

- Injury / mortality to marine fauna.

6.1.3 Risk Assessment

Receptors that could be affected by physical interaction and that have been identified in the Description of Environment as occurring in the area are identified below.

Impacts	Receptors	
	Marine Reptiles - Turtles	Marine Mammals
Injury / mortality to fauna	✓	✓

6.1.3.1 Injury / mortality to fauna

Marine megafauna are at the most risk from this hazard and thus are the focus of this evaluation.

Several marine turtle species including species listed as either threatened and/or migratory under the EPBC Act may occur within the operational areas, however no critical habitat or BIAs for turtles have been identified. The presence of turtles in the operational area is considered remote.

Several marine mammals (e.g. whales, dolphins, seals) including those listed as either threatened and/or migratory under the EPBC Act have the potential to occur within the operational area. The Pygmy blue whale has distribution and foraging habitat overlapping the operational areas and the Southern right whale migration BIA also overlaps the operational areas.

Cetaceans are naturally inquisitive marine mammals that are often attracted to offshore vessels and facilities. The reaction of whales to the approach of a vessel is quite variable. Some species remain motionless when in the vicinity of a vessel, while others are curious and often approach ships that have stopped or are slow moving, although they generally do not approach, and sometimes avoid, faster-moving ships (Richardson *et al*. 1995).

Collisions between larger vessels with reduced manoeuvrability and large, slow-moving cetaceans occur more frequently where high vessel traffic and cetacean habitat occurs (Whale and Dolphin Conservation Society, 2006). Laist *et al*. (2001) identified that larger vessels with reduced manoeuvrability moving in excess of 10 knots may cause fatal or severe injuries to cetaceans, with the most severe injuries caused by vessels travelling faster than 14 knots. Vessels typically used to support these activities do not have the same limitations on manoeuvrability and would not be moving at these speeds when conducting activities inside the operational area.

The Australian and New Zealand fur-seals are highly agile species that haul themselves onto rocks and oil and gas platform structures. As such, it is likely that they will avoid any collision with moving support vessels.

Peel *et al*. (2016) reviewed vessel strike data (1997-2015) for marine species in Australian waters and identified the following:

- Whales including the Humpback, Pygmy blue, Antarctic blue, Southern right, Dwarf minke, Antarctic minke, Fin, Bryde's, pygmy right, Sperm, Pygmy sperm and Pilot species were identified as having interacted with vessels. The Humpback whale exhibited the highest incidence of interaction followed by the Southern right whale. A number of these species may be observed in the waters within the vicinity of the operational area.
- Dolphins including the Australian humpback, Common bottlenose, Indo-Pacific bottlenose and Risso's dolphin species were also identified as interacting with vessels. The Common bottlenose dolphin exhibited the highest incidence of interaction. A number of these species may be observed within the vicinity of the operational area.
- There were no vessel interaction reports during the period for either the Australian or New Zealand fur seal. There have been incidents of seals being injured by boat propellers, however all indications are rather than 'boat strike' these can be attributed to be the seal interacting/playing with a boat, with experts indicating the incidence of boat strike for seals is very low.

The duration of fauna exposure to vessel strike is limited to the duration of works under this EP expected to be approximately 50 to 70 days per well. If a fauna strike occurred and resulted in death, it is not expected that it would have a detrimental effect on the overall population. Consequently, the potential consequence level from fauna strike is considered to be **Consequence Level III** (Potential Short Term, Minor Adverse Effects) as this type of event may result in a localised, short-term impact to species of recognised conservation value but is not expected to affect the population or local ecosystem function.

Due to restricted area of operation (operational area is a 500 m radius of each well) and the slow speed of support vessels when operating in this area, in the unlikely event that contact is made the impact is expected to be non-life threatening. Accordingly, the likelihood of vessel strike and associated severe injury or death of an individual is considered **Very Highly Unlikely (E)** during these activities.

6.1.4 Risk Ranking

Consequence	Likelihood	Risk Ranking
III	E	4

6.1.5 Controls

Environmental Performance Outcome	Control	Environmental Performance Standard	Measurement Criteria
No injury or death of megafauna resulting from vessel strike.	Vessel Master	Vessel Masters will implement interaction management actions consistent with the EPBC Regulations 2000 – Part 8 Division 8.1 • Vessels will not knowingly travel faster than 6 knots within 300m of a whale or 150 m of a dolphin • Vessels will not knowingly get closer than 100m of a whale or 50m of a dolphin • If a cetacean approaches the vessel within the above zones, the vessel will avoid rapid changes in engine speed or direction.	Daily operations reports note when cetaceans were sighted in the caution zone and interaction management actions implemented.

6.1.6 Demonstration of ALARP

ALARP Decision Context and Justification	**Decision Context B** Offshore petroleum operations are widely undertaken both locally, nationally and internationally. The risk of cetacean vessel strike is well managed via legislative control measures that are considered industry best practice. These controls are well understood and implemented by the industry. However these legislative controls do not manage the risk of death or injury to seals via interaction/playing with vessels. The consequence of any impact associated with a vessel strike was assessed as Level III. No stakeholder objections or concerns were raised with regard to the risk of physical interaction with marine fauna. Esso believes **ALARP Decision Context B** should apply.		
Good Practice	Adopted	Control	Rationale

EPBC Regulations 2000 – Part 8 Division 8.1: Interacting with cetaceans (Australian National Guidelines for Whale and Dolphin Watching 2017).	✓	Vessel Master	The Vessel Master has responsibility for ensuring the requirements of these Regulations and Guidelines are followed. The Guidelines describe strategies to ensure whales and dolphins are not harmed during offshore interactions with people. These Guidelines were developed jointly by all state and territory governments through the Natural Resource Management Ministerial Council and, although more relevant for tourism activities, provide a list of requirements that are generally adopted by the oil and gas industry to minimise the risk of cetacean strike occurring. Note: Both the lack of visibility of seals in the water and number of seals in close proximity to oil and gas offshore installations make applicability of these guidelines to seals impracticable. Furthermore fauna interaction management actions as described in the guidelines will not prevent seals approaching / playing with vessels.

Engineering Risk Assessment			
Additional, Alternative, Improved Controls	Benefit	Cost / Feasibility	Adopted
Grates on vessel thrusters	Grates on vessel tunnel thrusters would prevent entrapment of marine mammals, in particular seals which are known to approach / play with vessels while stationary on DP.	Smaller support vessels (such as those used to deploy ROVs) do not generally have grates on tunnel thrusters, however. it is more common for larger PSVs. Adding grates to thrusters significantly impacts efficiency of vessels leading to increased fuel usage and air emissions, particularly for small	Not adopted.

		vessels. Further, grates lead to increased potential for marine growth (which further reduces efficiency of thrusters) Retrofitting of grates to vessels requires dry docking at significant cost.	

6.1.7 Demonstration of Acceptability

Factor	Demonstration Criteria	Criteria Met	Rationale
Risk Assessment Process for Unplanned Events	The risk ranking is lower than Category 1	✓	The risk ranking is Category 4 (the lowest category) and is therefore considered acceptable.
Principles of Ecologically Sustainable Development (ESD)	No potential to affect biological diversity and ecological integrity (i.e. Consequence Level is not I)	✓	The potential impact associated with this aspect is limited to a localised short-term impact, which is not considered as having the potential to affect biological diversity and ecological integrity.
	Activity does not have the potential to result in serious or irreversible environmental damage.	✓	The activities were evaluated as having the potential to result in a Level III consequence thus are not considered as having the potential to result in serious or irreversible environmental damage.
Legislative and Other Requirements	Legislative and other requirements have been identified and met.	✓	Requirements of EPBC Regulations 2000 – Part 8 Division 8.1: Interacting with cetaceans, although more relevant for tourism activities, have been adopted. The following other requirements were identified as relevant to the risk of vessel strike. Vessel disturbance is a recognised threat to these species and proposed activity is consistent

			with conservation / management actions where specified: • Conservation Management Plan for the Blue Whale (DoE, 2015) • Approved Conservation Advice for the Humpback Whale (TSSC, 2015a) • Conservation Management Plan for the Southern Right Whale (DSEWPAC, 2012a) • Approved Conservation Advice for the Sei Whale (TSSC, 2015b) • Approved Conservation Advice for the Fin Whale (TSSC, 2015c) • Recovery Plan for Marine Turtles in Australia (DoE, 2017) • Approved Conservation Advice for Leatherback Turtle (TSSC, 2008)
Internal Context	Consistent with Esso's Environment Policy.	✓	Proposed activities are consistent with Esso's Environment Policy, in particular, to "comply with all applicable environmental laws and regulations and apply responsible standards where laws and regulations do not exist"
	Meets ExxonMobil Environmental Standards	✓	There is no specific Environmental Standard which addresses interaction with marine fauna but the activities proposed meet the strategic objectives of the Upstream Environmental Standards.
	Meets ExxonMobil Operations Integrity Management System (OIMS) Objectives	✓	Proposed activities meet: OIMS System 6-5 objective to identify and assess environmental aspects; significant aspects are addressed and controlled consistent with policy and regulatory requirements; and OIMS System 8-1 objective to clearly define and communicate OI requirements to contractors.

External Context	Stakeholder concerns have been considered / addressed through the consultation process.	✓	No specific stakeholder concerns have been raised concerning the risk of physical interaction with marine fauna.

6.2 Physical Presence - Introduction of IMS

6.2.1 Causes of introduction of IMS

An invasive marine species (IMS) is a species occurring, as a result of human activities, beyond its accepted normal distribution and which threaten the environment, human health or economic values by the damage it causes (DoEE, 2019). Not all non-indigenous marine species introduced into new environments will cause demonstrable effects, some are relatively benign, and few have spread widely beyond ports and harbours. The following activities have the potential to result in the introduction of IMS in the activity area:

- Discharge of ballast water from JUR / support vessels containing foreign species; and
- Translocation of foreign species through biofouling of the JUR hull and legs and support vessel hull and niches (e.g. sea chests, bilges, strainers).

6.2.2 Risks of introduction of IMS

The translocation of IMS through biofouling or ballast water discharge has the potential to result in effects to seabed habitat and marine ecosystems due to:

- Changes in ecosystem dynamics.

6.2.3 Risk Assessment

Receptors that could be affected by the introduction of IMS and that have been identified in the Description of Environment as occurring in the area are identified below.

Impacts	Receptors		
	Benthic Habitat – Bare Substrate	Fisheries – Commercial (Commonwealth)	Fisheries – Commercial (State)
Change in ecosystem dynamics	✓	✓	✓

6.2.3.1 Change in ecosystem dynamics

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., project area).
- Colonisation (e.g., dislodgement or reproduction) of the marine species in the recipient region, followed by successful establishment of a viable new local population.

It is estimated that there are more than 250 exotic species in the Australian marine environment and that about one in six to ten introduced marine species become ‘pests’ (i.e. the effects of the introduced organisms are sufficiently severe) (McDonald, 2008).

IMS are likely to have little or no natural competition or predators, thus potentially outcompeting native species for food or space, preying on native species, or changing the nature of the environment.

Marine pest species can also deplete fishing grounds and aquaculture stock, with between 10% and 40% of Australia’s fishing industry being potentially vulnerable to marine pest incursion. For example, the introduction of the Northern Pacific seastar (*Asterias amurensis*) in Victorian and Tasmanian waters was linked to a decline in scallop fisheries (DSE, 2004). Similarly the New Zealand screw shell (*Maoricolpus roseus*), thought to have been introduced on dry ballast or through the live oyster trade, may threaten other mollusc species, including scallops. The New Zealand screw shell can densely blanket the sea floor with live and dead shells, and faecal pellets and therefore also smother other seafloor species (ABC Science, 2000).

Marine pests can also damage marine and industrial infrastructure, such as encrusting jetties and marinas or blocking industrial water intake pipes. By building up on vessel hulls, they can slow the vessels down and increase fuel consumption.

The benthic habitat within the operational area is characterised by a soft sediment and shell/rubble seabed, infauna communities, and sparse epibiotic communities (typically sponges). The nearest area of higher value or sensitivity to BTW, the Ninety Mile Beach Marine National Park on the Victorian coast, is located more than 15 km inshore from the operational area. The Beware Reef Marine Sanctuary and Point Hicks Marine National Park are located more than 40 kms inshore from the KPA operational area.

Once established, some pests can be difficult to eradicate (Hewitt, 2002) and therefore there is the potential for a long-term or persistent change in habitat structure. It has been found that highly disturbed environments (such as marinas) are more susceptible to colonisation than open-water environments, where the number of dilutions and the degree of dispersal are high (Paulay *et al*., 2002).

If an IMS was introduced, and if it did colonise an area, it is expected that any colony would remain fragmented and isolated, and only within the vicinity of the wells (i.e. it would not be able to propagate to nearshore environments, and protected marine areas present in the wider region). Therefore, there is the potential for a localised, but irreversible, impact to habitat resulting in a **Level III** consequence.

The JUR legs may pose a risk of introducing IMS. The risk however is lower, when compared to semi-submersible MODUs and vessels, because JURs are either transported between locations on a heavy lift ship or the legs are raised out of the water when towed, meaning that any biofouling generally dehydrates and dies (and may dislodge) between locations and is therefore less likely to survive in a new location (when the legs are lowered and the hull jacked up).

Compliance with regulatory requirements for the management of ballast water and ensuring all vessels are assessed as posing a low biofouling risk in accordance with national guidelines will significantly reduce the likelihood of translocation of an IMS. Successful colonisation in the recipient region would be difficult given the nature of the benthic habitats near the operational area (i.e. predominantly bare sands with patchy occurrences of hard substrate) and location outside of coastal waters where the risk of IMS establishment is considered greatest (BRS, 2007). It is considered **Very Unlikely (D)** that this activity would result in the introduction of an IMS and any subsequent impact to receptors.

6.2.4 Risk Ranking

Consequence	Likelihood	Risk Ranking
III	D	4

6.2.5 Controls

Environmental Performance Outcome	Control	Environmental Performance Standard	Measurement Criteria
No introduction and establishment of IMS	Ballast Water Management Plan (BWMP) and Ballast Water Management Certificate (BWMC)	Ballast Water Management Plan approved in accordance with IMO Ballast Water Management Convention - Guidelines for Ballast Water Management and Development of Ballast Water Management Plans Ballast Water Management Certificate approved in accordance with Regulation E-1 of the Ballast Water Convention	Approved BWMP and BWMC.
	Ballast Water Record System	Ballast Water Record System is maintained in accordance with Regulation B-2 of the Annex to the IMO Ballast Water Management Convention including • start and finish coordinates • actual pumping times • residual volume remaining in the tank at the end the empty cycle prior to refill (empty refill method only)	Ballast Water Records
	Vessel Master	Vessel Master to obtain DAWR clearance to enter Australian territory through pre-arrival information reported through	Records confirm DAWR clearance obtained if vessel is arriving in

		Maritime Arrivals Reporting System (MARS).	Australian territory from a foreign port or is under biosecurity control.
		Vessel Master to adhere to Australian Ballast Water Management (ABWM) Requirements for ballast water exchange.	Ballast water records show location of ballast water uptake and discharge.
	Anti-fouling Coating (AFC)	Support vessels will have effective and integral AFC.	Documents provided by Vessel Operator demonstrate that AFC is effective and integral. These documents could include: • antifouling record book; • paint specification report; • UWILD reports; or • hull maintenance / cleaning records.
	Anti-fouling Certificate	Vessels with AFC have an Anti-fouling Certificate which certifies that it complies with the requirements of Annex 1 to the International Convention of the Control of Anti-fouling Systems on Ships.	Vessels with AFC have a valid Anti-fouling Certificate.
	Biofouling records	Biofouling records maintained in accordance with IMO Guidelines for the Control and Management of Ships' Biofouling to Minimise the Transfer of Invasive Aquatic Species.	Biofouling records collected in order to conduct biofouling risk assessment confirm these are maintained.
	IMS Risk Assessment Procedure (IMS-RAP)	Biofouling risk assessment conducted in accordance with IMS RAP shows low risk.	Biofouling risk assessment record confirms vessel poses low risk of introducing IMS
	Immersible Retrievable - Equipment Cleaning	All immersible retrievable - equipment has been cleaned and / or inspected in accordance with National Biofouling Management Guidance for the Petroleum Production and Exploration Industry prior to commencement of the activity.	Records document cleaning and / or inspection of immersible retrievable - equipment.

6.2.6 Demonstration of ALARP

ALARP Decision Context and Justification	**Decision Context B** The causes resulting in an introduction of IMS from ballast water discharge or biofouling are well understood and well managed by national and international regulations and industry guidance. Esso is experienced in the implementation of industry requirements through their existing ongoing operations. Given the potential for an irreversible (although localised) effect on the benthic habitat, there is the potential for Consequence Level **III** impacts. No stakeholder objections or were claims raised with regards to the risk of introduction of IMS. Based on the Level **III** consequence rating, Esso believes **ALARP Decision Context B** should apply.

Good Practice	Adopted	Control	Rationale
International Convention for the Control and Management of Ships' Ballast Water and Sediments (Ballast Water Management Convention) (IMO, 2004)	✓	BWMP and BWMC Ballast Water Record System	The Ballast Water Management Convention requires signatory flag states to ensure that ships flagged by them comply with standards and procedures for the management and control of ships' ballast water and sediments. The Convention aims to prevent the spread of harmful aquatic organisms from one region to another and halt damage to the marine environment from ballast water discharge, by minimising the uptake and subsequent discharge of sediments and organisms. • The Convention requires all vessels designed to carry ballast water to implement a ballast water management plan and to carry out ballast water management procedures in accordance with approved methods. Specifically these are: • Use of a ballast water management system • Ballast water exchange in an acceptable area (at least 12NM from land and in at least 50 m water depth) • Use of low risk ballast water • Retention of high risk ballast water on board

			• Discharge to an approved ballast water reception facility. A management certificate is required for all vessels to which the Convention applies, this certificate verifies that the vessel has been surveyed to a standard compliant with the Convention. All vessels that carry ballast water must maintain a ballast water record system.
Maritime Arrivals Reporting System	✓	Vessel Master	The Vessel Master has responsibility for ensuring a pre-arrival report is submitted in MARS and clearance to enter Australian territory is obtained from DAWR. Offshore installations operating outside of Australian territory are not under the jurisdiction of the Biosecurity Act 2015. However, any conveyance (vessel or aircraft) which leaves Australian territory and is not subject to biosecurity control, and which interacts with an installation (or other conveyance) outside of the Australian territory will become an 'exposed conveyance'. A conveyance becomes exposed by being in physical contact with, in close proximity to or being contaminated by the installation or another conveyance. When the exposed conveyance returns to Australian territory, it becomes subject to biosecurity control and it must pre-arrival report and notify if it intends to unload goods, unless exempt under the Biosecurity (Exposed conveyance – exceptions from biosecurity control) Determination 2016.
Australian Ballast Water Management Requirements (DAWR, 2017)	✓	Vessel Master	The Vessel Master has responsibility for ensuring these Requirements are followed. The Requirements describe the obligations on vessel operators with regards to the management of ballast water and sediments when operating in Australian seas.

			The acceptable area for a ballast water exchange between an offshore oil and gas installation and an Australian port is in areas that are no closer than 500 m from the offshore installation and no closer than 12 NM from the nearest land.
Prevent biofouling of vessel hull	✓	Anti-fouling Coating	An anti-fouling coating is commonly applied as the outer layer to the hull of a ship to slow the growth and/or facilitate detachment of subaquatic organisms that attach to the hull i.e. biofouling.
International Convention of the Control of Antifouling Systems on Ships (AFS Convention) (IMO, 2001)	✓	Anti-fouling Certificate	The AFS Convention prohibits the use of harmful organotins in anti-fouling paints used on ships and establishes a mechanism to prevent the potential future use of other harmful substances in anti-fouling systems. Annex I states that all ships shall not apply or re-apply organotins compounds which act as biocides in anti-fouling systems. This applies to all ships (including fixed and floating platforms, floating storage units and Floating Production Storage and Offtake units), however the survey and certification regime does not apply to these.
Guidelines for the Control and Management of Ships' Biofouling to Minimise the Transfer of Invasive Aquatic Species (Biofouling Guidelines) (IMO, 2011)	✓	Biofouling Records	The Biofouling Guidelines recommend that a Biofouling Record Book be maintained for each ship, in which should be recorded the details of all inspections and biofouling management measures undertaken on the ship.
National Biofouling Guidelines for the Petroleum Production and Exploration Industry (DAWR, 2009)	✓	IMS Risk Assessment Procedure	Biofouling risk will be assessed, and mitigated, in accordance with these Guidelines This means biofouling risk will be assessed with: • In-water inspection by divers or inspection in dry dock undertaken if deemed necessary.

			• Cleaning of hull and internal seawater systems undertaken if deemed necessary. • Antifouling coating status taken into account, with antifouling renewal undertaken if deemed necessary. The Western Australian Department of Fisheries Biofouling Risk Assessment Tool (https://vesselcheck.fish.wa.gov.au) will be completed for the JUR and support vessels to calculate a vessel risk status (in the absence of an equivalent [and as a proxy for] Commonwealth- or Victorian-waters risk assessment tool). Only vessels with low risk rankings will be permitted to work on the activity.
		Immersible equipment cleaning	Management of submersible equipment will be in accordance with these Guidelines.

Engineering Risk Assessment			
Additional, Alternative, Improved Controls	Benefit	Cost / Feasibility	Adopted
Use of freshwater ballast	By using freshwater ballast the likelihood of introducing an IMS can be reduced. However because the likelihood of the consequence is already low (see above), there is limited environmental benefit associated with implementing this measure.	Costs associated with this measure are high, and disproportionate to the benefit.	Not adopted
Use only JUR/support vessels that are currently operating in Bass Strait to	By only using vessels or MODUs that are currently operating in Bass Strait, the	Limiting JUR/support vessel selection to use of those currently operating in Bass	Not adopted

reduce the potential for introduction of IMS.	likelihood of introducing an IMS can be reduced. However, because the likelihood of the consequences is already low (see above), there is limited environmental benefit associated with implementing this measure.	Strait could potentially pose a significant risk in terms of time and duration for sourcing a vessel, as well as the ability of those chosen to perform the required tasks. This potential cost is grossly disproportionate to the minor environmental gain (of reducing the potential likelihood of IMS introduction) achieved, and is not reasonably practicable.	
Inspect and clean all vessels	By dry docking and cleaning all wetted surfaces on all vessels the likelihood of a pest relocation is considerably lowered.	Inspection and cleaning require specialist facilities, sites with no pests immediately prior to the work commencing. The risk already has a low likelihood so the substantial cost (and time required) to inspect and clean all vessels outweighs the environmental benefit.	Not adopted

6.2.7 Demonstration of Acceptability

Factor	Demonstration Criteria	Criteria Met	Rationale
Risk Assessment Process for Unplanned Events	The risk ranking is lower than Category 1	✓	The risk ranking is Category 4 (the lowest category) and therefore considered acceptable.
Principles of Ecologically Sustainable	No potential to affect biological diversity and ecological integrity (i.e.	✓	There is potential for a localised, but irreversible, impact to benthic communities resulting in a Level III

Development (ESD)	Consequence Level is not I)		consequence. This impact is limited in extent (i.e. localised) and is not considered as having the potential to affect biological diversity and ecological integrity.
	Activity does not have the potential to result in serious or irreversible environmental damage.	✓	Although the habitat with the potential to be impacted is characterised by soft sediment communities, because of the potential for irreversible impacts, this aspect is considered as having the potential to (although very unlikely) result in serious or irreversible environmental damage. Therefore, further evaluation against the remaining Principles of ESD is required. There is little uncertainty associated with this aspect as the activities are well practised, the cause pathways are well known, and activities are well regulated and managed. It is not considered that there is significant scientific uncertainty associated with this aspect. Therefore, the precautionary principle has not been applied.
Legislative and Other Requirements	Legislative and other requirements have been identified and met.	✓	The requirements of the International Convention for the Control and Management of Ships' Ballast Water and Sediments (IMO, 2004), International Convention on the Control of Harmful Anti-fouling Systems on Ships (IMO, 2001) and Guidelines for the Control and Management of Ships' Biofouling to Minimise the Transfer of Invasive Aquatic Species (IMO, 2011) have been adopted. The following legislative and other requirements are considered relevant as they apply to the implementation of these Guidelines and Conventions in Australia:

			• Biosecurity Act 2015 • Protection of the Sea (Harmful Anti-fouling Systems) Act 2006. • Marine Order 98 (Marine pollution prevention - anti-fouling systems) 2013. Australian Ballast Water Management Requirements (DAWR, 2017) will be adhered to and measures for managing ballast water discharges in this document are incorporated in the controls. Biofouling risk is assessed, and mitigated, in accordance with the National Biofouling Guidelines for the Petroleum Production and Exploration Industry (DAWR, 2009).
Internal Context	Consistent with Esso's Environment Policy.	✓	Proposed activities are consistent with Esso's Environment Policy, in particular, to "comply with all applicable environmental laws and regulations and apply responsible standards where laws and regulations do not exist"
	Meets ExxonMobil Environmental Standards	✓	There is no specific Environmental Standard which addresses the introduction of IMS but the activities proposed meet the strategic objectives of the Upstream Environmental Standards.
	Meets ExxonMobil Operations Integrity Management System (OIMS) Objectives	✓	Proposed activities meet: OIMS System 6-5 objective to identify and assess environmental aspects; significant aspects are addressed and controlled consistent with policy and regulatory requirements; and OIMS System 8-1 objective to qualify, evaluate and select contractors based on their ability to perform work in a safe, secure and environmentally sound manner.

External Context	Stakeholder concerns have been considered / addressed through the consultation process.	✓	No specific stakeholder concerns have been raised concerning the risk of introduction of IMS.

6.3 Accidental Release – Dropped Objects

6.3.1 Causes of dropped objects

Dropped objects may be released by accidently dropping objects (e.g. small tools (such as spanners) or equipment (such as clamps)), cargo loads (such as bulk chemical containers or chemical wastes), subsea infrastructure (such as wellheads and subsea trees) overboard from the JUR or support vessels, or during ROV operations, due to human error, equipment failure or adverse weather.

6.3.2 Risks of dropped objects

The accidental release of dropped objects has the potential to result in:

- Change in habitat; and
- Change in water quality.

6.3.3 Risk Assessment

Receptors that could be affected by dropped objects and that have been identified in the Description of Environment as occurring in the area are identified below.

Impacts	Receptors				
	Benthic Habitat – Bare Substrate	Plankton	Fish	Marine Reptiles - Turtles	Marine Mammals
Change in habitat	✓				
Change in water quality		✓	✓	✓	✓

6.3.3.1 Change in habitat

In the unlikely event of an accidental dropped object from either the JUR or support vessels, or during ROV operations, effects will be limited to localised physical disturbance to benthic communities arising from equipment sinking to, and dragging across the seabed. Any environmental impact caused by damage to small areas of seabed and associated communities would be mitigated by ubiquitous distribution of similar habitat in the region.

Severity of impact to benthic communities is affected by density of biota, sensitivity of biota to disturbance and recovery potential of benthic communities. Physical disturbance to the seabed from a dropped load would be limited to the footprint of the load (estimated at less than 10 m^2) and temporary in nature if the item was retrieved and long term if irretrievable. Both are likely to pose minor environmental risk as the seabed within the operational area is largely sandy sediment with benthic assemblages (predominantly polychaetes (worms), crustaceans and molluscs) that are not particularly susceptible to physical disturbance.

Wastes such as paint cans containing paint residue, batteries and so forth, would settle on the seabed if dropped overboard. Over time, this may result in the leaching of chemicals to the seabed resulting in a small area of substrate becoming toxic and unsuitable for colonisation by benthic fauna. Given the low release volumes it is expected that only very small areas of benthic habitat would be affected.

Considering the possible footprint of a dropped object (against the total area of similar habitat within the Bass Strait region) it is highly unlikely that a dropped object would have an effect on any benthic community other than a minor and localised one resulting in a **Level IV** (Inconsequential or No Adverse Impact) consequence.

6.3.3.2 Change in water quality

Impacts from a chemical release during crane transfer of bulk chemical containers - with the maximum volume based upon the loss of an intermediate bulk container 1 m3 - would be minimal, due to the small potential volumes released, and the fact that spilled chemicals will rapidly evaporate, disperse and weather. In the open ocean environment, the spilled liquids would be rapidly dispersed and diluted to concentrations at which they are non toxic resulting in a **Level IV** (Inconsequential or No Adverse Impact) consequence.

The key risk to benthic habitat is that a cargo load or subsea equipment is dropped during lifting, given the controls in place it is considered **Very Unlikely (D)** that such a dropped object would result in the impacts described above.

6.3.4 Risk Ranking

Consequence	Likelihood	Risk Ranking
IV	D	4

6.3.5 Controls

Environmental Performance Outcome	Control	Environmental Performance Standard	Measurement Criteria
No dropped objects which result in disturbance of benthic habitat.	Crane handling and transfer procedures	The crane handling and transfer procedure is in place and implemented by crane operators (and others, such as dogmen).	Completed handling and transfer procedure checklist, PTWs and/or risk assessments verify that the procedure is implemented prior to each transfer.
	Planned Maintenance System (PMS)	Visual inspection of lifting gear is undertaken every quarter by a qualified competent person (e.g. maritime officer) and lifting gear	Inspection of PMS records and Lifting Register verifies that inspections and testing have been conducted to schedule.

		is tested regularly in line with the PMS.	
	Cargo Securing Manual	All cargo securely fastened to or stored during transport in accordance with approved Cargo Securing Manual to prevent loss to sea.	A completed pre-departure inspection checklist verifies that cargo is securely sea-fastened.

6.3.6 Demonstration of ALARP

ALARP Decision Context and Justification	**Decision Context A** The use of cranes and other lifting equipment to handle equipment and materials offshore is well practiced. There is a good understanding of potential dropped object sources, and the control measures required to manage these. Furthermore, the associated safety risks mean that these activities are well regulated. There is little uncertainty associated with the potential environmental impacts which have been evaluated as **Consequence Level IV** (the lowest level). No objections or concerns were raised during stakeholder consultation with regard to the risk of dropped objects. Esso believes **ALARP Decision Context A** should apply.		
Good Practice	Adopted	Control	Rationale
American Petroleum Industry (API) Recommended Practice (RP) 2D	✓	Crane handling and transfer procedures	API RP 2D are industry-developed requirements which provide guidance in the development of operating and maintenance procedures for use in the safe operation of cranes on fixed or floating off-shore platforms. The JUR holds Cargo Gear Certificates which certify that the deck cranes and accessory gear are compliant with API RP 2D.
Maintenance of lifting gear	✓	Planned Maintenance System (PMS)	It is industry good practice that a PMS is in place to ensure that the lifting gear continues to operate at the required standard.
SOLAS Chapter VI Carriage of Cargoes & Chapter	✓	Cargo Securing Manual	SOLAS is the International Convention for the Safety of Life at Sea and sets minimum safety standards in the construction, equipment and operation of merchant ships.

VII Carriage of Dangerous Goods			In accordance with regulations VI/5 and VII/5 of the SOLAS Convention cargo units and cargo transport units will be loaded, stowed and secured throughout the voyage in accordance with the approved Cargo Securing Manual (as appropriate to vessel class).

Engineering Risk Assessment			
Additional, Alternative, Improved Controls	Benefit	Cost / Feasibility	Adopted

6.3.7 Demonstration of Acceptability

Factor	Demonstration Criteria	Criteria Met	Rationale
Risk Assessment Process for Unplanned Events	The risk ranking is lower than Category 1	✓	The risk ranking is Category 4 (the lowest category) and is therefore considered acceptable.
Principles of Ecologically Sustainable Development (ESD)	No potential to affect biological diversity and ecological integrity (i.e. Consequence Level is not I)	✓	The potential impact associated with this aspect is limited to a localised short-term impact, which is not considered as having the potential to affect biological diversity and ecological integrity.
	Activity does not have the potential to result in serious or irreversible environmental damage.	✓	The activities were evaluated as having the potential to result in a Level IV consequence thus are not considered as having the potential to result in serious or irreversible environmental damage.
Legislative and Other Requirements	Legislative and other requirements have been identified and met.	✓	The proposed activities outlined in this EP align with the requirements of the: • OPGGS Act 2006: • Section 280(2) - no interference with….the conservation of the

			resources of the sea and seabed…..to a greater extent than is necessary for the exercise of the rights conferred by titles granted. • Schedule 3 Occupational health and safety and OPGGS (Safety) Regulations 2009 (OPGGS(S)R). The OPGGS(S)R require the operator of each offshore facility to prepare a safety case for submission to NOPSEMA including assessment and controls to manage significant risks associated with dropped objects. Activities at a facility must be conducted in accordance with a safety case that has been accepted by NOPSEMA. The requirements of SOLAS Chapters VI and VII, in relation to a Cargo Securing Manual, have also been adopted.
Internal Context	Consistent with Esso's Environment Policy.	✓	Proposed activities are consistent with Esso's Environment Policy, in particular, to "comply with all applicable environmental laws and regulations and apply responsible standards where laws and regulations do not exist"
	Meets ExxonMobil Environmental Standards	✓	There is no specific Environmental Standard which addresses accidentally dropped objects but the activity proposed meets the strategic objectives of the Upstream Environmental Standards.
	Meets ExxonMobil Operations Integrity Management System (OIMS) Objectives	✓	Proposed activities meet: OIMS System 6-5 objective to identify and assess environmental aspects; significant aspects are addressed and controlled consistent with policy and regulatory requirements; and

			OIMS System 8-1 objectives to clearly define and communicate operations integrity requirements to contractors and to qualify, evaluate and select contractors based on their ability to perform work in a safe, secure and environmentally sound manner.
External Context	Stakeholder concerns have been considered / addressed through the consultation process.	✓	No specific stakeholder concerns have been raised concerning the risk of dropped objects.

6.4 Accidental Release – Waste

6.4.1 Causes of accidental release of waste

The handling and storage of materials and waste on board the JUR and support vessels has the potential for accidental over-boarding of hazardous/non-hazardous materials and waste. Small quantities of hazardous/non-hazardous materials (solids and liquids) will be used and wastes created, and then handled and stored on board until transferred to port facilities for disposal at licensed onshore facilities. However, accidental releases to sea are a possibility, such as in rough ocean conditions when items may roll off or be blown off the deck.

The following non-hazardous materials and wastes will be disposed of to shore, but have the potential to be accidentally dropped or released overboard.

- Paper and cardboard;
- Wooden pallets;
- Scrap steel, metal, aluminium, cans;
- Glass; and
- Plastics.

The following hazardous materials may be used and waste generated through the use of consumable products and will be disposed to shore, but may be accidentally dropped or released overboard:

- Hydrocarbons, hydraulic oils and lubricants;
- Hydrocarbon-contaminated materials (e.g., oily rags, pipe dope, oil filters);
- Batteries, empty paint cans, aerosol cans, fluorescent tubes, printer cartridges;
- Contaminated personal protective equipment (PPE); and
- Acids and solvents (laboratory wastes).

6.4.2 Risk of accidental releases of waste

The potential environmental impacts associated with the accidental release of waste are:

- Injury / mortality to fauna; and
- Change in habitat.

6.4.3 Risk Assessment

Receptors that could be affected by the accidental release of waste and that have been identified in the Description of Environment as occurring in the area are identified below.

Impacts	Receptors					
	Plankton	Benthic Habitat – Bare Substrate	Fish	Marine reptiles - Turtles	Birds	Marine mammals
Injury / mortality to fauna			✓	✓	✓	✓
Change in habitat	✓	✓	✓	✓	✓	✓

6.4.3.1 Injury / mortality to fauna

Discharged overboard, wastes can cause injury or death to marine fauna or seabirds through ingestion or entanglement (e.g. plastics caught around the necks of seals or ingested by seabirds, fish or cetaceans). Several marine mammals (e.g. whales, dolphins, seals), marine reptiles and fish including those listed as either threatened and/or migratory under the EPBC Act have the potential to occur within the operational area. The Pygmy blue whale has distribution and foraging habitat overlapping the operational areas and the Southern right whale migration BIA also overlaps the operational areas. The Great white shark breeding and distribution BIAs overlap the operational areas.

Most records of impacts of plastic debris on wildlife relate to entanglement, rather than ingestion. However, the rate of ingestion of plastic debris by marine wildlife is difficult to assess as not all dead animals are necropsied or ingested plastic debris may not be recorded where it is not considered as the primary cause of death.

The patterns of reports of entanglement in and ingestion of plastic debris by wildlife in Australian waters are likely to be influenced by factors such as the size and distribution of populations, foraging areas, migration patterns, diets, proximity of species to urban centres, changes in fisheries equipment and practices, weather patterns, and ocean currents, as well as the frequency of monitoring and/or observation of wildlife. Species dominating existing entanglement and ingestion records are turtles and Humpback whales. Australian pelicans and a number of cormorant species are also frequently reported (C&R Consulting, 2009).

6.4.3.2 Change in habitat

Hazardous wastes released to the sea can cause pollution and contamination, with either direct or indirect effects on marine organisms. For example, chemical residues (depending on the volumes released) can impact on marine life from plankton to pelagic fish communities, causing physiological damage through ingestion or absorption through the skin. Impacts from a minor accidental release would be limited to the immediate area surrounding the release, prior to the dilution of the chemical with the surrounding seawater. In an open ocean environment such as the operational area, it is expected that any release would be rapidly diluted and dispersed, and thus temporary and localised.

Solid hazardous wastes, such as paint cans containing paint residue, batteries and so forth, would settle on the seabed if dropped overboard. Over time, this may result in the leaching of hazardous materials to the seabed, which is likely to result in a small area of substrate becoming toxic and unsuitable for colonisation by benthic fauna. The benthic habitats of the area are broadly similar to those elsewhere in the region, so impacts to very localised areas of seabed will not result in the long-term loss of benthic habitat or species diversity or abundance.

Given the restricted exposures and limited quantity of marine pollution expected from this program, it is expected that any impacts from marine pollution may have a consequence of **Level IV** (Inconsequential or No Adverse Effect) resulting from a localised short-term impact to species of recognised conservation value but not affecting local ecosystem functioning.

As discussed above, marine pollution has previously caused injury and death of marine fauna however given the control measures in place pollution of the marine environment is not expected to occur during the drilling activities. The probability of an accidental release of waste resulting in these impacts is considered to be **Very Unlikely (D)**.

6.4.4 Risk Ranking

Consequence	Likelihood	Risk Ranking
IV	D	4

6.4.1 Controls

Environmental Performance Outcome	Control	Environmental Performance Standard	Measurement Criteria
No unplanned overboard release of waste	Class certification	Vessel compliant with MARPOL Annex V as appropriate to vessel class.	Vessels have class certification verified and issued by IACS member.

6.4.2 Demonstration of ALARP

ALARP Decision Context and Justification	**Decision Context A** The risk of accidental release of waste is well regulated via various treaties and legislation, both nationally and internationally, which specify industry best practice control measures. These are well understood and implemented by the industry. There is little uncertainty associated with the potential environmental impacts of this risk and the consequence of any impact was assessed as Level IV (the lowest level).

	No objections or claims raised by relevant stakeholders during consultation for the campaign. Esso believes **ALARP Decision Context A** should apply.

Good Practice	Adopted	Control	Rationale
MARPOL Annex V Prevention of Pollution from Garbage from Ships	✓	Class certification	The vast majority of commercial ships are built to and surveyed for compliance with the standards (i.e. Rules) laid down by classification societies. The role of vessel classification and classification societies has been recognised by the International Maritime Organisation (IMO) across many critical areas including the International Convention for the Safety of Life at Sea, (SOLAS), the 1988 Protocol to the International Convention on Load Lines and the International Convention for the Prevention of Pollution from Ships (MARPOL). A vessel built in accordance with the applicable Rules of an IACS Member society may be assigned a class designation relevant to the IMO rules, on satisfactory completion of the relevant classification society surveys. For ships in service, the society carries out routine scheduled surveys to verify that the ship remains in compliance with those Rules. Should any defects that may affect class become apparent, or damages be sustained between the relevant surveys, the owner is required to inform the society concerned without delay. MARPOL Annex V Regulations for the Prevention of Pollution by Garbage from Ships specifically requires vessels (as appropriate to class) to have a garbage management plan and garbage record book in place and implemented.

Engineering Risk Assessment			
Additional, Alternative, Improved Controls	Benefit	Cost / Feasibility	Adopted

6.4.3 Demonstration of Acceptability

Factor	Demonstration Criteria	Criteria Met	Rationale
Risk Assessment Process for Unplanned Events	The risk ranking is lower than Category 1	✓	The risk ranking is Category 4 (the lowest category) and therefore considered acceptable.
Principles of Ecologically Sustainable Development (ESD)	No potential to affect biological diversity and ecological integrity (i.e. Consequence Level is not I)	✓	The potential impact associated with this aspect is limited to a localised and likely short-term impact, which is not considered as having the potential to affect biological diversity and ecological integrity.
	Activity does not have the potential to result in serious or irreversible environmental damage.	✓	The activities were evaluated as having the potential to result in a Level IV consequence thus are not considered as having the potential to result in serious or irreversible environmental damage.
Legislative and Other Requirements	Legislative and other requirements have been identified and met.	✓	Requirements of MARPOL Annex V have been adopted. The following legislative and other requirements are considered relevant as they apply to the implementation of MARPOL in Australia: • Protection of the Sea (Prevention of Pollution from Ships) Act 1983. • Navigation Act 2012 – Chapter 4 (Prevention of Pollution). • Marine Order 95 (Marine pollution prevention - garbage) 2013.
Internal Context	Consistent with Esso's Environment Policy.	✓	Proposed activities are consistent with Esso's Environment Policy, in particular, to "comply with all applicable environmental laws and regulations and apply responsible

			standards where laws and regulations do not exist”
	Meets ExxonMobil Environmental Standards	✓	Proposed activity meet the requirements of the Upstream Waste Management Standard in particular “develop and implement a Waste Management Plan”.
	Meets ExxonMobil Operations Integrity Management System (OIMS) Objectives	✓	Proposed activities meet: OIMS System 6-5 objective to identify and assess environmental aspects; significant aspects are addressed and controlled consistent with policy and regulatory requirements; OIMS System 8-1 objective to qualify, evaluate and select contractors based on their ability to perform work in a safe, secure and environmentally sound manner.
External Context	Stakeholder concerns have been considered / addressed through the consultation process.	✓	No specific stakeholder concerns have been raised concerning the accidental release of waste.

6.5 Accidental Release – LOC Hazardous Substances

6.5.1 Causes of loss of containment of hazardous substances

Hazardous materials that could be accidentally released to the environment include fuels, hydraulic fluids and drilling muds. Causes of accidental releases from the JUR, support vessels and ROV may include:

- Failure or mechanical breakdown of equipment that use, store or transfer hazardous materials
- Failure to align valves correctly during transfer to tanks
- Overfilling of chemical or mud tanks on JUR
- Wrongly operated Mud System or other ‘environmentally sensitive’ valves
- Overfilling of fuel bulk storage tanks on the JUR

An evaluation of these types of events was completed to determined indicative volumes associated with each type of event.

Both hydraulic line failure and failure or breakdown of equipment onboard were associated with small volume spill events. An ROV underwater hydraulic line failure, for example, is estimated to result in a maximum spill volume of 20 L.

Operational fluids, e.g. drilling and completion fluids or brines, inadvertently released from a valve misalignment, overfilling of tanks or unintentionally dumped from the storage tanks would pose the same or lesser risk. Volumes are likely to be less as the tanks are compartmentalised and have redundant alarms systems.

AMSA (2015) suggests the maximum credible spill volume from a refuelling incident with continuous supervision is approximately the transfer rate over 15 minutes. Assuming failure of dry-break couplings and based on the largest typical transfer rate in the order of 250 m^3/h rate this equates to an instantaneous spill of approximately 63 m^3.

6.5.2 Risks of loss of containment of hazardous substances

A minor loss of containment has the potential to result in chronic and acute impacts to marine fauna via:

- Change in water quality; and
- Change in habitat.

6.5.3 Risk Assessment

Receptors that could be affected by a LOC of hazardous substances and that have been identified in the Description of Environment as occurring in the area are identified below.

Impacts	Receptors				
	Benthic Habitat – Bare Substrate	Plankton	Fish	Marine Reptiles - Turtles	Marine Mammals
Change in water quality		✓	✓	✓	✓
Change in habitat	✓				

Given the low toxicity, high biodegradability of ROV hydraulic fluid the accidental release of a small volume is unlikely to adversely affect the receiving environment.

Effects from planned operational discharges and the planned discharge of cement and drilling muds and cuttings are discussed in detail in Sections 5.7, 5.8 and 5.9. In the event of an unplanned loss of containment little incremental effect is expected on the benthic habitat beyond that predicted for planned discharges. The loss of a small area of habitat, until it can be re-colonised, will not adversely affect the viability of local populations of infauna or epifauna, the ecology of the local area or the biodiversity of the region. The incremental increase in consequence is considered **Consequence Level IV** (Inconsequential or No Adverse Effect) as supported by considering the footprint as a percentage of the area of the Bass Strait region.

Small open sea hydrocarbon spills result in similar short-term impacts as that of a large hydrocarbon release (Brussaard *et al.* 2016). The characteristics of open sea waters is a significant mitigating factor in dispersing small oil spills, such that, no definitive evidence of long-term effects on marina fauna has been identified (Dicks, 1998). The environmental risks associated with a larger loss of diesel fuel from a vessel collision are assessed in Section 6.6. The environmental risks associated with an accidental release of 63 m^3 of diesel will be less than that associated with a loss of diesel from a vessel collision, and thus have not been evaluated further here.

Considering the small volumes of chemicals or hydrocarbons associated with this type of event together with the control measures in place, the probability of a loss of containment of hazardous substances resulting in the impacts described above is considered **Very Unlikely (D)**.

6.5.4 Risk Ranking

Consequence	Likelihood	Risk Ranking
IV	D	4

6.5.5 Controls

Environmental Performance Outcome	Control	Environmental Performance Standard	Measurement Criteria
No unplanned release of hazardous substances to the marine environment	Bunkering / NAF and chemical transfer procedures	Bulk fluid transfer procedures are in place before commencing operations. The process will include: • communication protocols (including testing prior to commencement). • continuous visual monitoring. • tank volume monitoring. • hose and dry break coupling inspection, prior to each use.	Records (PTW, JSA or equivalent) demonstrate implementation of bulk fluid transfer process.
	Design and certification of hoses	Transfer hoses shall comprise sufficient floating devices and self-sealing weak-link couplings in the mid-section of the hose string, where required, and suitable pressure rating.	Hose certificate confirms suitable fittings and rating.
	Planned Maintenance System (PMS)	The transfer hoses are inspected and replaced in accordance with the PMS or when they are visibly degraded.	The hose register and PMS indicate regular inspection and replacement of fuel/chemical/mud hoses

	Bunding	Bulk liquid transfer points and equipment located on deck utilising hydraulic fluids (e.g. cranes, winches or other hydraulic equipment) will have primary bunding or sheathing.	Inspection records demonstrate that bulk transfer points and equipment located on deck utilising hydraulic fluids have primary bunding or sheathing.
	Class certification	Vessel compliant with MARPOL Annex I, as appropriate to class.	Vessels have class certification verified and issued by IACS member.

6.5.6 Demonstration of ALARP

ALARP Decision Context and Justification	**Decision Context A** The transfer, storage and handling of fuels and chemicals offshore are commonly practised activities. There is a good understanding of potential spill sources, and the control measures required to manage these. Furthermore, the associated safety risks mean that these activities are well regulated. There is little uncertainty associated with the potential environmental impacts which have been evaluated as consequence Level IV (the lowest level). No stakeholder objections or were claims raised during consultation for this campaign. Esso believes **ALARP Decision Context A** should apply.

Good Practice	Adopted	Control	Rationale
Job Safety Analysis (JSA) and Permit to Work (PTW)	✓	JUR and support vessel bunkering / drilling fluid and chemical transfer procedures	JSA and PTW controls reflect industry good practice adopted to ensure the safety of personnel on board all vessels servicing and supporting offshore facilities, and to reduce the risks associated with such operations.
Design and certification of hoses	✓	Design and certification of hoses	Hose certification reflects industry good practice adopted to ensure the safety of personnel on board all vessels servicing and supporting offshore facilities, and to reduce the risks associated with such operations.

Maintenance of hoses	✓	Planned Maintenance System (PMS)	It is industry good practice that a PMS is in place to ensure that hoses are inspected and replaced when degraded.
Containment of oils and chemicals to prevent spills overboard	✓	Bunding	It is industry good practice that storage of oils and chemicals is adequately contained.
Shipboard Marine Pollution Emergency Plan (SMPEP)	✓	Class certification	The vast majority of commercial ships are built to and surveyed for compliance with the standards (i.e. Rules) laid down by classification societies. The role of vessel classification and classification societies has been recognised by the International Maritime Organisation (IMO) across many critical areas including the International Convention for the Safety of Life at Sea, (SOLAS), the 1988 Protocol to the International Convention on Load Lines and the International Convention for the Prevention of Pollution from Ships (MARPOL). A vessel built in accordance with the applicable Rules of an IACS Member society may be assigned a class designation relevant to the IMO rules, on satisfactory completion of the relevant classification society surveys. For ships in service, the society carries out routine scheduled surveys to verify that the ship remains in compliance with those Rules. Should any defects that may affect class become apparent, or damages be sustained between the relevant surveys, the owner is required to inform the society concerned without delay. MARPOL Annex I Regulations for the Prevention of Pollution by Oil specifically require that a Shipboard Marine Pollution Emergency Plan (SMPEP) (or equivalent, according to class) is in place. To prepare for a spill event, the SMPEP details: • response equipment available to control a spill event

			• review cycle to ensure that the SMPEP is kept up to date • testing requirements, including the frequency and nature of these tests. In the event of a spill, the SMPEP details: • reporting requirements and a list of authorities to be contacted • activities to be undertaken to control the release • procedures for coordinating with local authorities.

Engineering Risk Assessment			
Additional, Alternative, Improved Controls	Benefit	Cost / Feasibility	Adopted

6.5.7 Demonstration of Acceptability

Factor	Demonstration Criteria	Criteria Met	Rationale
Risk Assessment Process for Unplanned Events	The risk ranking is lower than Category 1	✓	The risk ranking is Category 4 (the lowest category) and therefore considered acceptable.
Principles of Ecologically Sustainable Development (ESD)	No potential to affect biological diversity and ecological integrity (i.e. Consequence Level is not I)	✓	The potential impact associated with this aspect is limited to a localised short-term impact, which is not considered as having the potential to affect biological diversity and ecological integrity.
	Activity does not have the potential to result in serious or irreversible environmental damage.	✓	The activities were evaluated as having the potential to result in a Level IV consequence thus are not considered as having the potential to result in serious or irreversible environmental damage.

Legislative and Other Requirements	Legislative and other requirements have been identified and met.	✓	The requirements of MARPOL Annex I have been adopted. The following legislative and other requirements are considered relevant as they apply to the implementation of MARPOL in Australia: • Protection of the Sea (Prevention of Pollution from Ships) Act 1983. • Navigation Act 2012 – Chapter 4 (Prevention of Pollution). • Marine Order 91 (Marine pollution prevention – oil) 2014
Internal Context	Consistent with Esso's Environment Policy.	✓	Proposed activities are consistent with Esso's Environment Policy, in particular, to "comply with all applicable environmental laws and regulations and apply responsible standards where laws and regulations do not exist"
	Meets ExxonMobil Environmental Standards	✓	The Upstream Water Management Standard does not specifically address a LOC of hazardous substances but the activities proposed meet the strategic objectives of the Upstream Environmental Standards.
	Meets ExxonMobil Operations Integrity Management System (OIMS) Objectives	✓	Proposed activities meet: OIMS System 6-5 objective to identify and assess environmental aspects; significant aspects are addressed and controlled consistent with policy and regulatory requirements; and OIMS System 8-1 objectives to clearly define and communicate operations integrity requirements to contractors and to qualify, evaluate and select contractors based on their

			ability to perform work in a safe, secure and environmentally sound manner.
External Context	Stakeholder concerns have been considered / addressed through the consultation process.	✓	No specific stakeholder concerns have been raised concerning the accidental release of hazardous substances.

6.6 Accidental Release – LOC Refined Oils (Collision)

6.6.1 Causes of loss of containment of refined oils

The following activities have the potential to result in a spill of marine diesel oil (MDO):

- A collision between the support vessel and the JUR or a third-party vessel that results in tank rupture and MDO loss.

Vessel drift or powered grounding is not considered credible given the distance from shore of the operational area and the lack of emergent features in the operational area.

6.6.2 Spill Modelling

To understand the potential consequences of a MDO spill and the response preparedness required, stochastic and deterministic modelling was undertaken in accordance with Section 3.4.1.1 (RPS, 2019a). Model inputs and parameters are summarised Table 6-1.

Table 6-1 Vessel collision MDO spill modelling inputs

Parameter	Details – KPA Drilling	Details – BTW Drilling
Number of spill simulations	100	
Period of the year (season)	Annual analysis	
Hydrocarbon type	MDO Group II	
Total spill volume	280 m^3	
Volume basis	AMSA's guideline for indicative maximum credible spill volumes for other, nonoil tanker, vessel collision (AMSA 2015) is the volume of the largest fuel tank. The loss of a full tank is most likely an overestimate as hydrostatic pressure would limit the release and pumping of material to another tank could also restrict the amount lost. Based on the type support vessel that may be used, the largest MDO tank volume of 280 m^3 has been used to undertake the impact assessment.	
Release location	Kipper (KPA) subsea facility 38°10' 53" S, 148° 35' 35" E	Barracouta (BTA) platform 38° 17' 54" S, 147° 40' 29" E
Location basis	Location of KPA drilling operations	Modelling was undertaken from a release point located at the BTA platform approximately 6 km from the BTW well locations. This location is appropriate for the assessment of impacts as is

		a similar distance to sensitive shoreline and marine receptors, and consequently is considered to be directly analogous to a release occurring within the BTW operational areas.
Release duration	6 hours	
Modelled duration	30 days	
MDO Characteristics	Density	829 kg/m³ @ 15˚C
	API	37.6
	Dynamic Viscosity	4.0 cP @ 25°C
	Pour Point	-14 ºC
	Oil Property Category	Group II (light persistent oil)

6.6.2.1 Modelling Outputs – Weathering and Fate

Marine diesel contains 95% light hydrocarbons (or non-persistent constituents) that are likely to evaporate when available to the atmosphere. The remaining 5% is composed of heavy hydrocarbons (or persistent compounds) that may persist on the sea-surface for extended times.

It is important to note that the viscosity of marine diesel does not change significantly over time and hence has a strong tendency to physically entrain into the upper water column as oil droplets in the presence of waves, where it is subjected to microbial biodegradation (decay), but can refloat to the surface if wave energies abate.

Both Figure 6-1 and Figure 6-2 clearly show that evaporation is the dominant process contributing to the removal of MDO from the sea surface.

The deterministic trajectory for BTW MDO modelling that resulted in the largest volume of shoreline loading, the longest length of shoreline contacted above 100 g/m² (actionable shoreline oil) and the minimum time before exposure to immediate nearshore waters by visible oil was identified as the 'worst' simulation and was selected for weathering and fate analysis.

Figure 6-1 presents the fates and weathering graph for the BTW 'worst' single spill trajectory. At the conclusion of the simulation period, approximately 67% spilled oil was lost to the atmosphere through evaporation, approximately 14% of the MDO was predicted to have decayed, while approximately 12% was predicted to remain within the water column and 8% is predicted to arrive ashore.

For the KPA release no shoreline contact was predicted, so the deterministic trajectory that had the largest swept area of oil on the sea surface of 10 g/m² (actionable oil) was considered the 'worst' simulation and selected for weathering and fate analysis.

Figure 6-2 presents the fates and weathering graph for the 'worst' KPA single spill trajectory. At the conclusion of the simulation period, approximately 89% spilled oil was lost to the atmosphere through evaporation, approximately 5% of the MDO was predicted to have decayed, while approximately 5% was predicted to remain within the water column.

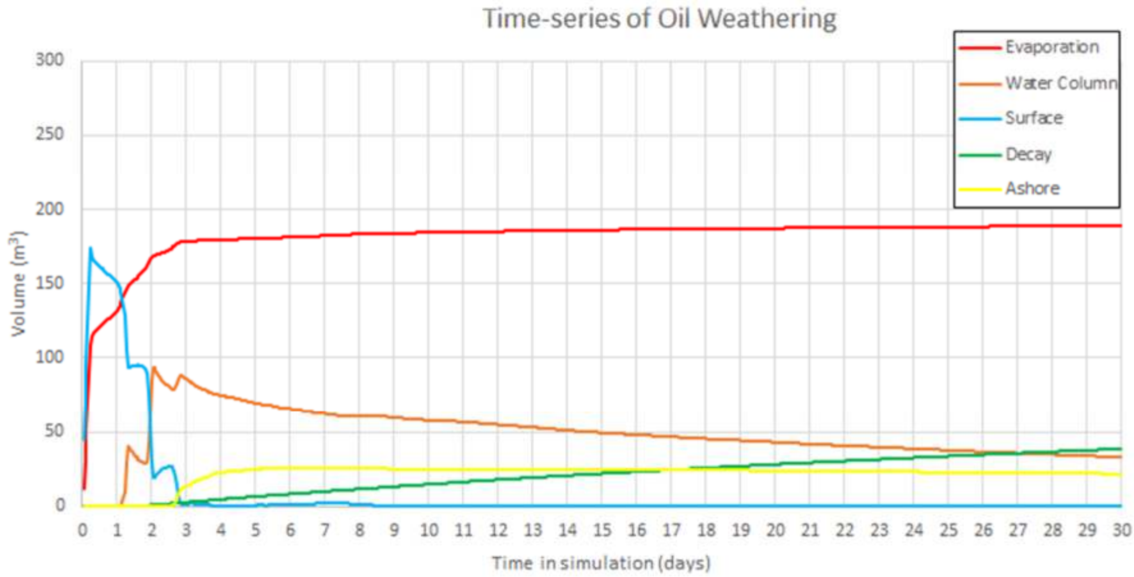

Figure 6-1 Predicted weathering and fates graph as volume for the selected single BTA MDO spill trajectory: largest oil volume ashore, longest length of actionable shoreline oil and minimum time to exposure of nearshore waters to visible oil

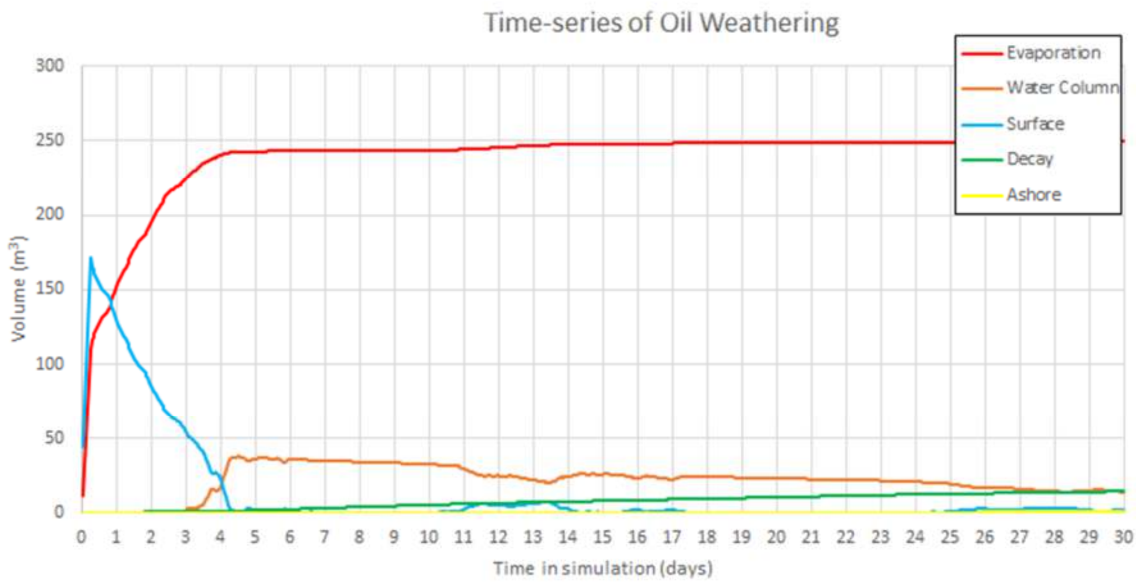

Figure 6-2 Predicted weathering and fates graph as volume for the selected single KPA MDO spill trajectory: largest surface swept area.

6.6.2.2 Modelling Outputs – Stochastic and Deterministic

Oil spill modelling predicts that the total area that could be exposed to hydrocarbon, including trace concentrations of oil in the water column, as a result of any spill. This is known as the Potentially

Exposed Area (PEA) and is used for planning purposes to ensure that all social and environmental sensitivities are acknowledged, described and considered in the development of the EP.

Modelling is also used to inform specific impact assessments by understanding the location and extent of oil at concentrations likely to result in environmental consequences. There is no agreed exposure level below which environmental impacts will not occur so outputs should not be interpreted as a boundary. However, mapping areas which could be moderately impacted by a spill is a useful tool for impact or consequence assessment.

The location and extent of hydrocarbons from a marine diesel spill at BTA or KPA are shown below. Environmental sensitivities within this area are:

Table 6-2 Vessel collision MDO modelling output summary

Model Parameter	Exposure Value	Stochastic Modelling (based on 100 annualised spill trajectories)	
		BTA	KPA
Surface Exposure	Moderate $10g/m^2$	Maximum distance from release site is approx. 33 km in a SW direction. The zone of moderate exposure overlaps several petrel and albatross foraging BIAs, distribution/foraging and migration whale BIAs (for the Pygmy blue and Southern right whales respectively) and the White shark distribution and breeding BIAs. Does not extend into State waters or contact any National Parks and Reserves.	Maximum distance from release site is approx. 17 km in an E direction. The zone of moderate exposure overlaps the KEF: Upwelling East of Eden, several petrel and albatross foraging BIAs, distribution/foraging and migration whale BIAs (for the Pygmy blue and Southern right whales respectively) and the White shark distribution BIA. Does not extend into State waters or contact any National Parks and Reserves.
	High $50g/m^2$	Maximum distance from release location is approx. 10 km in an ENE direction. There is a 25% probability that the zone of high exposure will overlap petrel and albatross foraging BIAs, distribution/foraging and migration whale BIAs (for the Pygmy blue and Southern right whales respectively) and the White shark distribution and breeding BIAs.	Maximum distance from release location is approx. 2 km in a NNE direction. There is a 13% probability that the zone of high exposure will overlap the KEF: Upwelling East of Eden, petrel and albatross foraging BIAs, distribution/foraging and migration whale BIAs (for the Pygmy blue and Southern right whales respectively) and the White shark distribution BIA.
Shoreline Exposure	Moderate $100g/m^2$	Shoreline contact at the moderate exposure threshold along the Gippsland coast between Ocean Grange and Seaspray, is predicted at	None predicted.

		a probability of less than 3%. Note: part of this shoreline is within the Gippsland Lakes Coastal Park. Maximum length of shoreline exposed is 9 km (average approx. 4 km). The minimum time before shoreline accumulation at this threshold is 3 days.	
In-water (dissolved) Exposure	Moderate 50ppb instantaneous	None predicted	None predicted

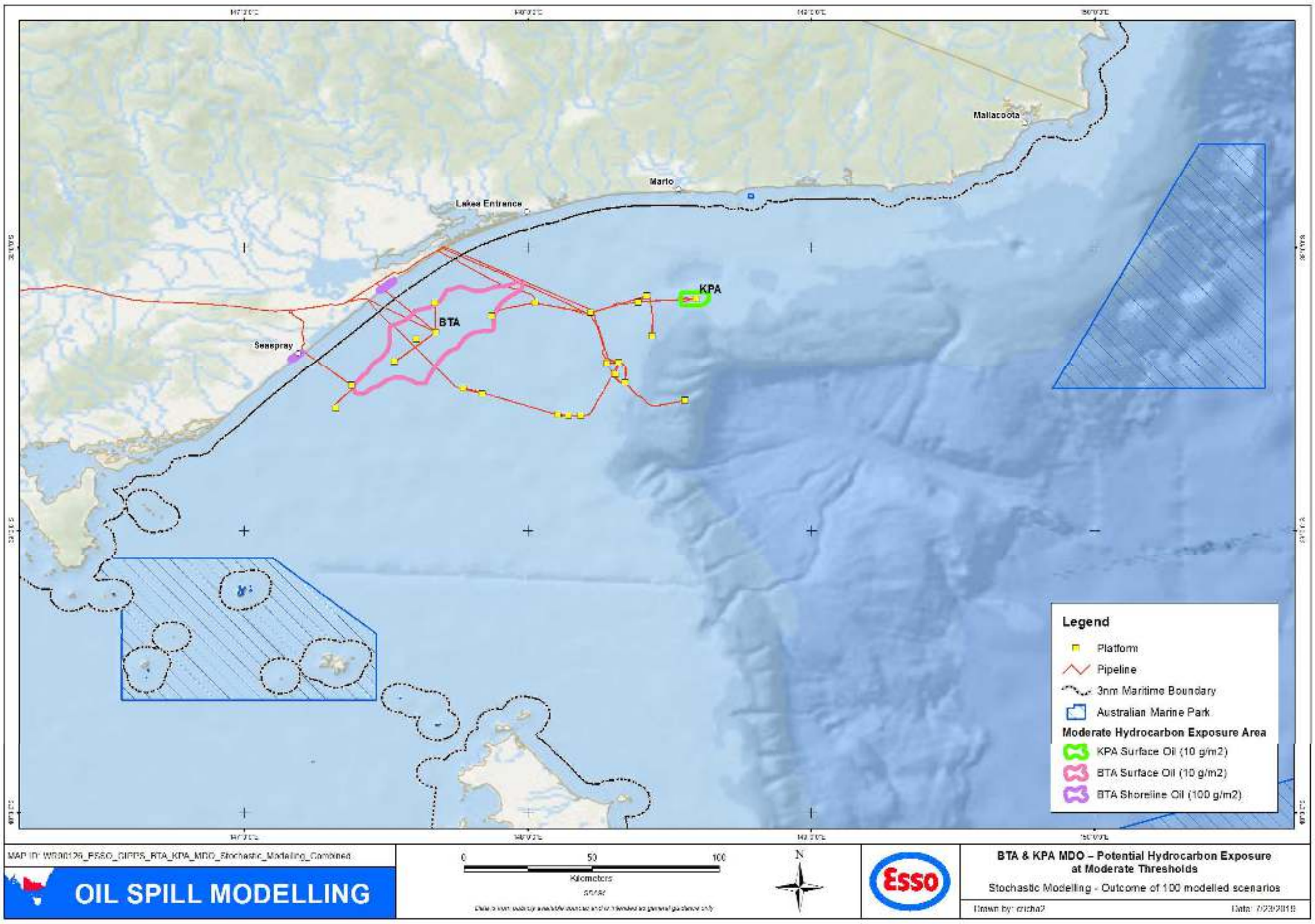

Figure 6-3 Vessel collision MDO spill stochastic modelling output for both BTA and KPA release locations. Hydrocarbon exposure at the moderate thresholds (Surface: 10 g/m^2 and Shoreline: 100 g/m^2)

6.6.3 Risk of loss of containment of refined oils

An accidental release of refined oils (MDO) has the potential to result in the following impacts:

- Injury / mortality to fauna;
- Change in habitat; and
- Change to the function, interests or activities of other users.

6.6.4 Risk Assessment

Receptors that could be affected by a LOC of MDO and that have been identified in the Description of Environment as occurring in the area are identified below.

Impacts	Receptors					
	Benthic Habitats	Plankton	Fish	Marine Reptiles - Turtles	Birds	Marine Mammals
Injury / mortality to fauna		✓	✓	✓	✓	✓
Change in habitat						

Impacts	Receptors			
	Coastal Habitats	Australian Marine Parks	KEFs	National Parks and Reserves
Change in habitat	✓		✓	✓

Impacts	Receptors		
	Fisheries – Commercial (Commonwealth and State)	Cultural - Indigenous and Historic	Recreation and Tourism
Change to the function, interests or activities of other users	✓		✓

Discussion of the key receptors considered to be at risk in the event of a MDO spill are described below.

Table 6-3 Risks of surface, shoreline and in-water hydrocarbon exposure from MDO spill

Receptor	Impact of MDO exposure	Exposure risk assessment
Plankton	Plankton are found in nearshore and open waters beneath the surface in the water column. These organisms migrate vertically through the water column to feed in surface waters at night (NRDA, 2012). As they move close to the sea surface it is possible that they may be exposed to both surface hydrocarbons but to a greater extent, hydrocarbons dissolved or entrained in the water column	There is no predicted exposure above the moderate in-water (dissolved) threshold. The consequences to plankton are assessed as **Level IV** (Inconsequential or No Adverse Effect).
Fish	Fish can be exposed to oil through a variety of pathways, including: direct dermal contact (e.g. swimming through oil); ingestion (e.g. directly or via oil-affected prey/foods); and inhalation (e.g. elevated dissolved contaminant concentrations in water passing over the gills). Fish are generally considered vulnerable to oil spills because they inhabit areas coincident with oil exploration and production and those areas that may be subsequently impacted by an oil spill; including coral reefs, seagrasses, nearshore areas, deep offshore areas, pelagic habitats and demersal habitats (Moore & Dwyer, 1974; Gundlach & Hayes, 1978). Of the potential toxicants, monocyclic and polycyclic aromatic hydrocarbons (MAHs and PAHs) are generally regarded as the most toxic to fish. <u>Surface oil</u> Since fish and sharks do not generally break the sea surface, the exposure of surface hydrocarbons to fish and shark species are unlikely to occur. Near the sea surface, fish are able to detect and avoid contact with surface slicks meaning fish mortalities rarely occur in the event of a hydrocarbon spill in open waters (Volkman *et al*., 2004). As a result, wide-ranging pelagic fish of the open ocean generally are not highly susceptible to impacts from surface hydrocarbons. Adult fish kills reported after oil spills occur mainly to shallow water, near-shore benthic species (Volkman *et al.*, 2004). Following the Deep Water Horizon (DWH) incident, it was suggested that whale sharks may be vulnerable to oiling of gills if exposed to the oil. The tendency of whale sharks to feed close to surface waters will increase the likelihood of exposure to surface slicks and elevated hydrocarbon concentrations beneath slicks. <u>In-water oil</u> Exposure to hydrocarbons entrained or dissolved in the water column can be toxic to fishes. 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 metabolize toxic hydrocarbons, which reduces the risk of bioaccumulation (NRDA, 2012). 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	NOAA (2013) and ITOPF (2011) state that MDO spills in open water are so rapidly diluted that fish kills are rarely observed. The predicted impact from surface oiling on fish is considered to be negligible at a population level. Pelagic free-swimming fish and sharks are unlikely to suffer either acute or chronic effects from oil spill exposure because dissolved/entrained hydrocarbons in the water column are predicted to be below thresholds at which impacts might occur and their mobile, transitory characteristics reduce the risk of prolonged exposure. The consequences to fish are assessed as **Level IV** (Inconsequential or No Adverse Effect).

Receptor	Impact of MDO exposure	Exposure risk assessment
	sufficient to cause harm. Pelagic species are also generally highly mobile and as such are not likely to suffer extended exposure (e.g. >96 hours) at concentrations that would lead to chronic effects due to their patterns of movement. Demersal fish are not expected to be impacted given the presence of in-water hydrocarbons in surface layers only. Fish are most vulnerable to hydrocarbon discharges during their embryonic, larval and juvenile life stages. Oil exposure may result in decreased spawning success and abnormal larval development. 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 areal extent of a spill. As egg/larvae dispersal is widely distributed in the upper layers of the water column it is expected that current induced drift will rapidly replace any oil affected populations.	
Marine Reptiles - Turtles	Marine turtles are vulnerable to the effects of oil at all life stages; eggs, hatchlings, juveniles, and adults. Oil exposure affects different turtle life stages in different ways; and each turtle life stage frequents a habitat with varied potential to be impacted during an oil spill. Several aspects of turtle biology and behaviour place them at particular risk, including a lack of avoidance, indiscriminate feeding in convergence zones, and large pre-dive inhalations. Marine turtles can be exposed to oil externally (e.g. swimming through oil slicks) or internally (e.g. swallowing the oil, consuming oil affected prey, or inhaling of volatile oil related compounds). <u>Surface oil</u> Effects of oil on turtles include increased egg mortality and developmental defects; direct mortality due to oiling in hatchlings, juveniles, and adults; and negative impacts to the skin, blood, digestive and immune systems, and salt glands. Oil can enter cavities such as the eyes, nostrils, or mouth; and oil covering their bodies may interfere with breathing because they inhale large volumes of air to dive. Experiments on physiological and clinical pathological effects of hydrocarbons on loggerhead turtles (~15–18 months old) showed that the turtles' major physiological systems were adversely affected by both chronic and acute exposures (96 hour exposure to a 0.05 cm layer of South Louisiana crude oil versus 0.5 cm for 48 hours) (Lutcavage *et al.* 1995). Recovery from the sloughing skin and mucosa took up to 21 days, increasing the turtle's susceptibility to infection or other diseases, such as fibropapilloma (Lutcavage *et al*. 1995). 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 DWH incident in	While marine turtles, including threatened species, are known to occur in the area potentially exposed to MDO at moderate - high concentrations they are not noted to reside or aggregate in significant numbers, and there are no recognised BIAs in the region. There are no turtle nesting beaches along the Gippsland coastline, so impacts to turtles from shoreline oiling will not occur. Although the effects of MDO on marine reptiles, specifically turtles can be severe, the low density of turtles expected in the region (due to lack of BIA or aggregations) suggests that few, if any, individuals would be affected. Consequently the potential impacts to marine reptiles are considered to be Consequence **Level IV** (Inconsequential or No Adverse Impact).

Receptor	Impact of MDO exposure	Exposure risk assessment
	the Gulf of Mexico (GoM), although many of these animals did not show any sign of oil exposure (NOAA, 2013). Of the dead turtles found, 3.4% were visibly oiled and 85% of the live turtles found were oiled (NOAA, 2013). Of the captured animals, 88% of the live turtles were later released, suggesting that oiling does not inevitably lead to mortality. <u>Shoreline oil</u> Turtles may experience oiling impacts on nesting beaches and eggs through chemical exposures resulting in decreased survival to hatching and developmental defects in hatchlings. Adult females crossing an oiled beach could cause external oiling of the skin and carapace; nothing that most oil is deposited at the high-tide line, and most turtles nest well above this level. Studies on freshwater snapping turtles showed uptake of PAHs from contaminated nest sediments, but no impacts on hatching success or juvenile health following exposure of eggs to dispersed weathered light crude (Rowe *et a*l., 2009). However, other studies found evidence that exposure of freshwater turtle embryos to PAHs results in deformities (Bell *et a*l., 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 water (AMSA, 2015). Hatchlings that contact oil residues while crossing a beach can exhibit a range of effects including impaired movement and bodily functions (Shigenaka, 2003). Hatchlings sticky with oily residues may also have more difficulty crawling and swimming, rendering them more vulnerable to predation. It should be noted that the threat and relative impacts of an unplanned discharge on some marine reptile species are considered less damaging than other stressors. Report cards produced on protected marine reptiles in Australia generally ranked oil pollution as either 'not of concern' or 'of less concern' depending on the marine region (DSEWPAC 2012b).	
Birds	Seabirds and shorebirds are sensitive to the impacts of oiling, with their vulnerability arising from the fact that they cross the air - water interface to feed, while their shoreline habitats may also be oiled (Hook *et al*., 2016). Species that raft together in large flocks on the sea surface are particularly at risk (ITOPF, 2011). <u>Surface oil</u> Birds foraging at sea have the potential to directly interact with oil on the sea surface some considerable distance from breeding sites in the course of normal foraging activities. Seabird species most at risk include those that readily rest on the sea surface (e.g. shearwaters) and surface plunging species (e.g. terns, boobies). As seabirds are a top order predator, any impact on other marine life (e.g. pelagic fish) may disrupt and limit food supply both for the maintenance of adults and the provisioning of young.	Several threatened, migratory and/or listed marine species may occur in the area exposed to moderate-high surface thresholds. There are foraging BIA's for some species of petrels and albatrosses throughout the exposed area. However, there are no breeding BIAs within this area. Seabirds rafting, resting, diving or feeding at sea have the potential to come into contact with surface oil, ranging from moderate to high exposure. Given the extensive ocean foraging habitat available to species such as albatross and petrel, the small area and temporary nature of MDO on the sea surface makes it unlikely that a spill will limit their ability to forage for unaffected prey. When first released, the MDO has higher toxicity due to the presence of volatile components. Individual birds making contact close to the spill source at the time of the spill may suffer impacts however it is unlikely that a large number of birds will be affected. As such, acute or

Receptor	Impact of MDO exposure	Exposure risk assessment
	For seabirds, direct contact with hydrocarbons can foul feathers, which may subsequently result in hypothermia due to a reduction in the ability of the bird to thermo-regulate and impair water-proofing. A bird suffering from cold, exhaustion and a loss of buoyancy may also dehydrate, drown or starve (DSEWPAC, 2011). 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, may lead to emaciation (DSEWPAC, 2011). The greatest vulnerability in this case occurs when birds are feeding or resting at the sea surface (Peakall *et al.,* 1987). . In a review of 45 actual marine 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 (Hook *et al*., 2016). The Iron Baron vessel spill (325 tonnes of bunker fuel in Tasmania in 1995) is estimated to have resulted in the death of up to 20,000 penguins (Hook *et al*., 2016). <u>Shoreline oil</u> Shorebirds are likely to be exposed to oil when it directly impacts the intertidal zone and onshore due to their feeding habitats. Foraging shorebirds will be at potential risk of both direct impacts through contamination of individual birds (e.g. fouling of feathers) and indirect impacts (e.g. fouling and/or a reduction in prey items) (Clarke, 2010). Birds that are coated in oil can also suffer from damage to external tissues, including skin and eyes, as well as internal tissue irritation in their lungs and stomachs Breeding birds (both seabirds and shorebirds) may be exposed to oil via direct contact or the contamination of the breeding habitat (e.g. shores of islands) (Clarke, 2010). Bird eggs may subsequently 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. 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. Toxic effects on birds may result where oil is ingested as the bird attempts to preen its feathers, or via consumption of oil-affected prey. Whether this toxicity ultimately results in mortality will depend on the amount consumed and other factors relating to the health and sensitivity of the particular bird species. Engelhardt (1983), Clark (1984), Geraci & St Aubin (1988) and Jenssen (1994) indicated that the threshold thickness of oil that could impart a lethal dose to an individual wildlife species is 10 µm (~10 g/m^2). Scholten et al. (1996) indicates that a layer 25 µm thick would be harmful for most birds that contact the slick.	chronic toxicity impacts (death or long-term poor health) to small numbers of birds are possible, however this is not considered significant at a population level. The maximum length of shoreline predicted to be exposed to shoreline loading of hydrocarbons that may have biological impacts to birds (>100 g/m^2) is 9 km. This section of coastline comprises mostly wide sandy beaches that provides habitat for shorebird species such as Hooded plovers and terns and nesting habitat for seabird species. MDO is unlikely to persist on the surface of sandy beaches because it quickly penetrates porous sediments (NOAA, 2013). This behaviour limits the duration of exposure to fauna on the shoreline. Shorebirds foraging for food in intertidal areas or along the high tide mark and splash zone may encounter weathered hydrocarbons that may be brought back to nests. Hydrocarbon entering the sandy nests of Hooded plovers, terns or other bird species is likely to percolate through the sand and not accumulate in the feathers of adults or young. Toxicity effects from ingestion of contaminated prey caught in the intertidal zone or from direct exposure, or transport back to, are unlikely, as the volatile components are likely to have flashed off prior to stranding (minimum stranding times range from 2 days). The populations of seabird and shorebird species have a wide geographic range, meaning that impacts to individuals or a population at one location will not necessarily extend to populations at other un-impacted locations. Consequently, the potential consequence of risks to seabirds and shorebirds from a vessel collision event are considered to be **Level III** (Potential Short Term, Minor Adverse Effects), to account for a species of local importance being affected.

Receptor	Impact of MDO exposure	Exposure risk assessment
Marine Mammals (Pinnipeds)	Pinnipeds are directly at risk from impacts associated with the exposure to surface, shoreline and in-water hydrocarbons. <u>Sea surface oil</u> Pinnipeds are vulnerable to sea surface exposures in particular given they spend much of their time on or near the surface of the water, as they need to surface every few minutes to breathe, and regularly haul out on to beaches. Pinnipeds are also sensitive as they will stay near established colonies and haul-out areas, meaning they are less likely to practise 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. As a result of exposure to surface oils, pinnipeds, with their relatively large, protruding eyes are particularly vulnerable to effects such as irritation to mucous membranes that surround the eyes and line the oral cavity, respiratory surfaces, and anal and urogenital orifices. Hook *et al* (2016) reports that seals appear not to be very sensitive to contact with oil, but instead to the toxic impacts from the inhalation of volatile components. For some pinnipeds, fur is an effective thermal barrier because it traps air and repels water. Petroleum stuck to fur reduces its insulative value by removing natural oils that waterproof the pelage. Consequently, the rate of heat transfer through fur seal pelts can double after oiling (Geraci & St.Aubin, 1988), adding an energetic burden to the animal. Kooyman *et al* (1976) suggest that in fact, fouling of approximately one-third of the body surface resulted in 50% greater heat loss in fur seals immersed in water at various temperatures. Fur-seals are particularly vulnerable due to the likelihood of oil adhering to fur. Heavy oil coating and tar deposits on fur-seals may result in reduced swimming ability and lack of mobility out of the water. <u>In-water oil</u> Ingested hydrocarbons can irritate or destroy epithelial cells that line the stomach and intestine, thereby affecting motility, digestion and absorption. However, pinnipeds have been found to have the enzyme systems necessary to convert absorbed hydrocarbons into polar metabolites, which can be excreted in urine (Engelhardt, 1982; Addison & Brodie, 1984; Addison *et al*., 1986). Volkman *et al* (1994) report that benzene and naphthalene ingested by seals is quickly absorbed into the blood through the gut, causing acute stress, with damage to the liver considered likely. If ingested in large volumes, hydrocarbons may not be completely metabolised, which may result in death. <u>Shoreline oil</u>	Seals are known to occur within the area exposed to moderate-high surface threshold. However, these areas are not identified as critical habitat and there are no identified BIAs for seals in the region. There is no predicted oil stranding along shorelines known to be used by Australian or New Zealand fur-seals as breeding or haul-out sites. As such, it is unlikely that oiling of seals will occur on shorelines. Although the characteristics of MDO reduce the risk of hyperthermia from oiling, other effects of surface and in-water MDO on pinnipeds can be severe. Long term impacts at a population level are considered unlikely however the consequence is assessed as **Level III** (Potential Short Term, Minor Adverse Effects).

Receptor	Impact of MDO exposure	Exposure risk assessment
	Breeding colonies (used to birth and nurse until pups are weaned) are particularly sensitive to hydrocarbon spills (Higgins & Gass, 1993). ITOPF (2011) report that species that rely on fur to regulate their body temperature (such as fur-seals) are the most vulnerable to oil as the animals may die from hypothermia or overheating, depending on the season, if the fur becomes matted with oil. It is reported that most pinnipeds scratch themselves vigorously with their flippers and do not lick or groom themselves, so are less likely to ingest oil from skin surfaces (Geraci & St. Aubin, 1988). However, mothers trying to clean an oiled pup may ingest oil. The Long Term Environmental Impact and Recovery report for the Iron Barren oil spill concluded that “The number of pups born at Tenth Island in 1995 was reduced when compared to previous years. There was a strong relationship between the productivity of the seal colonies and the proximity of the islands to the oil spill wherein the islands close to the spill showed reduced pup production and those islands more distant to the oil spill did not” (Tasmanian SMPC, 1999). Pinnipeds are further at risk because they appear to rely on scent to establish a mother-pup bond (Sandegren, 1970; Fogden, 1971), and consequently oil-coated pups may not be recognisable to their mothers. This is only theorised, with studies and research indicating interaction between mothers and oiled pups were normal (Davis and Anderson, 1976; Davies, 1949; Shaughnessy & Chapman, 1984). Australian sea-lions have 'naturally poor recovery abilities' due to 'unusual reproductive biology and life history' (TSSC, 2005). Due to the extreme philopatry of females and limited dispersal of males between breeding colonies, the removal of only a few individuals annually may increase the likelihood of decline and potentially lead to the extinction of some of the smaller colonies.	
Marine Mammals (Cetaceans)	Whales and dolphins can be exposed to the chemicals in oil through: • Internal exposure by consuming oil or contaminated prey; • Inhaling volatile oil compounds when surfacing to breathe; • External exposure, by swimming in oil and having oil directly on the skin and body; and • Maternal transfer of contaminants to embryos (NRDA, 2012). <u>Surface oil</u> Direct surface oil contact with hydrocarbons is considered to have little deleterious effect on whales, possibly due to the skin's effectiveness as a barrier to toxicity, and effect of oil	Several threatened, migratory and/or listed cetacean species may traverse the MDO spill plume. The foraging BIA for the Pygmy blue whale and the migration BIA for the Southern right whale may be exposed to surface concentrations at moderate-high thresholds. Biological effects of physical contact with areas of moderate concentrations of MDO at the sea surface are unlikely to lead to any long-term consequences. In the unlikely event of an MDO spill, the environmental impact would be limited to a relatively short period following the release and would need to coincide migration to result in exposure of a large number of individuals. The highly mobile nature of cetacean species means that such exposure is not anticipated to result in long term population viability effects and the resultant impact is assessed as **Consequence Level III** (Potential Short Term, Minor Adverse Effects).

Receptor	Impact of MDO exposure	Exposure risk assessment
	on cetacean skin is probably minor and temporary (Geraci & St Aubin, 1988). French-McCay (2009) identifies that a 10-25 µm oil thickness threshold has the potential to impart a lethal dose to the species, however also estimates a probability of 0.1% mortality to cetaceans if they encounter these thresholds based on the proportion of the time spent at surface. The inhalation of oil droplets, vapours and fumes is a distinct possibility if whales surface in slicks to breathe. Exposure to hydrocarbons in this way could damage mucous membranes, damage airways or even cause death. <u>In-water oil</u> The physical impacts from ingested hydrocarbon with subsequent lethal or sub-lethal impacts are both applicable to entrained oil. However, the susceptibility of cetaceans varies with feeding habits. Baleen whales (such as Blue, Southern right and Humpback whales) are not particularly susceptible to ingestion of oil in the water column as they feed by skimming the surface. Oil may stick to the baleen while they 'filter feed' near slicks. Toothed whales and dolphins may be susceptible to ingestion of dissolved and entrained oil as they gulp feed at depth. As highly mobile species, in general it is very unlikely that these animals will be constantly exposed to concentrations of hydrocarbons in the water column for continuous durations (e.g., >96 hours) that would lead to chronic effects. Note also, many marine mammals appear to have the necessary liver enzymes to metabolise hydrocarbons and excrete them as polar derivatives. Evidence suggests that many cetacean species are unlikely to detect and avoid spilled oil (Matkin *et al*. 2008). There are numerous examples where cetaceans have appeared to incidentally come into contact with oil and/or not demonstrated any obvious avoidance behaviour; e.g. following the Exxon Valdez oil spill, Matkin *et al*. (2008) reported killer whales in slicks of oil as early as 24 hours after the spill. Some whales, particularly those with coastal migration and reproduction, display strong site fidelity to specific resting, breeding and feeding habitats, as well as to their migratory paths and this may override any tendency for cetaceans to avoid the noxious presence of hydrocarbons. The Southern right whale exhibits varying degrees of site fidelity, with the majority of females and calves returning to the same birthing location, while some also travel long distances between breeding grounds within a season (DSEWPAC, 2013). If spilled oil reaches these biologically important habitats, the pollution may disrupt natural behaviours, displace animals, reduce foraging or reproductive success rates and increase mortality. If sufficiently high numbers are impacted, the greater population may experience reduced recovery and survival rates.	
Coastal Habitat –	Sandy beaches provide potential foraging and breeding habitat for numerous bird, marine turtle and pinniped species. These activities primarily occur above the high tide line, with exception of haul outs. Note, most of the oil on a sandy shore will be concentrated at, and	The maximum length of coastline potentially at risk from stranded oil at the moderate threshold is 9 km. This coastline is dominated by wide sandy beaches.

Receptor	Impact of MDO exposure	Exposure risk assessment
Sandy Shoreline	below, the high tide mark. Sandy beaches are also inhabited by a diverse assemblage (although not always abundant) of infauna (including nematodes, copepods and polychaetes); and macroinvertebrates (e.g. crustaceans). Because the sand retains oil, such animals may be killed if oil penetrates into the sediments. Long-term depletion of sediment fauna could have an adverse effect on birds or fish that use tidal flats as feeding grounds (IPIECA, 1999). Depth of penetration in sandy sediment is influenced by: • Particle size. Penetration is not generally as great on mud as on coarser sediments. • Oil viscosity. Viscous oils and mousse (water-in-oil emulsion) tend to penetrate less deeply than low-viscosity oils such as light crudes or diesel oil. • Drainage. If sediments are poorly drained (as is often the case with tidal flats remote from creeks or channels), the water content may prevent the oil from penetrating into the sediment. In contrast, oil may reach depths greater than one metre in coarse well-drained sediments. • Animal burrows and root pores. Penetration into fine sediments is increased if there are burrows of animals such as worms, or pores left where plant roots have decayed. A 100 g/m^2 threshold (considered a 'stain' or 'film', and equivalent to 0.1 mm thickness) is assumed as the lethal threshold for invertebrates on hard substrates and sediments (mud, silt, sand, gravel) in intertidal habitats. A threshold of 100 g/m^2 oil thickness would be enough to coat an animal and likely impact its survival and reproductive capacity (French-McCay, 2009). Based on this, areas of heavy oiling would likely result in acute toxicity, and death, of many invertebrate communities, especially where oil penetrates into sediments through animal burrows (IPIECA, 1999). However, these communities would be likely to rapidly recover (recruitment from unaffected individuals and recruitment from nearby areas) as oil is removed from the environment. Following the Sea Empress spill (in west Wales, 1996) many amphipods (sandhoppers), cockles and razor shells were killed. There were mass strandings on many beaches of both intertidal species (such as cockles) and shallow sub-tidal species. Similar mass strandings occurred after the Amoco Cadiz spill (in Brittany, France, 1978) (IPIECA, 1999). Following the Sea Empress spill, populations of mud snails recovered within a few months but some amphipod populations had not returned to normal after one year. Opportunists such as some species of worm may actually show a dramatic short-term increase following an oil spill (IPIECA, 1999).	With the shortest time to shoreline accumulation at the moderate threshold being 3 days the MDO will have partially weathered. The shoreline loadings may result in acute toxicity, and mortality, of invertebrate communities, especially as the MDO will easily penetrate into sandy sediments. However, tidal action is expected to lead to rapid weathering of any hydrocarbons in the intertidal area and the populations of these communities would be likely to rapidly recover. The impact of MDO coming ashore on sandy beaches is considered to have a **Consequence Level III (**Potential Short Term, Minor Adverse Effects**).**

Receptor	Impact of MDO exposure	Exposure risk assessment
	In March 2014, small volumes of crude oil from an unidentified source (confirmed to not be offshore oil and gas production facilities) washed up along a 7-km section of sandy beach on the Victorian Gippsland coast as small (a few millimetres thick) granular balls (Gippsland Times, 2014). AMSA (2014) reported that no impacts were observed over the course of two months following the incident. As a result of the DWH incident, oil washed up on sandy beaches of the Alabama coastline. The natural movement of sand and water through the beach system continually transformed and re-distributed oil within the beach system, and 18 months after the event, mobile remnant oil remained in various states of weathering buried at different depths in the beaches (Hayworth *et al*., 2011). There is also evidence that submerged oil mats (SOM) exist just offshore of the Alabama beaches (ranging in thickness from a few millimetres to several centimetres), which has resulted in the regular washing up of tar balls onto sandy beaches. These SOMs may serve as long-term sources of remnant oil to the beach ecosystem (Hayworth *et al*., 2011). Long-term changes to the beach ecosystem as a result of stranded oil are unknown. Other results from beach sampling undertaken at Dapuhin Island, Alabama, in May (pre-impact) and September 2011 (post-impact) found a large shift in the diversity and abundance of microbial species (e.g., nematodes, annelids, arthropods, polychaetes, protists, fungi, algae and bacteria). Post-spill, sampling indicated that species composition was almost exclusively dominated by a few species of fungi. DNA analyses revealed that the 'before' and 'after' communities at the same sites weren't closely related to each other (Bik *et al*., 2012). Similar studies found that oil deposited on the beaches caused a shift in the community structure toward a hydrocarbonoclastic consortium (petroleum hydrocarbon degrading microorganisms) (Lamendella *et al*., 2014).	
National Parks and Reserves	Potential impacts to sensitive receptors related to the shoreline of the Gippsland Lakes Coastal Park, such as sandy beaches and birds, are discussed in the appropriate sections above.	Part of the coast bordering the Gippsland Lakes Coastal Park is within the zone of moderate shoreline exposure. The consequence to Gippsland Lakes Coastal Park is assessed as localised and short term, and ranked as **Consequence Level III** (Potential Short Term, Minor Adverse Effects).
KEFs	Potential impacts to sensitive receptors related to the Upwelling East of Eden, such as plankton and other marine fauna, are discussed in the appropriate sections above.	The zone of moderate sea surface MDO exposure intersect the westernmost portion of the KEF: Upwelling East of Eden. While a spill would not affect the upwelling itself, if the spill occurs at the time of an upwelling event, it may result in krill being exposed to in-water MDO. However no in-water exposure is predicted above levels at which impacts are expected to occur. The consequence is assessed as **Level IV** (Inconsequential or No Adverse Effect).

Receptor	Impact of MDO exposure	Exposure risk assessment
Commercial fisheries	Commercial fishing has the potential to be impacted through exclusion zones associated with the spill, the spill response and subsequent reduction in fishing effort. Exclusion zones may impede access to commercial fishing areas, for a short period of time, and nets and lines may become oiled. The impacts to commercial fishing from a public perception perspective however, may be much more significant and longer term than the spill itself. Fishing areas may be closed for fishing for shorter or longer periods because of the risks of the catch being tainted by oil. Concentrations of petroleum contaminants in fish and crustacean and mollusc tissues could pose a significant potential for adverse human health effects, and until these products from nearshore fisheries have been cleared by the health authorities, they could be restricted for sale and human consumption. Indirectly, the fisheries sector will suffer a heavy loss if consumers are either stopped from using or unwilling to buy fish and shellfish from the region affected by the spill. Impacts to fish stocks have the potential for reduction in profits for commercial fisheries, and exclusion zones exclude fishing effort. Davis *et a*l (2002) report detectable tainting of fish flesh after a 24-hour exposure at crude concentrations of 0.1 ppm, marine fuel oil concentrations of 0.33 ppm and diesel concentrations of 0.25 ppm. The Montara spill (as the most recent [2009] example of a large hydrocarbon spill in Australian waters) occurred over an area fished by the Northern Demersal Scalefish Managed Fishery (with 11 licences held by 7 operators), with goldband snapper, red emperor, saddletail snapper and yellow spotted rockcod being the key species fished (PTTEP, 2013). As a precautionary measure, the WA Department of Fisheries advised the commercial fishing fleet to avoid fishing in oil-affected waters. Testing of fish caught in areas of visible oil slick (November 2009) found that there were no detectable petroleum hydrocarbons in fish muscle samples, suggesting fish were safe for human consumption. In the short-term, fish had metabolised petroleum hydrocarbons. Limited ill effects were detected in a small number of individual fish only (PTTEP, 2013). No consistent effects of exposure on fish health could be detected within two weeks following the end of the well release. Follow up sampling in areas affected by the spill during 2010 and 2011 (PTTEP, 2013) found negligible ongoing environmental impacts from the spill. Since testing began in the month after the DWH blowout in the Gulf of Mexico (GoM) (2010), levels of oil contamination residue in seafood consistently tested 100 to 1,000 times lower than safety thresholds established by the USA FDA, and every sample tested was found to be far below the FDA's safety threshold for dispersant compounds (BP, 2015). FDA testing of oysters found oil contamination residues to be 10 to 100 times below safety thresholds (BP, 2014). Sampling data shows that post-spill fish populations in the GoM since 2011 were generally consistent with pre-spill ranges and for many shellfish species,	Several commercial fisheries may operate within the area potentially exposed in the event of a LOWC and a temporary fisheries closure may be put in place. Oil may foul the hulls of fishing vessels and associated equipment, such as gill nets. A temporary fisheries closure, combined with oil tainting of target species (actual or perceived), may lead to financial losses to fisheries and economic losses for individual licence holders. Fisheries closures and the flow on losses from the lack of income derived from these fisheries are likely to have short-term but widespread socio-economic consequences, such as reduced employment (in fisheries service industries, such as tackle and bait supplies, fuel, marine mechanical services, accommodation and so forth). Any exclusion zone would be restricted to the immediate vicinity of the release location and due to rapid weathering only in place for a number of days, consequently, the potential impacts to commercial fisheries from an MDO LOC are considered to be **Consequence Level III** (Potential Short Term, Minor Adverse Effects).

Receptor	Impact of MDO exposure	Exposure risk assessment
	commercial landings in the GoM in 2011 were comparable to pre-spill levels. In 2012, shrimp (prawn) and blue crab landings were within 2.0% of 2007-09 landings. Recreational fishing harvests in 2011, 2012 and 2013 exceeded landings from 2007-09 (BP, 2014).	
Cultural – Indigenous and Historic	Visible sheen has the potential to reduce the visual amenity of cultural heritage sites such as indigenous or historic (e.g. shipwreck) protected areas.	Oil sheen is predicted to encroach upon nearshore waters in the vicinity of the Gunai Kurnai Native Title Determination Area and a number of historic shipwrecks. However, given the relatively short duration, and limited extent of predicted exposure the consequence level is considered **Level IV** (Inconsequential or No Adverse Effect).
Recreation and tourism	Refer to sections on fish, cetaceans and sandy shorelines above.	Tourism and recreation is also linked to the presence of marine fauna (e.g. whales), particular habitats and locations for swimming or recreational fishing. The modelling predicts a low probability of visible oil extending into Victorian waters (including Ninety Mile Beach MNP) and to the sandy shoreline along Ninety Mile Beach (including Gippsland Lakes Coastal Park). Short-term impacts to nature-based tourism and other human uses of beaches (and nearshore waters) may occur as a result of temporary beach closures to protect human health or due to perceptions of a polluted environment that is not desirable to visit. However, given the relatively short duration, and limited extent of predicted shoreline contact the consequence level is considered **Level III** (Potential Short Term, Minor Adverse Effects).

Based on industry data, vessel collisions are considered rare (37 collisions reported from a total of 1200 marine incidents in Australian waters between 2005 and 2012). As most vessel collisions involve the loss of containment of a forward tank, which are generally double-lined and smaller than other tanks, the loss of the maximum volume used in the scenario above is unlikely.

Considering the inherent low likelihood of a collision occurring, the safeguards in place and enactment of the SMPEP and OPEP, and the rapid weathering of MDO the probability of the impacts described above occurring is considered **Very Highly Unlikely (E)**.

6.6.5 Risk Ranking

Consequence	Likelihood	Risk Ranking
III	E	4

6.6.6 Controls

Environmental Performance Outcome	Control	Environmental Performance Standard	Measurement Criteria
No unplanned release of MDO to the marine environment from support vessel collision	Support vessel approach procedure	OIM to coordinate with support vessels to avoid a collision	Radio operations communications log verifies coordination with approaching vessels have been issued when necessary
	ASOG / CAMO procedures	Activity Specific Operating guidelines (ASOG) / Critical Activity Mode (CAMO) procedures developed to IMCA Standard.	Agreed-for-Implementation (AFI) version of procedures signed by Vessel Master and available.
	Support vessel DP system	All support vessels have Class 2 or better DP systems.	Vessel has IACS member DP Notation, Failure Mode and Effects Analysis (FMEA) and proving trials.
		Watchkeepers in charge of watch hold DP certification.	Watchkeepers' DP certificates available.
	Pre-start notifications	AMSA JRCC notified before operations commence to enable AMSA to distribute an AUSCOAST warning.	Records confirm that information to distribute an AUSCOAST warning was provided to the JRCC before operations commenced. Issued AUSCOAST warning dated prior to, or on the date operations commenced.

		AHS notified before operations commence to allow generation of navigation warnings (including Notice to Mariners).	Issued Notice to Mariners dated prior to, or on the date operations commenced.
		Relevant stakeholders are notified of activities approximately four weeks and again one week prior to commencement.	Stakeholder consultation records confirm that information was distributed to relevant stakeholders in required timeframes.
Minimise the impact on the environment of an MDO spill.	Shipboard Marine Pollution Emergency Plan (SMPEP), or equivalent as appropriate to class.	Vessel compliant with MARPOL Annex I, as appropriate to class.	Vessels have class certification verified and issued by IACS member.

6.6.7 Demonstration of ALARP

ALARP Decision Context and Justification			**Decision Context A** Operating vessels close to a MODU is common practice for activities such as fuel transfer, provision of cargo, and reverse logistical support. These activities are well regulated with associated control measures, well understood, and are implemented across the offshore industry. Although there is the potential for impacts of consequence Level III from a vessel collision, spill source volumes are limited in size, the environmental impact of MDO is well understood, a credible spill volume has been modelled and a very conservative threshold has been selected to define the PEA, so there is limited uncertainty associated with this event. During stakeholder engagement, no questions were raised regarding the acceptability of the risk of this event. Esso believes **ALARP Decision Context A** should apply.
Good Practice	Adopted	Control	Rationale
Support vessel approach protocols	✓	Support vessel approach procedure	It is standard industry practice for procedures describing support vessel approach protocols to be developed.
Structured operational limits		Activity Specific Operating	The application of ASOG / CAMO risk management tools is industry best practice for

criteria for dynamic positioning (DP) operations	✓	Guidelines (ASOG) / Critical Activity Mode of Operation (CAMO) procedures	DP operations. CAMO describes how to configure the vessels DP system and ASOG sets out the operational, environmental and equipment performance limits considered necessary for safe DP operations whilst carrying out a specific activity.
DP Class 2	✓	Support vessel DP system	DP Class 2 (redundancy so that no single fault in an active system will cause the system to fail) is the industry standard where loss of position keeping capability may cause personnel injury, pollution or damage with large economic consequences.
Pre-start notifications	✓	Pre-start notifications	Under the Navigation Act 2012, the Australasian Hydrographic Society (AHS) is responsible for maintaining and disseminating hydrographic and other nautical information and nautical publications including: • Notices to Mariners • AUSCOAST warnings. Details of the PSZ will be published in Notices to Mariners, thus enabling other marine users to plan their activities, and minimising disruption to exclusion zones. Relevant details will be provided to the Joint Rescue Coordination Centre (JRCC) to enable AUSCOAST warnings to be disseminated. Pre-start notices will be provided to all relevant stakeholders approximately 4 weeks and then 1 week prior to activities commencing.
Shipboard Marine Pollution Emergency Plan (SMPEP)	✓	SMPEP	The vast majority of commercial ships are built to and surveyed for compliance with the standards (i.e. Rules) laid down by classification societies. The role of vessel classification and classification societies has been recognised by the International Maritime Organisation (IMO) across many critical areas including the International Convention for the Safety of Life at Sea, (SOLAS), the 1988 Protocol to the International Convention on Load Lines and the International Convention for the Prevention of Pollution from Ships (MARPOL).

			A vessel built in accordance with the applicable Rules of an IACS Member society may be assigned a class designation relevant to the IMO rules, on satisfactory completion of the relevant classification society surveys. For ships in service, the society carries out routine scheduled surveys to verify that the ship remains in compliance with those Rules. Should any defects that may affect class become apparent, or damages be sustained between the relevant surveys, the owner is required to inform the society concerned without delay. MARPOL Annex I Regulations for the Prevention of Pollution by Oil specifically require that a SMPEP (or equivalent, according to class) is in place. To prepare for a spill event, the SMPEP details: • response equipment available to control a spill event • review cycle to ensure that the SMPEP is kept up to date • testing requirements, including the frequency and nature of these tests. In the event of a spill, the SMPEP details: • reporting requirements and a list of authorities to be contacted • activities to be undertaken to control the release • procedures for coordinating with local authorities.
Oil spill response planning	✓	OPEP	Under the OPGGS(E)R, NOPSEMA require that the petroleum activity have an accepted OPEP in place before commencing the activity. In the event of a vessel collision the OPEP will be implemented.
Oil spill monitoring planning	✓	OSMP	Esso's OSMP details the arrangements and capability in place for: • operational monitoring of a hydrocarbon spill to inform response activities • scientific monitoring of environmental impacts of the spill and response activities.

			Operational monitoring will allow adequate information to be provided to aid decision making to ensure response activities are timely, safe, and appropriate. Scientific monitoring will identify if potentially longer-term remediation activities are required.
Engineering Risk Assessment			
Additional, Alternative, Improved Controls	Benefit	Cost / Feasibility	Adopted

6.6.8 Demonstration of Acceptability

Factor	Demonstration Criteria	Criteria Met	Rationale
Risk Assessment Process for Unplanned Events	The risk ranking is lower than Category 1	✓	The risk ranking is Category 4 (the lowest category) and therefore considered acceptable.
Principles of Ecologically Sustainable Development (ESD)	No potential to affect biological diversity and ecological integrity (i.e. Consequence Level is not I)	✓	The potential impact associated with this aspect is limited to a localised short-term impact, which is not considered as having the potential to affect biological diversity and ecological integrity.
	Activity does not have the potential to result in serious or irreversible environmental damage.	✓	The activities were evaluated as having the potential to result in a Level III consequence thus are not considered as having the potential to result in serious or irreversible environmental damage.
Legislative and Other Requirements	Legislative and other requirements have been identified and met.	✓	The proposed activities align with the requirements of the: • Navigation Act 2012 – Chapter 6 (Safety of Navigation) Part 6 deals with safe navigation including

			provisions about reporting of movement of vessels. The requirements of MARPOL Annex I has been adopted. The following legislative and other requirements are considered relevant as they apply to the implementation of MARPOL in Australia: • Protection of the Sea (Prevention of Pollution from Ships) Act 1983. • Navigation Act 2012 – Chapter 4 (Prevention of Pollution). • Marine Order 91 (Marine pollution prevention – oil) 2014
Internal Context	Consistent with Esso's Environment Policy.	✓	Proposed activities are consistent with Esso's Environment Policy, in particular, to "comply with all applicable environmental laws and regulations and apply responsible standards where laws and regulations do not exist"
	Meets ExxonMobil Environmental Standards	✓	There is no standard related to a LOC of MDO but the activities proposed meet the strategic objectives of the Upstream Environmental Standards.
	Meets ExxonMobil Operations Integrity Management System (OIMS) Objectives	✓	Proposed activities meet: OIMS System 6-5 objective to identify and assess environmental aspects; significant aspects are addressed and controlled consistent with policy and regulatory requirements; OIMS System 8-1 objective to clearly define and communicate operations integrity requirements to contractors; and OIMS System 10-2 objectives to document, resource and communicate emergency response plans, and conduct training,

			exercises and/or drills to determine the adequacy of the plans.
External Context	Stakeholder concerns have been considered / addressed through the consultation process.	✓	No specific stakeholder concerns have been raised concerning the risk of a LOC resulting from vessel collision.

6.7 Accidental Release – LOC Reservoir Hydrocarbons (LOWC)

6.7.1 Causes of loss of containment of reservoir hydrocarbons

A loss of well control (LOWC) can occur when primary and secondary well control measures fail, which could potentially result in a release of reservoir hydrocarbons into the marine environment.

6.7.2 Spill Modelling

To understand the potential consequences of a LOWC and the response preparedness required, stochastic and deterministic modelling was undertaken as detailed in Section 3.4.1.1 (RPS, 2019b). Model inputs and parameters are summarised in Table 6-4.

Table 6-4 LOWC spill modelling inputs

Parameter	Details – KPA Drilling	Details – BTW Drilling
Number of spill simulations	100	
Period of the year (season)	Annual analysis	
Hydrocarbon type	Condensate / gas	Condensate / gas
Total spill volume	676.2 kbbl / 22.3 GCF	375.0 kbbl / 25.0 GCF
Volume basis	Worst Credible Discharge Scenario (WCDS): • Open hole blowout while drilling; BOP failure • Modeled with drill pipe in hole (annular flow only: 9-1/2" open-hole through reservoir, 5-1/2" drill pipe in hole) • All gas zones to well TD are open to flow • Surface discharge assumed in line with JUR operations	
Release location	Kipper subsea facility 38°10' 53" S, 148° 35' 35" E	West Barracouta drill location 38° 19' 06" S, 147° 36' 53" E
Release duration	98 days	98 days
Duration basis	Relief well assumed to be primary response plan (see Volume 3). The response time for a relief well is based on rig mobilisation from Singapore; 98 days was chosen for volume calculations, assuming a Semi-submersible MODU.	

Modelled duration	118 days	118 days
Condensate Characteristics	Density	770.6 @ 15°C
	API	52.15
	Dynamic Viscosity	0.14 @ 25°C
	Pour Point	-3 °C
	Oil Property Category	Group I (non-persistent oils)

6.7.2.1 Modelling Outputs – Weathering and Fate

The oil type used in the modelling of the BTW and KPA LOWC scenarios was a proxy condensate. The properties of this condensate are shown in Table 6-4. These properties classify it as a Group I oil according to the International Tanker Owners Pollution Federation classifications (ITOPF, 2014). This condensate is composed of 98.6% volatiles and semi- to low-volatile compounds and 1.4% persistent compounds. This condensate is expected to readily evaporate once on the sea surface (RPS, 2019b).

Both Figure 6-4 and Figure 6-5 clearly show that evaporation is the dominant process contributing to the removal of condensate from the sea surface. No shoreline contact was predicted for either scenario.

The deterministic trajectory for each set of LOWC modelling that resulted in the largest swept area of oil on the sea surface of 1 g/m^2 (visible oil) was considered the 'worst' simulation and was selected for weathering and fate analysis. Figure 6-4 presents the fates and weathering graph for the BTW 'worst' single spill trajectory. At the conclusion of the simulation period, approximately 93% of condensate was lost to the atmosphere through evaporation, approximately 6% predicted to have decayed /biodegraded and only 1% was predicted to remain within the water column.

Figure 6-5 presents the fates and weathering graph for the KPA 'worst' single spill trajectory. At the conclusion of the simulation period, approximately 91% spilled oil was lost to the atmosphere through evaporation, approximately 7% was predicted to have decayed / biodegraded, and only1% was predicted to remain within the water column.

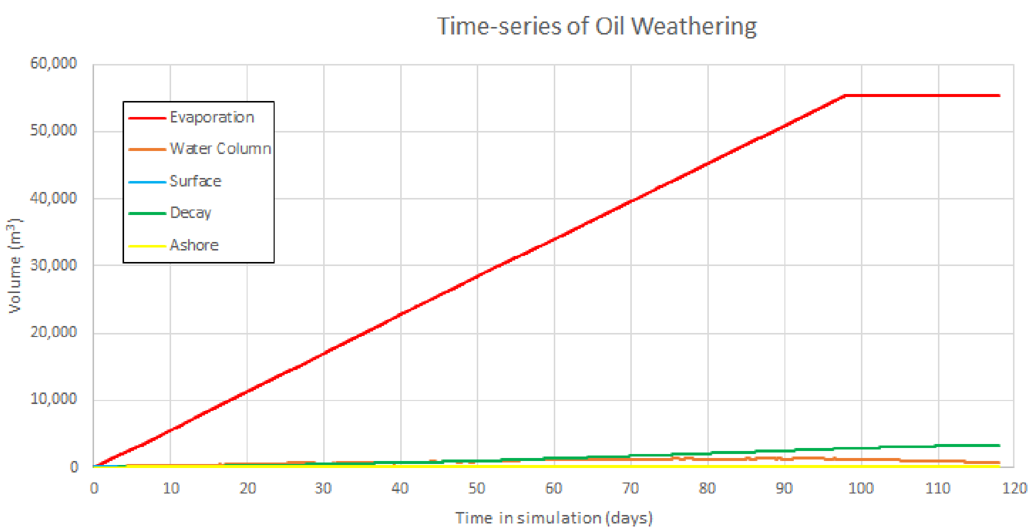

Figure 6-4 Predicted weathering and fates graph as volume for the selected single BTW LOWC trajectory: largest surface swept area

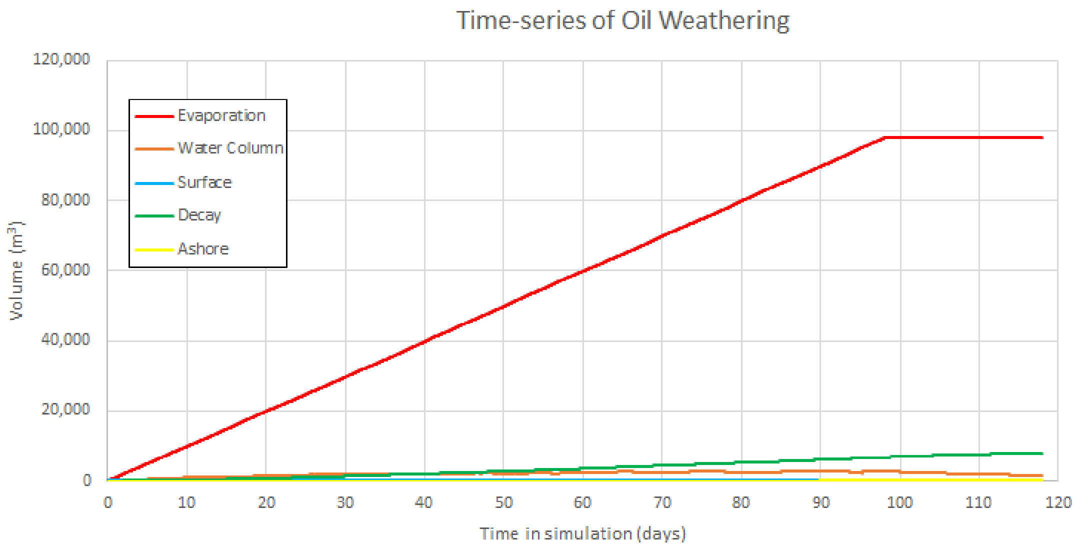

Figure 6-5 Predicted weathering and fates graph as volume for the selected single KPA LOWC trajectory: largest surface swept area

6.7.2.2 Modelling Outputs – Stochastic and Deterministic

Oil spill modelling predicts that the total area that could be exposed to hydrocarbon, including trace concentrations of oil in the water column, as a result of any spill. This is known as the Potentially Exposed Area (PEA) and is used for planning purposes to ensure that all social and environmental sensitivities are acknowledged, described and considered in the development of the Environment Plan.

Modelling is also used to inform specific impact assessments by understanding the location and extent of oil at concentrations likely to result in environmental consequences. There is no agreed exposure level below which environmental impacts will not occur so outputs should not be interpreted as a boundary. However, mapping areas which could be moderately impacted by a spill is a useful tool for impact or consequence assessment.

The location and extent of hydrocarbons from a LOWC at BTW or KPA are shown below. Environmental sensitivities within this area are:

Model Parameter	Exposure Value	Stochastic Modelling (based on 100 annualised spill trajectories)	
		BTW Drilling Location	KPA Drilling Location
Surface exposure	Moderate 10 g/m^2	Maximum distance from release location 1 km in a WSW direction. There is a 100% probability of contact with several petrel and albatross foraging BIAs, distribution/foraging and migration whale BIAs (for the Pygmy blue and Southern right	Maximum distance from release location approx. 3 km in a WNW direction. There is a 100% probability of contact with the KEF: Upwelling East of Eden, several petrel and albatross foraging BIAs, distribution/foraging and migration

		whales respectively) and the White shark distribution and breeding BIAs at the moderate exposure threshold.	whale BIAs (for the Pygmy blue and Southern right whales respectively) and the White Shark distribution BIA at the moderate exposure threshold.
Shoreline Exposure	Moderate 100 g/m^2	None predicted	None predicted.
In-water (dissolved) Exposure	Moderate 50ppb instantaneous	In the water column at 0-10 m depth, there is a 5% probability of contact with several white tern and albatross foraging BIAs, distribution/foraging and migration whale BIAs (for the Pygmy blue, Humpback and Southern right whales respectively) and the White Shark distribution and breeding BIAs at the moderate exposure threshold. There is a very low (2%) probability of contact with the KEF: Upwelling East of Eden and (1%) with Victorian waters off Lakes Entrance and/or Corringle.	In the water column at 0-10m depth there is a 78% probability of contact with the KEF: Upwelling East of Eden, common petrel and several albatross foraging BIAs, distribution/foraging and migration whale BIAs (for the Pygmy blue and Southern right whales respectively) and the White Shark distribution BIA at the moderate exposure threshold.

Other features, outside of the mapped area but that are within the Potentially Exposed Area are:

Model Parameter	Exposure Value	Stochastic Modelling (based on 100 annualised spill trajectories)	
		BTW Drilling Location	KPA Drilling Location
Surface Exposure	Low 1 g/m^2	Maximum distance approx. 44 km from release location in an ENE direction. Does not extend into State waters or contact any National Parks and Reserves. The maximum area of coverage of visible oil on the sea surface at any given time throughout the scenario was predicted to occur 40 days after the spill started and covered approximately 52 km^2.	Maximum distance approx. 47 km from release location in a SSW direction. Does not extend into State waters or contact any National Parks and Reserves. The maximum area of coverage of visible oil on the sea was predicted to occur 49 days after the spill started and covered approximately 38 km^2.

Shoreline Exposure	Low $10 g/m^2$	None predicted	None predicted.
In-water (dissolved) Exposure	Low 10ppb instantaneous	In the water column at 0-10m depth there is a 94% probability of contact with several albatross foraging BIAs, distribution/foraging and migration whale BIAs (for the Pygmy blue, Humpback and Southern right whales respectively) at the moderate exposure threshold. There is an 11% probability of encroachment into Victorian waters and contact with Point Hicks Marine National Park. At depths >10m there is a 28% probability of contact with several albatross and shearwater foraging BIAs, distribution/foraging and migration whale BIAs (for the Pygmy blue and Southern right whales respectively) and White Shark breeding and distribution BIAs.	In the water column at 0-10m depth there is a 100% probability of contact with KEF: Upwelling of Eden, several albatross and petrel foraging BIAs, distribution/foraging and migration whale BIAs (for the Pygmy blue, and Southern right whales respectively) and White shark distribution BIA at the low exposure threshold. There is a 5% probability of encroachment into Victorian waters.
In-water (entrained) Exposure	Low 10ppb instantaneous	There is a 100% probability of contact with the KEF: Upwelling East of Eden and 55% probability of contact with East Gippsland AMP. Encroachment into Victorian, Tasmanian and New South Wales waters is predicted with a 95-100% probability including Beware Reef Marine Sanctuary, Cape Howe, Ninety Mile Beach, and Point Hicks Marine National Parks, Croajingolong National Park and Cape Conran Coastal Park. There is a 54% probability of contact with Gippsland Lakes Ramsar wetland. There is a 50-100% probability of contact with several albatross, petrel and shearwater foraging BIAs, Crested tern and Little penguin foraging and breeding BIAs, Grey nurse shark foraging/migration and breeding BIAs, Spotted bottlenose dolphin breeding BIAs, Pygmy blue, Humpback and Southern right whale BIAs and White	There is a 95-100% probability of contact with East Gippsland AMP and the KEFs: Upwelling of Eden and Big Horseshoe Canyon. Encroachment into Victorian, Tasmanian and New South Wales state waters is predicted with a 100% probability including Beware Reef Marine Sanctuary, Cape Howe, and Point Hicks Marine National Parks, Batemans Marine Park (NSW) and Croajingolong and Kent Group (Tas.) National Parks. There is a 23% probability of contact with Gippsland Lakes Ramsar wetland. There is a 50-100% probability of contact with several albatross, petrel and shearwater foraging BIAs, Crested tern and Little penguin foraging and breeding BIAs, Grey nurse shark foraging/migration and breeding BIAs, Spotted bottlenose dolphin breeding BIAs, Pygmy blue,

		shark BIAs at the low exposure threshold.	Humpback and Southern right whale BIAs and White shark BIAs at the low exposure threshold.

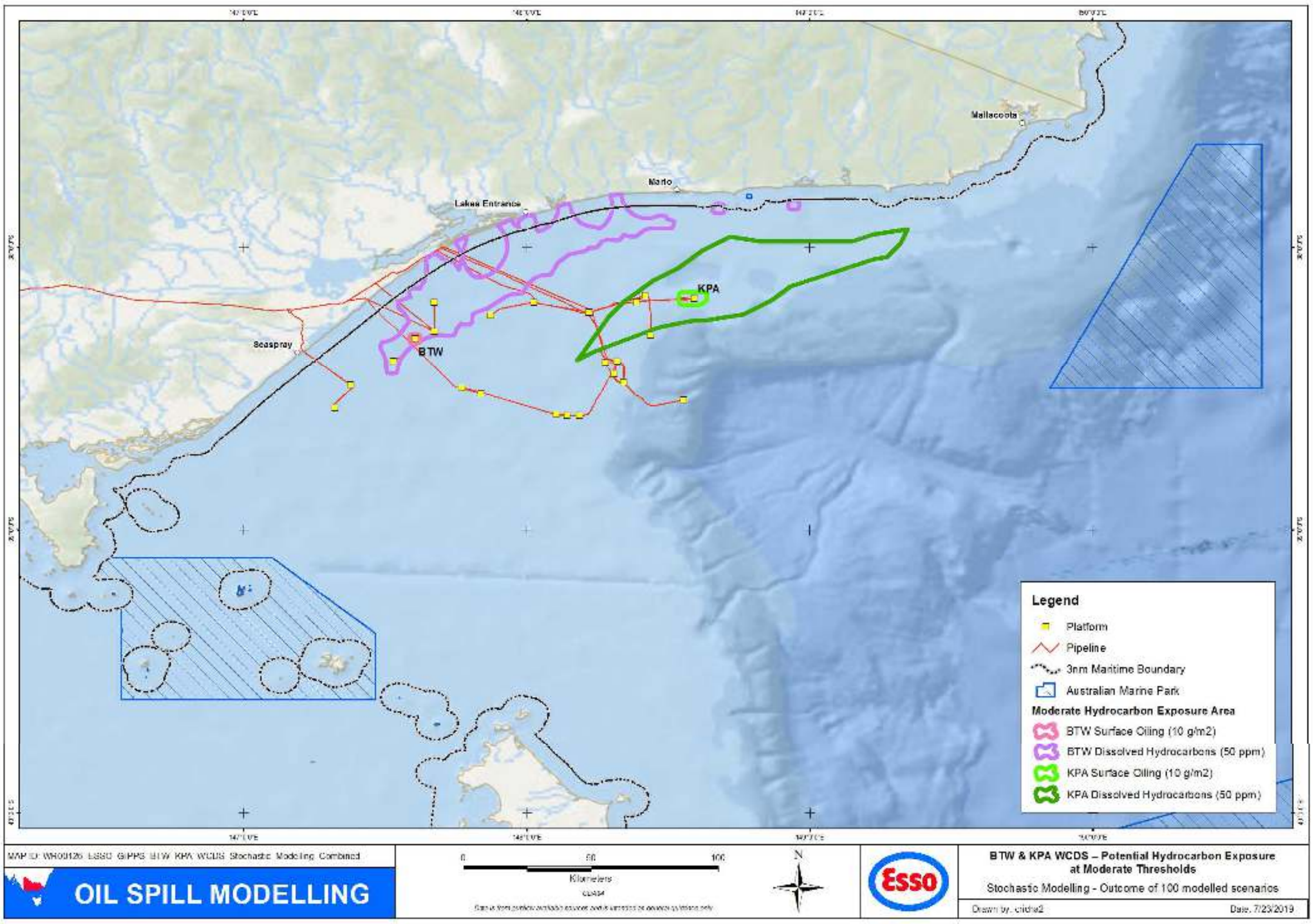

Figure 6-6 LOWC condensate spill stochastic modelling output for both BTW and KPA release locations. Hydrocarbon exposure at the moderate thresholds (Surface: 10 g/m^2 and In-water (dissolved): 50 ppb instantaneous)

6.7.3 Risk of loss of containment of reservoir hydrocarbons

A loss of containment of reservoir hydrocarbons has the potential to result in the following impacts:

- Injury / mortality to fauna;
- Change in habitat; and
- Change to the function, interests or activities of other users.

6.7.4 Risk Assessment

Receptors that could be affected by a LOC of reservoir hydrocarbons and that have been identified in the Description of Environment as occurring in the area are identified below.

Impacts	Receptors					
	Benthic Habitats	Plankton	Fish	Marine Reptiles - Turtles	Birds	Marine Mammals
Injury / mortality to fauna		✓	✓	✓	✓	✓
Change in habitat	✓					

Impacts	Receptors				
	Coastal Habitats	Wetlands	Australian Marine Parks	KEFs	National Parks and Reserves
Change in habitat				✓	

Impacts	Receptors	
	Fisheries – Commercial (Commonwealth and State)	Cultural - Historic
Change to the function, interests or activities of other users	✓	✓

Table 6-5 Risks of surface, shoreline and in-water hydrocarbon exposure

Receptor	Impact of condensate exposure	Exposure risk assessment
Benthic Habitats – Bare Substrate, Coral, Seagrass, Macroalgae, Subtidal Rocky Reef	**Bare Substrate** While this receptor represents the 'bare sand' areas offshore, it does provide habitat for benthic invertebrates (both infauna and macroinvertebrates). Surveys undertaken after the Montara blowout found no obvious visual signs of major disturbance at Barracouta and Vulcan shoals (Heyward *et al.,* 2010), which occur about 20-30 m below the water line in otherwise deep waters (generally >150 m water depth). Later sampling indicated the presence of low-level severely degraded oil at some shoals, though in the absence of pre-impact data, this could not be directly linked to the Montara spill. Levels of hydrocarbons in the sediments were, in any case, several orders of magnitude lower than levels at which biological effects become possible (Heyward *et al.,* 2012; Gagnon & Rawson, 2011). Studies undertaken since the DWH incident have shown that fewer than 2% of the more than 8,000 sediment samples collected exceeded the US EPA sediment toxicity benchmark for aquatic life, and these were largely limited to the area close to the wellhead (BP, 2015). Acute or chronic exposure through contact and/or digestion can result in toxicological risks to invertebrates. However, the presence of an exoskeleton (e.g. crustaceans) reduces the impact of hydrocarbon absorption through the surface membrane. Invertebrates with no exoskeleton and larval forms may be more prone to impacts. Exposure can induce changes in burrowing depth into the substrate (which can lead to higher predation rates on some species) and can limit the growth, recruitment and reproductive capacity of some marine invertebrates (Fukuyama et al,. 1998). Deep water benthic invertebrates are usually protected from oiling by the buoyant nature of hydrocarbons, although the depth of oil penetration is dependent on turbulence in the water column. Hydrocarbons can also reach the benthos through the settlement of oiled particles such as faeces, dead plankton or inorganic sand particles (Jewett *et al*., 1999). **Coral** Corals are generally located in shallow and intertidal regions, where there is the potential for exposure to surface and in-water hydrocarbons.	Exposure to in-water hydrocarbons is largely restricted to the surface 10 m of the water column and therefore any potential impact to benthic habitats will only occur in shallow nearshore waters. There is a very low probability that the zone of moderate exposure to dissolved hydrocarbons would extend into nearshore Victorian waters. The predominant benthic habitat in the Gippsland Basin is bare substrate. However, known areas of seagrass which may be exposed include Lakes Entrance. There is the potential that exposure could result in sub-lethal impacts, more so than lethal impacts, possibly because much of seagrasses' biomass is underground in their rhizomes (Zieman *et al*., 1984). Seagrass in this region isn't considered a significant food source for marine fauna. Impact by direct contact of benthic species with hydrocarbon in the deeper areas of the release area is not expected given the surface nature of the spill and the water depths at the spill location. Species closer to shore may be affected although these effects will be localised, low level and temporary, Filter-feeding benthic invertebrates such as sponges, bryozoans, abalone and hydroids may be exposed to sub-lethal impacts however population level impacts are considered unlikely. The consequence of a LOWC on benthic habitats is assessed as **Level III** (Potential Short Term, Minor Effects).

Receptor	Impact of condensate exposure	Exposure risk assessment
	Experimental studies and field observations indicate all coral species are sensitive to the effects of oil, although there are considerable differences in the degree of tolerance between species. Differences in sensitivities may be due to the ease with which oil adheres to the coral structures, the degree of mucous production and self cleaning, or simply different physiological tolerances. Direct contact of coral by hydrocarbons may impair respiration and also photosynthesis by symbiotic zooanthellae (IPIECA, 1992). Coral gametes or larvae in the surface layer where they are exposed to the slick may also be fouled (Epstein *et al.,* 2000). Physical oiling of coral tissue can cause a decline in metabolic rate and may cause varying degrees of tissue decomposition and death (Negri and Heyward, 2000). Oil may also cling to certain types of sediment causing oil to sink to the seafloor, covering corals in oiled sediment. Where corals come into direct contact with surface exposures (i.e., intertidal/shallow areas), they are more susceptible due to physical presence, than toxicity associated with dissolved oil components within the water column which, in some cases, may be more toxic than the floating surface slicks (Volkman *et al*., 1994). A range of impacts is reported to result from toxicity including partial mortality of colonies, reduced growth rates, bleaching and reduced photosynthesis. Laboratory and field studies have demonstrated that branching corals appear to have a higher susceptibility to hydrocarbon exposure than massive corals or corals with large polyps. Chronic effects of oil exposure have been consistently noted in corals and, ultimately, can kill the entire colony. Chronic impacts include histological, biochemical, behavioural, reproductive and developmental effects. Field studies of chronically polluted areas and manipulative studies in which corals are artificially exposed to oil show that some coral species tolerate oil better than other species (NOAA, 2010). Reproductive stages of corals have been found to be more sensitive to oil toxicity. Fertilisation of coral species has been observed to be completely blocked in *Acropora tenuis* at heavy fuel oil concentrations of 150 ppb (Harrison, 1999), with significant reductions in fertilisation of *A.millepora* and *A. valida* at concentrations between 580 and 5800 ppb, in addition to developmental abnormalities and reduced survival of coral larvae at similar concentrations. Lower concentrations of less than 100 ppb crude oil were observed to inhibit larval metamorphosis in *A. millepora* (Negri & Heyward, 2000).	

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	Studies undertaken after the Montara incident included diver surveys to assess the status of Ashmore, Cartier and Seringapatam coral reefs. These found that other than a region-wide coral bleaching event caused by thermal stress (i.e., caused by sea water exceeding 32°C), the condition of the reefs was consistent with previous surveys, suggesting that any effects of hydrocarbons reaching these reefs was minor, transitory or sub-lethal and not detectable (Heyward *et al*., 2010). This is despite AMSA observations of surface slicks or sheen nears these shallow reefs during the spill (Heyward *et al*., 2010). Surveys in 2011 indicated that the corals exhibiting bleaching in 2010 had largely survived and recovered (Heyward *et al.,* 2012), indicating that potential exposure to hydrocarbons while in an already stressed state did not have any impact on the healthy recovery of the coral. In addition, surveys undertaken after the Montara blowout on the plateau areas of Barracouta and Vulcan shoals (Heyward *et al.,* 2010), which occur about 20-30 m below the water line in otherwise deep waters (generally >150 m water depth), and contain algae, hard coral and seagrass, found no obvious visual signs of major disturbance. **Macroalgae** Macroalgae are generally limited to growing on intertidal and subtidal rocky substrata in shallow waters to 10 m depth. As such, they may be exposed to subsurface and entrained and dissolved hydrocarbons, however are susceptible to surface hydrocarbon exposure more so in intertidal habitats as opposed to subtidal habitats. Reported toxic responses to oils have included a variety of physiological changes to enzyme systems, photosynthesis, respiration, and nucleic acid synthesis (Lewis & Pryor 2013). Despite the well established pool of literature on macroalgae exposure to petroleum oils, very few investigations have reported effects on species that are common in Australian waters (Lewis & Pryor 2013). Smothering, fouling and asphyxiation are some of the physical effects that have been documented from oil contamination in marine plants (Blumer, 1971; Cintron *et al*., 1981). In macroalgae, oil can act as a physical barrier for the diffusion of CO_2 across cell walls (O'Brien & 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	

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	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 oiled kelp beds 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). Intertidal macroalgal beds are more prone to oil spills than subtidal beds because although the mucous coating prevents oil adherence, oil that is trapped in the upper canopy can increase the persistence of the oil, which impacts upon site-attached species. Additionally, when oil sticks to dry fronds on the shore, they can become overweight and break as a result of wave action (IPIECA, 1995). The toxicity of hydrocarbons to macroalgae varies for the different macroalgal life stages, with water-soluble hydrocarbons more toxic to macroalgae (O'Brien and Dixon, 1976). Toxic effect concentrations for hydrocarbons and algae have varied greatly among species and studies, ranging 2- 10,000,000 ppb (Lewis & Pryor, 2013). The sensitivity of gametes, larva and zygote stages however have all proven more responsive to petroleum oil exposure than adult growth stages (Lewis & Pryor, 2013). Macrophytes, including macroalgae, require light to photosynthesise. So in addition to the potential impacts from direct smothering or exposure to entrained and dissolved hydrocarbons, the presence of entrained hydrocarbon within the water column can affect light qualities and the ability of macrophytes to photosynthesise. **Seagrass** Seagrasses generally grow in sediments in 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. As such, they may be exposed to both surface and sub-surface hydrocarbons. Submerged vegetation in nearshore areas can be exposed to oil by direct contact (i.e., smothering) and by uptake by rhizomes through contaminated sediments. Exposure also can take place via uptake of hydrocarbons through plant membranes. In addition, seeds may be affected by contact with oil contained within sediments (NRDA, 2012). When seagrass leaves are exposed to petroleum oil, sub-lethal quantities of the soluble fraction can be incorporated into the tissue, causing a reduction in tolerance to other stress factors (Zieman *et al*., 1984). The toxic components of	

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	petroleum oils are thought to be the PAH, which are lipophilic and therefore able to pass through lipid membranes and tend to accumulate in the thylakoid membranes of chloroplasts (Ren *et al.*, 1994). As such, the susceptibility of seagrasses to hydrocarbon spills will depend largely on distribution. Deeper communities will be protected from oiling under all but the most extreme weather conditions. Shallow seagrasses are more likely to be affected by dispersed oil droplets or, in the case of emergent seagrasses, direct oiling. Theoretically, intertidal seagrass communities would be the most susceptible because the leaves and rhizomes may both be affected. **Subtidal rocky reefs** Nearshore and offshore subtidal reef habitats are dominated by seaweeds, mobile invertebrates and fish. Potential impacts to sensitive receptors related to these reefs discussed in the appropriate sections. It was observed that the release of large quantities of fuel oil during the grounding of the Iron Baron did not substantially affect populations of subtidal reef associated organisms (Edgar & Barrett, 1995)	
Plankton	Plankton are found in nearshore and open waters beneath the surface in the water column. These organisms migrate vertically through the water column to feed in surface waters at night (NRDA, 2012). As they move close to the sea surface it is possible that they may be exposed to both surface hydrocarbons but to a greater extent, hydrocarbons dissolved or entrained in the water column Phytoplankton are typically not sensitive to the impacts of oil, though they do accumulate it rapidly (Hook *et al.*, 2016) due to their small size and high surface area to volume ratio. Phytoplankton exposed to hydrocarbons may affect their ability to photosynthesize and impact for the next trophic level in the food chain (Hook *et a*l., 2016). Oil can affect the rate of photosynthesis and inhibit growth in phytoplankton, depending on the concentration range. For example, photosynthesis is stimulated by low concentrations of oil in the water column (10-30 ppb), but become progressively inhibited above 50 ppb. Conversely, photosynthesis can be stimulated below 100 ppb for exposure to weathered oil (Volkman *et a*l., 2004). Zooplankton (microscopic animals such as rotifers, copepods and krill that feed on phytoplankton) are vulnerable to hydrocarbons (Hook *et a*l., 2016). Water column organisms that come into contact with oil risk exposure through ingestion, inhalation and dermal contact (NRDA, 2012), which can cause	Plankton are likely to be exposed to in-water (dissolved) hydrocarbons above the moderate exposure threshold in a narrow zone (up to 50 km in width) extending parallel to the Gippsland coastline (for up to 100 km from the release location). The impact to plankton is therefore predicted to be **Level III** (Potential Short Term, Minor Adverse Effects) with potential effects on the food web recognised.

Receptor	Impact of condensate exposure	Exposure risk assessment
	immediate mortality or declines in egg production and hatching rates along with a decline in swimming speeds (Hook *et al*., 2016). Plankton are generally abundant in the upper layers of the water column and is the basis of the marine food web, so an oil spill in any one location is unlikely to have long-lasting impacts on plankton populations at a regional level. Reproduction by survivors or migration from unaffected areas is likely to rapidly replenish losses (Volkman *et al.,* 2004). Oil spill field observations show minimal or transient effects on plankton (Volkman *et a*l., 2004). Once background water quality is re-established, plankton takes weeks to months to recover (ITOPF, 2011).	
Fish	Fish can be exposed to oil through a variety of pathways, including: direct dermal contact (e.g. swimming through oil); ingestion (e.g. directly or via oil-affected prey/foods); and inhalation (e.g. elevated dissolved contaminant concentrations in water passing over the gills). Fish are generally considered vulnerable to oil spills because they inhabit areas coincident with oil exploration and production and those areas that may be subsequently impacted by an oil spill; including coral reefs, seagrasses, nearshore areas, deep offshore areas, pelagic habitats and demersal habitats (Moore & Dwyer, 1974; Gundlach & Hayes, 1978). Of the potential toxicants, monocyclic and polycyclic aromatic hydrocarbons (MAHs and PAHs) are generally regarded as the most toxic to fish. <u>Surface oil</u> Since fish and sharks do not generally break the sea surface, the exposure of surface hydrocarbons to fish and shark species are unlikely to occur. Near the sea surface, fish are able to detect and avoid contact with surface slicks meaning fish mortalities rarely occur in the event of a hydrocarbon spill in open waters (Volkman *et al*., 2004). As a result, wide-ranging pelagic fish of the open ocean generally are not highly susceptible to impacts from surface hydrocarbons. Adult fish kills reported after oil spills occur mainly to shallow water, near-shore benthic species (Volkman *et al.,* 2004). Following the DWH incident, it was suggested that whale sharks may be vulnerable to oiling of gills if exposed to the oil. The tendency of whale sharks to feed close to surface waters will increase the likelihood of exposure to surface slicks and elevated hydrocarbon concentrations beneath slicks. <u>In-water oil</u> Exposure to hydrocarbons entrained or dissolved in the water column can be toxic to fishes. Studies have shown a range of impacts including changes in abundance, decreased size, inhibited swimming ability, changes to oxygen	Although pelagic fish species may be exposed to an area of moderate dissolved oil their mobile, transitory characteristics reduce the risk of prolonged exposure. Large-scale population level effects following a LOWC on fish species, abundances or assemblage composition would be unlikely due to the wide geographical distribution of many fish in Bass Strait and the potential for rapid re-colonisation. There is a low probability that the zone of moderate exposure to dissolved hydrocarbons will contact the White shark breeding and distribution BIAs. Pelagic species of shark including the White shark are at greatest risk of being exposed to oil following a LOWC given their wide foraging areas and risks of consuming contaminated prey. White sharks are known to aggregate near Ninety Mile Beach and philopatric characteristics means they may return to the place of birth to breed even if habitats are contaminated. This species is widely distributed and thus unlikely to suffer ecologically important declines in abundance. The consequences to fish and sharks are assessed as **Level II** (Potential Localised, Medium Term, Significant Adverse Effects).

Receptor	Impact of condensate exposure	Exposure risk assessment
	consumption and respiration, changes to reproduction, immune system responses, DNA damage, visible skin and organ lesions, and increased parasitism. However, many fish species can metabolize toxic hydrocarbons, which reduces the risk of bioaccumulation (NRDA, 2012). Pelagic species are also generally highly mobile and as such are not likely to suffer extended exposure (e.g. >96 hours) at concentrations that would lead to chronic effects due to their patterns of movement. Demersal fish are not expected to be impacted given the presence of in-water hydrocarbons in surface layers only. Fish are most vulnerable to hydrocarbon discharges during their embryonic, larval and juvenile life stages. Oil exposure may result in decreased spawning success and abnormal larval development. 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 areal extent of the spill. As egg/larvae dispersal is widely distributed in the upper layers of the water column it is expected that current induced drift will rapidly replace any oil affected populations.	
Marine Reptiles - Turtles	Marine turtles are vulnerable to the effects of oil at all life stages; eggs, hatchlings, juveniles, and adults. Oil exposure affects different turtle life stages in different ways; and each turtle life stage frequents a habitat with varied potential to be impacted during an oil spill. Several aspects of turtle biology and behaviour place them at particular risk, including a lack of avoidance, indiscriminate feeding in convergence zones, and large pre-dive inhalations. Marine turtles can be exposed to oil externally (e.g. swimming through oil slicks) or internally (e.g. swallowing the oil, consuming oil affected prey, or inhaling of volatile oil related compounds). <u>Surface oil</u> Effects of oil on turtles include increased egg mortality and developmental defects; direct mortality due to oiling in hatchlings, juveniles, and adults; and negative impacts to the skin, blood, digestive and immune systems, and salt glands. Oil can enter cavities such as the eyes, nostrils, or mouth; and oil covering their bodies may interfere with breathing because they inhale large volumes of air to dive. Experiments on physiological and clinical pathological effects of hydrocarbons on loggerhead turtles (~15–18 months old) showed that the turtles' major physiological systems were adversely affected by both chronic and acute exposures (96 hour exposure to a 0.05 cm layer of South Louisiana crude oil versus 0.5 cm for 48 hours) (Lutcavage *et al*. 1995). Recovery from the sloughing	While marine turtles, including threatened species, are known to occur in the area potentially exposed to condensate above surface and in-water (dissolved) moderate exposure thresholds they are not noted to reside or aggregate in significant numbers, and there are no recognised BIAs in the region. There are no turtle nesting beaches along the Gippsland coastline, so impacts to turtles from shoreline oiling will not occur. Although the effects of hydrocarbons on marine reptiles, specifically turtles can be severe, the low density of turtles expected in the region (due to lack of BIA or aggregations) suggests that a LOWC would affect individuals rather than population level. Consequently the potential impacts to marine reptiles are considered to be Consequence **Level III** (Potential Short Term, Minor Adverse Effects).

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	skin and mucosa took up to 21 days, increasing the turtle's susceptibility to infection or other diseases, such as fibropapilloma (Lutcavage *et al.* 1995). 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 DWH incident in the GoM, although many of these animals did not show any sign of oil exposure (NOAA 2013). Of the dead turtles found, 3.4% were visibly oiled and 85% of the live turtles found were oiled (NOAA, 2013). Of the captured animals, 88% of the live turtles were later released, suggesting that oiling does not inevitably lead to mortality. Shoreline oil Turtles may experience oiling impacts on nesting beaches and eggs through chemical exposures resulting in decreased survival to hatching and developmental defects in hatchlings. Adult females crossing an oiled beach could cause external oiling of the skin and carapace; nothing that most oil is deposited at the high-tide line, and most turtles nest well above this level. Studies on freshwater snapping turtles showed uptake of PAHs from contaminated nest sediments, but no impacts on hatching success or juvenile health following exposure of eggs to dispersed weathered light crude (Rowe *et al.,* 2009). However, other studies found evidence that exposure of freshwater turtle embryos to PAHs results in deformities (Bell *et al*., 2006, Van Meter *et al.,* 2006). Turtle hatchlings may be more vulnerable to smothering as they emerge from the nests and make their way over the intertidal area to the water (AMSA, 2015). Hatchlings that contact oil residues while crossing a beach can exhibit a range of effects including impaired movement and bodily functions (Shigenaka, 2003). Hatchlings sticky with oily residues may also have more difficulty crawling and swimming, rendering them more vulnerable to predation. It should be noted that the threat and relative impacts of an unplanned discharge on some marine reptile species are considered less damaging than other stressors. Report cards produced on protected marine reptiles in Australia generally ranked oil pollution as either 'not of concern' or 'of less concern' depending on the marine region (DSEWPAC 2012b).	
Birds	Seabirds and shorebirds are sensitive to the impacts of oiling, with their vulnerability arising from the fact that they cross the air-water interface to feed, while their shoreline habitats may also be oiled (Hook *et al*., 2016). Species that	Several threatened, migratory and/or listed marine species may occur in the area exposed above moderate surface thresholds. There are foraging BIA's for some species of petrels and albatrosses throughout the exposed area. However, there are no breeding BIAs within this area.

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	raft together in large flocks on the sea surface are particularly at risk (ITOPF, 2011). <u>Sea surface oil</u> Birds foraging at sea have the potential to directly interact with oil on the sea surface some considerable distance from breeding sites in the course of normal foraging activities. Seabird species most at risk include those that readily rest on the sea surface (e.g. shearwaters) and surface plunging species (e.g. terns, boobies). As seabirds are a top order predator, any impact on other marine life (e.g. pelagic fish) may disrupt and limit food supply both for the maintenance of adults and the provisioning of young. For seabirds, direct contact with hydrocarbons can foul feathers, which may subsequently result in hypothermia due to a reduction in the ability of the bird to thermo-regulate and impair water-proofing. A bird suffering from cold, exhaustion and a loss of buoyancy may also dehydrate, drown or starve (DSEWPAC, 2011). 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, may lead to emaciation (DSEWPAC, 2011). The greatest vulnerability in this case occurs when birds are feeding or resting at the sea surface (Peakall et al., 1987). . In a review of 45 actual marine 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 (Hook *et al*., 2016). The Iron Baron vessel spill (325 tonnes of bunker fuel in Tasmania in 1995) is estimated to have resulted in the death of up to 20,000 penguins (Hook *et al*., 2016). <u>Shoreline oil</u> Shorebirds are likely to be exposed to oil when it directly impacts the intertidal zone and onshore due to their feeding habitats. Foraging shorebirds will be at potential risk of both direct impacts through contamination of individual birds (e.g. fouling of feathers) and indirect impacts (e.g. fouling and/or a reduction in prey items) (Clarke, 2010). Birds that are coated in oil can also suffer from damage to	Seabirds rafting, resting, diving or feeding at sea have the potential to come into contact with surface oil, ranging from moderate to high exposure. Individual birds making contact close to the spill source at the time of the spill may suffer impacts however it is unlikely that a large number of birds will be affected. As such, acute or chronic toxicity impacts (death or long-term poor health) to small numbers of birds are possible, however this is not considered significant at a population level. Should the zone of moderate in-water exposure extend into nearshore waters foraging shorebirds may be indirectly impacted loss of invertebrate prey. The populations of seabird and shorebird species have a wide geographic range, meaning that impacts to individuals or a population at one location will not necessarily extend to populations at other un-impacted locations. Consequently, the potential consequence of risks to seabirds and shorebirds from a LOWC are considered to be **Level II** (Potential Localised, Medium Term, Significant Adverse Effects).

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	external tissues, including skin and eyes, as well as internal tissue irritation in their lungs and stomachs Breeding birds (both seabirds and shorebirds) may be exposed to oil via direct contact or the contamination of the breeding habitat (e.g. shores of islands) (Clarke, 2010). Bird eggs may subsequently 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. 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. Toxic effects on birds may result where oil is ingested as the bird attempts to preen its feathers, or via consumption of oil-affected prey. Whether this toxicity ultimately results in mortality will depend on the amount consumed and other factors relating to the health and sensitivity of the particular bird species. Engelhardt (1983), Clark (1984), Geraci & St Aubin (1988) and Jenssen (1994) indicated that the threshold thickness of oil that could impart a lethal dose to an individual wildlife species is 10 µm (~10 g/m^2). Scholten *et a*l. (1996) indicates that a layer 25 µm thick would be harmful for most birds that contact the slick.	
Marine Mammals (Pinnipeds)	Pinnipeds are directly at risk from impacts associated with the exposure to surface, shoreline and in-water hydrocarbons. <u>Sea surface oil</u> Pinnipeds are vulnerable to sea surface exposures in particular given they spend much of their time on or near the surface of the water, as they need to surface every few minutes to breathe, and regularly haul out on to beaches. Pinnipeds are also sensitive as they will stay near established colonies and haul-out areas, meaning they are less likely to practise 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. As a result of exposure to surface oils, pinnipeds, with their relatively large, protruding eyes are particularly vulnerable to effects such as irritation to mucous membranes that surround the eyes and line the oral cavity, respiratory surfaces, and anal and urogenital orifices. Hook *et al* (2016) reports that seals appear not	Seals are known to occur within the area exposed to moderate surface and in-water (dissolved) thresholds. Although these areas are not identified as critical habitat and there are no identified BIAs for seals in the region, fur seals are known to aggregate around offshore oil and gas installations. Exposure to surface oil can result in skin and eye irritations and disruptions to thermal regulation. Although the characteristics of condensate reduce the risk of hyperthermia from oiling, other effects of surface and in-water hydrocarbons on pinnipeds can be severe. Long term impacts at a population level are considered unlikely however the consequence is assessed as **Level II** (Potential Localised, Medium Term, Significant Adverse Effects).

Receptor	Impact of condensate exposure	Exposure risk assessment
	to be very sensitive to contact with oil, but instead to the toxic impacts from the inhalation of volatile components. For some pinnipeds, fur is an effective thermal barrier because it traps air and repels water. Petroleum stuck to fur reduces its insulative value by removing natural oils that waterproof the pelage. Consequently, the rate of heat transfer through fur seal pelts can double after oiling (Geraci & St.Aubin, 1988), adding an energetic burden to the animal. Kooyman *et al* (1976) suggest that in fact, fouling of approximately one-third of the body surface resulted in 50% greater heat loss in fur seals immersed in water at various temperatures. Fur-seals are particularly vulnerable due to the likelihood of oil adhering to fur. Heavy oil coating and tar deposits on fur-seals may result in reduced swimming ability and lack of mobility out of the water. <u>In-water oil</u> Ingested hydrocarbons can irritate or destroy epithelial cells that line the stomach and intestine, thereby affecting motility, digestion and absorption. However, pinnipeds have been found to have the enzyme systems necessary to convert absorbed hydrocarbons into polar metabolites, which can be excreted in urine (Engelhardt, 1982; Addison & Brodie, 1984; Addison *et al*., 1986). Volkman *et al* (1994) report that benzene and naphthalene ingested by seals is quickly absorbed into the blood through the gut, causing acute stress, with damage to the liver considered likely. If ingested in large volumes, hydrocarbons may not be completely metabolised, which may result in death. <u>Shoreline oil</u> Breeding colonies (used to birth and nurse until pups are weaned) are particularly sensitive to hydrocarbon spills (Higgins & Gass, 1993). ITOPF (2011) report that species that rely on fur to regulate their body temperature (such as fur-seals) are the most vulnerable to oil as the animals may die from hypothermia or overheating, depending on the season, if the fur becomes matted with oil. It is reported that most pinnipeds scratch themselves vigorously with their flippers and do not lick or groom themselves, so are less likely to ingest oil from skin surfaces (Geraci & St. Aubin, 1988). However, mothers trying to clean an oiled pup may ingest oil. The Long Term Environmental Impact and Recovery report for the Iron Barren oil spill concluded that “The number of pups born at Tenth	

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	Island in 1995 was reduced when compared to previous years. There was a strong relationship between the productivity of the seal colonies and the proximity of the islands to the oil spill wherein the islands close to the spill showed reduced pup production and those islands more distant to the oil spill did not" (Tasmanian SMPC, 1999). Pinnipeds are further at risk because they appear to rely on scent to establish a mother-pup bond (Sandegren, 1970; Fogden, 1971), and consequently oil-coated pups may not be recognisable to their mothers. This is only theorised, with studies and research indicating interaction between mothers and oiled pups were normal (Davis and Anderson, 1976; Davies, 1949; Shaughnessy & Chapman, 1984). Australian sea-lions have 'naturally poor recovery abilities' due to 'unusual reproductive biology and life history' (TSSC, 2005). Due to the extreme philopatry of females and limited dispersal of males between breeding colonies, the removal of only a few individuals annually may increase the likelihood of decline and potentially lead to the extinction of some of the smaller colonies. The Long Term Environmental Impact and Recovery report for the Iron Barren oil spill concluded that "The number of pups born at Tenth Island in 1995 was reduced when compared to previous years. There was a strong relationship between the productivity of the seal colonies and the proximity of the islands to the oil spill wherein the islands close to the spill showed reduced pup production and those islands more distant to the oil spill did not" (Tasmanian SMPC, 1999). Pinnipeds are further at risk because they appear to rely on scent to establish a mother-pup bond (Sandegren, 1970; Fogden, 1971), and consequently oil-coated pups may not be recognisable to their mothers. This is only theorised, with studies and research indicating interaction between mothers and oiled pups were normal (Davis and Anderson, 1976; Davies, 1949; Shaughnessy & Chapman, 1984). Australian sea-lions have 'naturally poor recovery abilities' due to 'unusual reproductive biology and life history' (TSSC, 2005). Due to the extreme philopatry of females and limited dispersal of males between breeding colonies, the removal of only a few individuals annually may increase the likelihood of decline and potentially lead to the extinction of some of the smaller colonies.	

Receptor	Impact of condensate exposure	Exposure risk assessment
Marine Mammals (Cetaceans)	Whales and dolphins can be exposed to the chemicals in oil through: • Internal exposure by consuming oil or contaminated prey; • Inhaling volatile oil compounds when surfacing to breathe; • External exposure, by swimming in oil and having oil directly on the skin and body; and • Maternal transfer of contaminants to embryos (NRDA, 2012). <u>Surface oil</u> Direct surface oil contact with hydrocarbons is considered to have little deleterious effect on whales, possibly due to the skin's effectiveness as a barrier to toxicity, and effect of oil on cetacean skin is probably minor and temporary (Geraci & St Aubin, 1988). French-McCay (2009) identifies that a 10-25 µm oil thickness threshold has the potential to impart a lethal dose to the species, however also estimates a probability of 0.1% mortality to cetaceans if they encounter these thresholds based on the proportion of the time spent at surface. The inhalation of oil droplets, vapours and fumes is a distinct possibility if whales surface in slicks to breathe. Exposure to hydrocarbons in this way could damage mucous membranes, damage airways or even cause death. <u>In-water oil</u> The physical impacts from ingested hydrocarbon with subsequent lethal or sub-lethal impacts are both applicable to entrained oil. However, the susceptibility of cetaceans varies with feeding habits. Baleen whales (such as Blue, Southern right and Humpback whales) are not particularly susceptible to ingestion of oil in the water column as they feed by skimming the surface. Oil may stick to the baleen while they 'filter feed' near slicks. Toothed whales and dolphins may be susceptible to ingestion of dissolved and entrained oil as they gulp feed at depth. As highly mobile species, in general it is very unlikely that these animals will be constantly exposed to concentrations of hydrocarbons in the water column for continuous durations (e.g., >96 hours) that would lead to chronic effects. Note also, many marine mammals appear to have the necessary liver enzymes to metabolise hydrocarbons and excrete them as polar derivatives. Evidence suggests that many cetacean species are unlikely to detect and avoid spilled oil (Matkin *et al.* 2008). There are numerous examples where cetaceans	Several threatened, migratory and/or listed cetacean species may traverse the condensate spill plume. The foraging BIA for the Pygmy blue whale and the migration BIA for the Southern right whale may be exposed to surface and in-water concentrations above the moderate exposure threshold. Individual whales could encounter surface oil above the moderate exposure threshold in the immediate vicinity of the release location, but the release would need to coincide with migration or foraging for a greater number of individuals to be present in the plume, The highly mobile nature of cetacean species means that exposure to moderate levels of surface or in-water hydrocarbon is not anticipated to result in long term population viability effects and the resultant impact is assessed as **Consequence Level II** (Potential Localised, Medium Term, Significant Adverse Effects), taking into consideration that the populations of these species remain small relative to pre-whaling numbers it is possible that mortality of even a small number of individuals as result of oiling could inhibit or retard species recovery.

Receptor	Impact of condensate exposure	Exposure risk assessment
	have appeared to incidentally come into contact with oil and/or not demonstrated any obvious avoidance behavior; e.g. following the Exxon Valdez oil spill, Matkin *et al*. (2008) reported killer whales in slicks of oil as early as 24 hours after the spill. Some whales, particularly those with coastal migration and reproduction, display strong site fidelity to specific resting, breeding and feeding habitats, as well as to their migratory paths and this may override any tendency for cetaceans to avoid the noxious presence of hydrocarbons. The Southern right whale exhibits varying degrees of site fidelity, with the majority of females and calves returning to the same birthing location, while some also travel long distances between breeding grounds within a season (DSEWPAC, 2013). If spilled oil reaches these biologically important habitats, the pollution may disrupt natural behaviours, displace animals, reduce foraging or reproductive success rates and increase mortality. If sufficiently high numbers are impacted, the greater population may experience reduced recovery and survival rates.	
KEFs	Potential impacts to sensitive receptors related to the KEF: Upwelling East of Eden, such as plankton and other marine fauna, are discussed in the appropriate sections above.	The zones of moderate sea surface and in-water (dissolved) exposure intersect the KEF: Upwelling East of Eden. While a spill would not affect the upwelling itself, if the spill occurs at the time of an upwelling event, it may result in krill being exposed to in-water phase hydrocarbons. Pygmy blue whales feeding at this time may suffer from reduced availability of prey however these impacts are expected to be localised and temporary. The consequence is assessed as **Level III** (Potential Short Term, Minor Adverse Effects).
Commercial Fisheries	Commercial fishing has the potential to be impacted through exclusion zones associated with the spill, the spill response and subsequent reduction in fishing effort. Exclusion zones may impede access to commercial fishing areas, for a short period of time, and nets and lines may become oiled. The impacts to commercial fishing from a public perception perspective however, may be much more significant and longer term than the spill itself. Fishing areas may be closed for fishing for shorter or longer periods because of the risks of the catch being tainted by oil. Concentrations of petroleum contaminants in fish and crustacean and mollusc tissues could pose a significant potential for adverse human health effects, and until these products from nearshore fisheries have been cleared by the health authorities, they could be restricted for sale and human consumption. Indirectly, the fisheries sector will	Several commercial fisheries may operate within the area potentially exposed in the event of a LOWC and a temporary fisheries closure may be put in place. Oil may foul the hulls of fishing vessels and associated equipment, such as gill nets. A temporary fisheries closure, combined with oil tainting of target species (actual or perceived), may lead to financial losses to fisheries and economic losses for individual licence holders. Fisheries closures and the flow on losses from the lack of income derived from these fisheries are likely to have short-term but widespread socio-economic consequences, such as reduced employment (in fisheries service industries, such as tackle and bait supplies, fuel, marine mechanical services, accommodation and so forth). Any exclusion zone would be restricted to the immediate vicinity of the release location and due to rapid weathering only in place for a number of days, consequently, the potential impacts to commercial fisheries from LOWC are considered to be **Consequence Level III** (Potential Short Term, Minor Adverse Effects).

Receptor	Impact of condensate exposure	Exposure risk assessment
	suffer a heavy loss if consumers are either stopped from using or unwilling to buy fish and shellfish from the region affected by the spill. Impacts to fish stocks have the potential for reduction in profits for commercial fisheries, and exclusion zones exclude fishing effort. Davis *et al* (2002) report detectable tainting of fish flesh after a 24-hour exposure at crude concentrations of 0.1 ppm, marine fuel oil concentrations of 0.33 ppm and diesel concentrations of 0.25 ppm. The Montara spill (as the most recent [2009] example of a large hydrocarbon spill in Australian waters) occurred over an area fished by the Northern Demersal Scalefish Managed Fishery (with 11 licences held by 7 operators), with goldband snapper, red emperor, saddletail snapper and yellow spotted rockcod being the key species fished (PTTEP, 2013). As a precautionary measure, the WA Department of Fisheries advised the commercial fishing fleet to avoid fishing in oil-affected waters. Testing of fish caught in areas of visible oil slick (November 2009) found that there were no detectable petroleum hydrocarbons in fish muscle samples, suggesting fish were safe for human consumption. In the short-term, fish had metabolised petroleum hydrocarbons. Limited ill effects were detected in a small number of individual fish only (PTTEP, 2013). No consistent effects of exposure on fish health could be detected within two weeks following the end of the well release. Follow up sampling in areas affected by the spill during 2010 and 2011 (PTTEP, 2013) found negligible ongoing environmental impacts from the spill. Since testing began in the month after the DWH blowout in the Gulf of Mexico (GoM) (2010), levels of oil contamination residue in seafood consistently tested 100 to 1,000 times lower than safety thresholds established by the USA FDA, and every sample tested was found to be far below the FDA's safety threshold for dispersant compounds (BP, 2015). FDA testing of oysters found oil contamination residues to be 10 to 100 times below safety thresholds (BP, 2014). Sampling data shows that post-spill fish populations in the GoM since 2011 were generally consistent with pre-spill ranges and for many shellfish species, commercial landings in the GoM in 2011 were comparable to pre-spill levels. In 2012, shrimp (prawn) and blue crab landings were within 2.0% of 2007-09 landings. Recreational fishing harvests in 2011, 2012 and 2013 exceeded landings from 2007-09 (BP, 2014).	

Receptor	Impact of condensate exposure	Exposure risk assessment
Cultural - Historic	Visible sheen has the potential to reduce the visual amenity of cultural heritage sites such as historic (e.g. shipwreck) protected areas.	Oil sheen is predicted to encroach upon nearshore waters in the vicinity of a number of historic shipwrecks. However, given the relatively short duration, and limited extent of predicted exposure the consequence level is considered **Level IV** (Inconsequential or No Adverse Effect).

An assessment of LOWC incidents was undertaken using SINTEF records (2013). This provided an indicative probability of a LOWC from well intervention or drilling that can be reasonably expected to occur, based on previous incidents. Statistics indicate the chances of the activity resulting in a LOWC (and the subsequent impacts to receptors) are <1 × 10^{-4} (**Very Highly Unlikely (E)**).

6.7.5 Risk Ranking

Consequence	Likelihood	Risk Ranking
II	E	4

6.7.6 Controls

Environmental Performance Outcome	Control	Environmental Performance Standard	Measurement Criteria
Maintain well control such that reservoir hydrocarbons are not released to the marine environment	NOPSEMA accepted WOMP	A NOPSEMA-accepted WOMP will be in place before drilling activities start	Records confirm a NOPSEMA-accepted WOMP was in place before operations commenced
	NOPSEMA accepted rig safety case	A NOPSEMA-accepted safety case for the rig will be in place before drilling activities start	Records confirm a NOPSEMA-accepted safety case for the rig was in place before operations commenced
Minimise the impact on the environment from a LOWC	OPEP	Emergency response activities will be implemented in accordance with the OPEP	Records confirm that emergency response activities have been implemented in accordance with the OPEP
	OSMP	Operational and scientific monitoring will be implemented in accordance with the OSMP	Records confirm that operational and scientific monitoring have been implemented in accordance with the OSMP.

6.7.7 Demonstration of ALARP

ALARP Decision Context and Justification	**Decision Context B** Drilling is a standard offshore activity. Although the consequences of a LOWC have been assessed as Level II the risks associated with a LOWC are well understood and effectively managed by regulatory controls. No concerns relating to a LOWC have been expressed during stakeholder consultation. Consequently, Esso believes **ALARP Decision Context B** should apply.

Good Practice	Adopted	Control	Rationale
Well operations planning to prevent LOWC	✓	NOPSEMA accepted WOMP	Under Part 5 of the Offshore Petroleum and Greenhouse Gas Storage (Resource Management and Administration) Regulations 2011, NOPSEMA is required to accept a WOMP to enable well activities to be undertaken. The WOMP details well barriers and the integrity testing that will be in place for the program. Esso's NOPSEMA-accepted WOMP describes the minimum requirements for well barriers during operations. Specifically, it requires: • minimum of two independent tested barriers • barrier integrity is verified upon installation and at periodic intervals • suspension of operations if barrier fails resulting in fewer than two independent barriers remaining in place.
Implementation of a safety management system which controls risks arising from major incidents and achieves safe operation of the facility	✓	NOPSEMA accepted JUR Safety Case	Under the OPGGS(S)R, NOPSEMA requires that the facility (i.e. the Tom Prosser JUR) has an accepted Safety Case in place before commencing the activity.
Oil spill response planning	✓	OPEP	Under the OPGGS(E)R, NOPSEMA requires that the petroleum activity has an accepted OPEP in place before commencing the activity. In the event of a LOWC the OPEP will be implemented.
Oil spill monitoring planning	✓	OSMP	Esso's OSMP details the arrangements and capability in place for: • operational monitoring of a hydrocarbon spill to inform response activities • scientific monitoring of environmental impacts of the spill and response activities.

			Operational monitoring will allow adequate information to be provided to aid decision making to ensure response activities are timely, safe, and appropriate. Scientific monitoring will identify if potential longer-term remediation activities may be required.

Engineering Risk Assessment			
Additional, Alternative, Improved Controls	Benefit	Cost / Feasibility	Adopted
Third level of well barriers	Increased level of protection from uncontrolled flow from a well beyond the 'two barrier' requirement.	The two barrier philosophy is considered industry best practice and the BOP already has multiple barriers with redundancy, specifically designed to reduce the risk to ALARP as per the WOMP.	Not Adopted

6.7.8 Demonstration of Acceptability

Factor	Demonstration Criteria	Criteria Met	Rationale
Risk Assessment Process for Unplanned Events	The risk ranking is lower than Category 1	✓	The risk ranking is Category 4 (the lowest category) and therefore considered acceptable.
Principles of Ecologically Sustainable Development (ESD)	No potential to affect biological diversity and ecological integrity (i.e. Consequence Level is not I)	✓	The impacts associated with this aspect are potentially significant but limited to the localised area and medium term, which is not considered as having the potential to affect biological diversity and ecological integrity.
	Activity does not have the potential to result in	✓	The activities were evaluated as having the potential to result in a Level II consequence thus are not considered as having the potential to

	serious or irreversible environmental damage.		result in long term or irreversible environmental damage.

Legislative and Other Requirements	Legislative and other requirements have been identified and met.	✓	The proposed activities align with the requirements of the:
			
			• OPGGS Act 2006:
			  • Schedule 3 Occupational health and safety and OPGGS(S)R. The OPGGS(S)R require the operator of each offshore facility to prepare a safety case for submission to NOPSEMA. Activities at a facility must be conducted in accordance with a safety case that has been accepted by NOPSEMA.
			  • Part 5, OPGGS (Resource Management and Administration) Regulations 2011 which require NOPSEMA to accept a WOMP to enable well activities to be undertaken.
			
			The following other requirements were identified as relevant to impacts from a LOWC. Oil spills are a recognised threat to these species and proposed activity is consistent with conservation / management actions where specified:
			
			• National Recovery Plan for Threatened Albatrosses and Giant Petrels, 2011-2016 (DSEWPAC, 2011)
			
			  • Wildlife Conservation Plan for Migratory Shorebirds (DEH, 2015)

Internal Context	Consistent with Esso's Environment Policy.	✓	Proposed activities are consistent with Esso's Environment Policy, in particular, to "comply with all applicable environmental laws and regulations and apply responsible standards where laws and regulations do not exist"

	Meets ExxonMobil Environmental Standards	✓	There is no standard related to a LOC of reservoir hydrocarbons but the activities proposed meet the strategic objectives of the Upstream Environmental Standards.
	Meets ExxonMobil Operations Integrity Management System (OIMS) Objectives	✓	Proposed activities meet: OIMS System 6-5 objective to identify and assess environmental aspects; significant aspects are addressed and controlled consistent with policy and regulatory requirements; OIMS System 8-1 objective to clearly define and communicate operations integrity requirements to contractors; and OIMS System 10-2 objectives to document, resource and communicate emergency response plans, and conduct training, exercises and/or drills to determine the adequacy of the plans.
External Context	Stakeholder concerns have been considered / addressed through the consultation process.	✓	No specific stakeholder concerns have been raised concerning the risk of a LOC resulting from a LOWC.

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Appendix A – Stakeholder Consultation Reports

West Barracouta and Kipper Jack Up Rig Consultation Tabl

Stakeholder ID	Correspondence Date	Correspondence ID	Summary	Objections/Claims/Issues/Merits	Follow Up Required?	Close Out Date
2	06-May-19	2955	Email sent from [redacted] (EAPL) to relevant stakeholders: Please find attached a campaign information sheet detailing a number of offshore activities within the Gippsland Basin off the Victorian coastline collectively called the 2020 Jack Up Rig Campaign. The campaign sheet contains details including activity description, location, timing, impacts and risks.	No objections, claims or issues raised	☐	
2	14-May-19	3004	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11' 10", 147° 49' 02" (Wirrah), 38° 05' 42", 148° 02' 05" (Sweetlips), 38° 11' 54", 148° 33' 42" (East Pilchard), 38° 34' 14", 147° 19' 17" and 38° 29' 20", 147° 22' 34" (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	RESPONSE 17/05/19 from [redacted] ([redacted]): Many thanks for the update and we look forward to receiving your revision to the Geophysical and Geotechnical survey EP for areas within and just outside the Gippsland ATBA.	☑	20-May-19
2	20-May-19	3041	[redacted] (EAPL) called [redacted] ([redacted]) to discuss her request to receive the revision to the Geophysical and Geotechnical survey EP. [redacted] advised [redacted] that she doesn't want to receive the EP, just to continue receiving our general Stakeholder updates.	No objections, claims or issues raised	☐	
4	06-May-19	2956	Email sent from [redacted] (EAPL) to relevant stakeholders: Please find attached a campaign information sheet detailing a number of offshore activities within the Gippsland Basin off the Victorian coastline collectively called the 2020 Jack Up Rig Campaign. The campaign sheet contains details including activity description, location, timing, impacts and risks.	No objections, claims or issues raised	☐	

Stakeholder ID	Correspondence Date	Correspondence ID	Summary	Objections/Claims/Issues/Merits	Follow Up Required?	Close Out Date
4	14-May-19	3002	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11' 10", 147° 49' 02" (Wirrah), 38° 05' 42", 148° 02' 05" (Sweetlips), 38° 11' 54", 148° 33' 42" (East Pilchard), 38° 34' 14", 147° 19' 17" and 38° 29' 20", 147° 22' 34" (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised	☐	
13	06-May-19	2957	Email sent from [redacted] (EAPL) to relevant stakeholders: Please find attached a campaign information sheet detailing a number of offshore activities within the Gippsland Basin off the Victorian coastline collectively called the 2020 Jack Up Rig Campaign. The campaign sheet contains details including activity description, location, timing, impacts and risks.	No objections, claims or issues raised	☐	
13	14-May-19	3016	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11' 10", 147° 49' 02" (Wirrah), 38° 05' 42", 148° 02' 05" (Sweetlips), 38° 11' 54", 148° 33' 42" (East Pilchard), 38° 34' 14", 147° 19' 17" and 38° 29' 20", 147° 22' 34" (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised	☐	

Stakeholder ID	Correspondence Date	Correspondence ID	Summary	Objections/Claims/Issues/Merits	Follow Up Required?	Close Out Date
15	05-Dec-18	2283	Offshore Community Session: summary of [redacted] (EAPL) talking points & stakeholder consultation as noted by [redacted] (EAPL): [redacted] spoke to the whole group about Esso's current and planned activities in Bass Strait in the next 12 months. Topics for discussion included the G&G survey work completed in 2018, the location and timing of survey work to be completed in 2019, and the scope of the BTW project. Other topics included: MILESTONES: - Over the last 24 months, our Gippsland operations have been able to meet unprecedented east coast gas demand by increasing our production well above our historical levels. - But as the major fields in Bass Strait reach the end of their natural lives, we need to find new sources of gas. - In August, we commenced our first deep-water exploration drilling program in over 20 years, by drilling two new wells, Baldfish and Hairtail at a block known as VIC/P70, south east of our existing fields. - While the $120m drilling campaign was completed safely and without incident by the drill rig Ocean Monarch in November, unfortunately, we didn't encounter commercial quantities of hydrocarbons. - Prior to drilling we also competed our Environment Plan, which included stakeholder consultation. We're keen to listen to your opinions on how that went and how we can keep improving our operations. - Despite not finding commercial gas at our first attempt in over 20 years, we are actively pursuing new gas development opportunities in Bass Strait so that we can meet the demand for gas. - We are going to keep trying to find new sources of gas. To do this, we have had our best engineering and science minds working on options for new gas developments to bring online much needed new gas supplies from Bass Strait fields. - We've already spent money reprocessing our historic seismic data across the Bass Strait and will consider purchasing new seismic data, should it be acquired. This will help our geoscience team better identify opportunities for new gas supplies that will keep Victorians warm in winter and cooking with gas. PLANNED OFFSHORE ACTIVITIES - Following the completion of our exploration drilling at Baldfish and Hairtail, Esso is planning to utilise the Ocean Monarch rig to undertake well abandonment work for the Blackback field and look to undertake possible further exploration drilling in VIC/P70 sometime in 2019. - We are also planning to develop a gas field in the VIC/L1 block, known as West Barracouta, approximately 6km south west of the existing Barracouta platform. - The proposed West Barracouta development will involve the drilling of two subsea wells which will be tied back to our existing Barracouta infrastructure in Bass Strait. - A subsea flowline approximately 6km in length will be connected via a subsea hot tap into the existing gas export pipeline and a controls umbilical approximately 6.5 km in length to the Barracouta platform will also be installed. - As the project develops, additional consultation with stakeholders will be conducted.	No objections, claims or issues raised	☐	

Stakeholder ID	Correspondence Date	Correspondence ID	Summary	Objections/Claims/Issues/Merits	Follow Up Required?	Close Out Date
			- We're also planning on undertaking repair and maintenance works on our Cobia pipeline, which will start soon on 20 December 2018. The pipeline is 5.5 kilometres long and runs between our Cobia and Halibut platforms. - The dive support vessel, the Seven Eagle, will be supported by the Bhagwan Dryden and the repair between Cobia and Halibut is expected to take 10-14 days. - The Seven Eagle collected the 5.5km flexible pipeline in Denmark in late October and has just left Singapore after taking on supplies and Australian crew. - Whilst the majority of the work will take place within the Cobia and Halibut petroleum safety zones a notice to mariners will be issued. - We're also updating the current environment plans for our offshore plans, which we conduct 5-yearly, and will consult with relevant stakeholders on ongoing and new risks. We've heard your feedback around multiple consultations and I'm pleased to say we've been able to work with the regulator to consolidate our 9 Environment Plans into 1 for our existing operations. - As you can see we have a busy schedule of work ahead of us and are pleased to continue investing in our operations, bringing new domestic gas supplies to market and creating jobs. 2019 also marks a milestone year for our Bass Strait operations, with the 50th year of production from our Gippsland Basin Joint Venture with BHP. - It's amazing to think that back in 1969 when hydrocarbons were first produced, that we'd still be here today 50 years later, powering the local economy. Stakeholders in attendance: [redacted] – Discussed Esso projects including Cobia PRP and timing of the activity this year. No environmental concerns or issues raised relating to EAPL projects or operations. Industry has been busy with a lot of consultation and they are concerned about the extent of the proposed [redacted] seismic campaign. Enquired as to whether there had been any change in fishing activities and areas in Bass Strait – only change has been the development of an octopus fishery. One boat is doing this and [redacted] are processing the catch. Octopus fishing involves the use of traps laid on the sea floor that are then retrieved. [redacted] – offshore recreational fishing has grown significantly in recent years with the development of the sword fish fishery. This is a long way offshore (beyond phone range) and has attracted up to 20 vessels at times. No environmental concerns or issues raised with EAPL operations or projects. [redacted] and [redacted] representatives – provided a brief overview of our operations and projects and the various regulatory requirements (environment plan, safety case, licences) – no environmental concerns or issues raised with EAPL operations or projects. Attendees of the [redacted] training course – quick discussion on long term opportunities for employment within the oil and gas business in Bass Strait no environmental issues raised. [redacted] – quick discussion about projects in the next 12+ months and the level of activity associated with maintaining gas production and supply to Victoria – no environmental concerns			

Stakeholder ID	Correspondence Date	Correspondence ID	Summary	Objections/Claims/Issues/Merits	Follow Up Required?	Close Out Date
			[redacted] - [redacted] ([redacted]) was also in attendance			
15	14-May-19	3018	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11' 10", 147° 49' 02" (Wirrah), 38° 05' 42", 148° 02' 05" (Sweetlips), 38° 11' 54", 148° 33' 42" (East Pilchard), 38° 34' 14", 147° 19' 17" and 38° 29' 20", 147° 22' 34" (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised	☐	

Stakeholder ID	Correspondence Date	Correspondence ID	Summary	Objections/Claims/Issues/Merits	Follow Up Required?	Close Out Date
17	18-Feb-19	2936	[redacted] BTW / Kipper Update: A geotechnical survey will be completed at a number of locations in Bass Strait including the BTW proposed well locations, Seahorse, Tarwhine and Kipper subsea facilities. The vessel to be used and timing are still being negotiated, but will be communicated to our stakeholders as soon as possible. Earliest start date will be April and latest start date will be July this year. The geotechnical campaign will take approximately 10 days. An ROV vessel will be contracted to complete inspection activities on the BTA450 approximately 400m from BTA (ie within the PSZ) at the proposed BTW hot tap location. The inspection activities will commence at the earliest mid-May for a duration of less than 10 days. Drilling EP preparation has commenced for BTW and KPA. Further details about the environmental impacts and risks from the drilling activity will be communicated separately. The earliest start date for drilling of BTW is January 2020. A ROV vessel will be conducting early inspection works at the KPA subsea facilities at the earliest June for a duration of 2 weeks. Another vessel will be contracted to continue the remaining geophysical survey in accordance with the Gippsland Basin Geophysical and Geotechnical Investigations EP. Esso will advise [redacted] the start dates once confirmed. [redacted]	No objections, claims or issues raised	☐	

Stakeholder ID	Correspondence Date	Correspondence ID	Summary	Objections/Claims/Issues/Merits	Follow Up Required?	Close Out Date
			[redacted]			

Stakeholder ID	Correspondence Date	Correspondence ID	Summary	Objections/Claims/Issues/Merits	Follow Up Required?	Close Out Date
17	10-Apr-19	2950	Email from [redacted] (EAPL) to [redacted] ([redacted]): As part of the Kipper project to drill two new subsea gas production wells, Esso is considering removal of two subsea protection frames at the existing Kipper Subsea Facility. These frames reduce the risk of snagging and protect equipment from inadvertent damage. Their removal is required to conduct maintenance and to drill the two new wells. The Kipper facility is within a gazetted Petroleum Safety Zone and vessels are prohibited from entering or being present in this area. Esso thanks you for your consideration and would welcome your thoughts on this proposal. If you would like any further details please contact the project via consultation@exxonmobil.com.	No objections, claims or issues raised	☐	
17	06-May-19	2999	Phone call between [redacted] (EAPL) and [redacted] ([redacted]): Spoke with [redacted] at [redacted] this morning. Discussion was around arranging a meeting to discuss consultation and how we could better achieve this as well as providing an update on current projects and EP submissions. Told him we had been in discussion with [redacted] and that [redacted] was suggesting some time May 20-May22 and that this could be in Melbourne, [redacted] or somewhere in between. [redacted] was keen to be involved and asked for an email with the possible dates – Note it could suit him to have another reason to come up to Melbourne. I also said we had been trying to get hold of [redacted] at [redacted] but hadn't had any luck. [redacted] indicated that [redacted] was very busy at the moment but said that he would print out the email and walk it around to [redacted] to see if the proposed dates would also work for [redacted].	No objections, claims or issues raised	☐	
17	06-May-19	2959	Email sent from [redacted] (EAPL) to relevant stakeholders: Please find attached a campaign information sheet detailing a number of offshore activities within the Gippsland Basin off the Victorian coastline collectively called the 2020 Jack Up Rig Campaign. The campaign sheet contains details including activity description, location, timing, impacts and risks.	No objections, claims or issues raised	☐	
17	14-May-19	3001	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11' 10", 147° 49' 02" (Wirrah), 38° 05' 42", 148° 02' 05" (Sweetlips), 38° 11' 54", 148° 33' 42" (East Pilchard), 38° 34' 14", 147° 19' 17" and 38° 29' 20", 147° 22' 34" (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised	☐	

Stakeholder ID	Correspondence Date	Correspondence ID	Summary	Objections/Claims/Issues/Merits	Follow Up Required?	Close Out Date
17	14-May-19	3000	Meeting request sent from [redacted] (EAPL) to [redacted] ([redacted]).	No response received.	☐	

Stakeholder ID	Correspondence Date	Correspondence ID	Summary	Objections/Claims/Issues/Merits	Follow Up Required?	Close Out Date
17	21-May-19	3043	9:00am – 10:00am Tuesday 21st May 2019 [redacted] Boardroom – [redacted] ATTENDEES [redacted]: [redacted] [redacted]: [redacted] EAPL: [redacted], [redacted], [redacted] and [redacted] [redacted] opened the meeting with discussion around the increased workload from the Oil and Gas industry to [redacted] / [redacted] and his reluctance to offer any support until a formal payment structure is in place for his services. This is strongly supported by [redacted] and [redacted], who also rely upon [redacted] and his extensive knowledge and relationships within the Gippsland Fishing community. The proposed solution offered by [redacted], [redacted] and [redacted] is for EAPL to fund a contractor to liaise between them and EAPL on stakeholder consultation, egg sending out SMS regarding EAPL activities in Bass Strait to relevant stakeholders and attending quarterly meetings with EAPL and then consulting with relevant stakeholders, as well as pre and post meeting work. [redacted] estimated approximately [redacted] a year for a consultant to fulfil this type of role. There was also a suggestion that a formal agreement could be made through APPEA for all interested Oil and Gas companies to fund such a role. EAPL have committed to reviewing options and will submit a proposal in the next fortnight. It was also noted that the fishing community would benefit from receiving EAPL activities plotted on nautical charts rather than Bass Strait maps. [redacted] (EAPL) and [redacted] (EAPL) will action this request in the coming month. [redacted] (EAPL) and [redacted] (EAPL) then talked through a presentation on the upcoming Esso projects (see attached). These consist of West Barracouta and Kipper projects (including the Geotechnical & Geophysical campaign), potential plugging and abandonment at Blackback, Seahorse, Tarwhine, Whiting, Perch and Dolphin and drilling at Sculpin, East Pilchard, Wirrah & Sweetlips. Key items of discussion were; That there was only one new petroleum safety zone at West Barracouta and it was noted that this was not new and had been discussed previously. Esso's design had progressed and the arrangements within the PSZ were now available for discussion. These are two West Barracouta wells with a snag resistant design, a pipeline end manifold and umbilical termination structure, both also designed to be snag resistant and that the electrical and hydraulic flying leads would be protected with concrete matts. These would all be located well within the 500m PSZ that must be avoided, no concerns were raised with this approach. The pipeline to Barracouta will be snag resistant and has been designed to be overfished, the umbilical will be trenched to minimise potential damage.		☐	

Stakeholder ID	Correspondence Date	Correspondence ID	Summary	Objections/Claims/Issues/Merits	Follow Up Required?	Close Out Date
			Work at Kipper was wholly within the existing petroleum safety zone. Work at Seahorse, Tarwhine, Perch and Dolphin would also be within PSZs and that decommissioning options and potential removal of their PSZs was being considered. The Geotechnical & Geophysical EP has been revised to cover potential advance work at these locations to confirm the sea bed is suitable for a jack-up rig. Drilling at Wirrah, Sweetlips, and East Pilchard would require temporary PSZs and if commercial hydrocarbons are discovered then development plans would follow and further consultation would take place. Drilling at Sculpin is expected to start Q3/Q4 this year this is very deep water (2400m) and there is no known commercial fishing effort at this depth. [redacted] and [redacted] raised no concerns with any of this. As already discussed the level of consultation is significant and a commercial arrangement should be examined to help ensure appropriate consultation is conducted and that certain industry figures are not overloaded with work that they are not there to conduct. The proposed [redacted] campaign has caused problems and whilst consultation with EAPL has always been good, the industry as a whole has been damaged by the actions of the [redacted] campaign. Questions were asked and answered about EAPL involvement with [redacted] this included that the [redacted] is entirely separate from EAPL, however given its scope of work EAPL would be interested in the results of the [redacted] to better understand Bass Strait and to better ID areas that could contain commercial hydrocarbons. Drilling is very expensive and as evident from the recent Baldfish / Hairtail campaign is not always successful.			
18	06-May-19	2960	Email sent from [redacted] (EAPL) to relevant stakeholders: Please find attached a campaign information sheet detailing a number of offshore activities within the Gippsland Basin off the Victorian coastline collectively called the 2020 Jack Up Rig Campaign. The campaign sheet contains details including activity description, location, timing, impacts and risks.	No objections, claims or issues raised	☐	
18	14-May-19	3019	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11’ 10”, 147° 49’ 02” (Wirrah), 38° 05’ 42”, 148° 02’ 05” (Sweetlips), 38° 11’ 54”, 148° 33’ 42” (East Pilchard), 38° 34’ 14”, 147° 19’ 17” and 38° 29’ 20”, 147° 22’ 34” (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised	☐	

Stakeholder ID	Correspondence Date	Correspondence ID	Summary	Objections/Claims/Issues/Merits	Follow Up Required?	Close Out Date
24	06-May-19	2962	Email sent from [redacted] (EAPL) to relevant stakeholders: Please find attached a campaign information sheet detailing a number of offshore activities within the Gippsland Basin off the Victorian coastline collectively called the 2020 Jack Up Rig Campaign. The campaign sheet contains details including activity description, location, timing, impacts and risks.	No objections, claims or issues raised	☐	
24	14-May-19	3032	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11’ 10”, 147° 49’ 02” (Wirrah), 38° 05’ 42”, 148° 02’ 05” (Sweetlips), 38° 11’ 54”, 148° 33’ 42” (East Pilchard), 38° 34’ 14”, 147° 19’ 17” and 38° 29’ 20”, 147° 22’ 34” (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised	☐	
26	06-May-19	2963	Email sent from [redacted] (EAPL) to relevant stakeholders: Please find attached a campaign information sheet detailing a number of offshore activities within the Gippsland Basin off the Victorian coastline collectively called the 2020 Jack Up Rig Campaign. The campaign sheet contains details including activity description, location, timing, impacts and risks.	No objections, claims or issues raised	☐	
26	14-May-19	3007	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11’ 10”, 147° 49’ 02” (Wirrah), 38° 05’ 42”, 148° 02’ 05” (Sweetlips), 38° 11’ 54”, 148° 33’ 42” (East Pilchard), 38° 34’ 14”, 147° 19’ 17” and 38° 29’ 20”, 147° 22’ 34” (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised	☐	

Stakeholder ID	Correspondence Date	Correspondence ID	Summary	Objections/Claims/Issues/Merits	Follow Up Required?	Close Out Date
27	23-Aug-18	2118	[redacted] Discussion – focusing on Offshore Operations 23rd of August 2018. Attendees [redacted] Stakeholder newsletter [redacted] presented a copy of the Offshore Stakeholder Newsletter and an update on upcoming offshore activities. [redacted]	No objections, claims or issues raised	☐	

Stakeholder ID	Correspondence Date	Correspondence ID	Summary	Objections/Claims/Issues/Merits	Follow Up Required?	Close Out Date
			Management arrangements regarding biofouling and ballast were discussed. Next year platform based Plug and Abandonment of well will commence. Kipper drilling programs is planned for later next year. The revised OPEP will also cover these activities. Reviews of response capabilities will be reviewed at this stage as the locations are closer to shore. Increased supply vessel operations may occur in the future due to these projects. PFW study has been conducted to understand the longer term impacts into the environment. Preparing the revised EP and associated OPEP/OSMP and is required to be submitted in the second half of 2019. Likely to engage AMOSC or OSRL to write the OPEP. Engagement of stakeholder will be included in the process. [redacted] [redacted] [redacted]			

Stakeholder ID	Correspondence Date	Correspondence ID	Summary	Objections/Claims/Issues/Merits	Follow Up Required?	Close Out Date
27	06-May-19	2964	Email sent from [redacted] (EAPL) to relevant stakeholders: Please find attached a campaign information sheet detailing a number of offshore activities within the Gippsland Basin off the Victorian coastline collectively called the 2020 Jack Up Rig Campaign. The campaign sheet contains details including activity description, location, timing, impacts and risks.	No objections, claims or issues raised	☐	
27	14-May-19	3028	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11’ 10”, 147° 49’ 02” (Wirrah), 38° 05’ 42”, 148° 02’ 05” (Sweetlips), 38° 11’ 54”, 148° 33’ 42” (East Pilchard), 38° 34’ 14”, 147° 19’ 17” and 38° 29’ 20”, 147° 22’ 34” (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised	☐	
33	10-Apr-19	2948	Email from [redacted] (EAPL) to [redacted] ([redacted]): As part of the Kipper project to drill two new subsea gas production wells, Esso is considering removal of two subsea protection frames at the existing Kipper Subsea Facility. These frames reduce the risk of snagging and protect equipment from inadvertent damage. Their removal is required to conduct maintenance and to drill the two new wells. The Kipper facility is within a gazetted Petroleum Safety Zone and vessels are prohibited from entering or being present in this area. Esso thanks you for your consideration and would welcome your thoughts on this proposal. If you would like any further details please contact the project via consultation@exxonmobil.com.	No objections, claims or issues raised	☐	

Stakeholder ID	Correspondence Date	Correspondence ID	Summary	Objections/Claims/Issues/Merits	Follow Up Required?	Close Out Date
33	29-Apr-19	2954	Email from [redacted] (EAPL) to [redacted] ([redacted]): I rang and left a message for you this morning and just wanted to follow up with an email. We are looking to undertake more consultation on the West Barracouta project and are keen to discuss how best we can do this going forward e.g. what sort of information people would be like to know about, how we can better involve the fishing industry, etc. I'm touching base to see if there is an opportunity for [redacted] (our West Barracouta contact) to meet with yourself, [redacted] and [redacted] to discuss this together. Please call me at your convenience and we can discuss setting up a meeting, or if you prefer, email me with some proposed dates and times. West Barracouta will be a small (2 well) subsea development tied back to the Barracouta facilities. The plan is to drill the two wells in Q1 2020 and this will take about 3 months with a Jack-up drill rig. Installation of the pipeline will occur in Q3 and last about a month. Environment Plans covering this work are currently being developed. To prepare for these campaigns there may be some additional surveys and seabed checks conducted this year – details will be provided for SMS alerts. From our understanding there isn't a great deal of fishing at West Barracouta. There will however likely be a new petroleum safety zone at the subsea well site to protect the equipment and would appreciate ideas of how best to get this information out to all fishers in the area. The pipeline itself is being designed to be over trawlable and there shouldn't be any snag points except at the two ends. One end will be in the new PSZ the other is within the existing Barracouta PSZ. To keep you informed of other Esso activities. The work at Blackback is continuing with the Ocean Monarch. Once complete she is likely to be used by [redacted] for a couple of months and will then return to Esso to drill another exploration well. This well will be south of the shipping lanes and in about 2400mm of water, I think this will make it one of the deepest water wells drilled in Australia. An EP for this is currently with NOPSEMA. I don't think there are any other Esso projects occurring this year but if this changes will let you know.		☐	
33	03-May-19	2997	Email sent from [redacted] (EAPL) to [redacted] ([redacted]): Following on from our phone conversation earlier in the week, please find attached our 2020 Jack up rig campaign for inclusion in the upcoming edition of [redacted]. Please contact me if you have any queries.	No objections, claims or issues raised	☐	
33	06-May-19	2965	Email sent from [redacted] (EAPL) to relevant stakeholders: Please find attached a campaign information sheet detailing a number of offshore activities within the Gippsland Basin off the Victorian coastline collectively called the 2020 Jack Up Rig Campaign. The campaign sheet contains details including activity description, location, timing, impacts and risks.	No objections, claims or issues raised	☐	

Stakeholder ID	Correspondence Date	Correspondence ID	Summary	Objections/Claims/Issues/Merits	Follow Up Required?	Close Out Date
33	14-May-19	3034	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11’ 10”, 147° 49’ 02” (Wirrah), 38° 05’ 42”, 148° 02’ 05” (Sweetlips), 38° 11’ 54”, 148° 33’ 42” (East Pilchard), 38° 34’ 14”, 147° 19’ 17” and 38° 29’ 20”, 147° 22’ 34” (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised	☐	

Stakeholder ID	Correspondence Date	Correspondence ID	Summary	Objections/Claims/Issues/Merits	Follow Up Required?	Close Out Date
33	21-May-19	3042	9:00am – 10:00am Tuesday 21st May 2019 [redacted] Boardroom – [redacted] ATTENDEES [redacted]: [redacted] [redacted]: [redacted] EAPL: [redacted], [redacted], [redacted] and [redacted] [redacted] opened the meeting with discussion around the increased workload from the Oil and Gas industry to [redacted] / [redacted] and his reluctance to offer any support until a formal payment structure is in place for his services. This is strongly supported by [redacted] and [redacted], who also rely upon [redacted] and his extensive knowledge and relationships within the Gippsland Fishing community. The proposed solution offered by [redacted], [redacted] and [redacted] is for EAPL to fund a contractor to liaise between them and EAPL on stakeholder consultation, egg sending out SMS regarding EAPL activities in Bass Strait to relevant stakeholders and attending quarterly meetings with EAPL and then consulting with relevant stakeholders, as well as pre and post meeting work. [redacted] estimated approximately [redacted] a year for a consultant to fulfil this type of role. There was also a suggestion that a formal agreement could be made through APPEA for all interested Oil and Gas companies to fund such a role. EAPL have committed to reviewing options and will submit a proposal in the next fortnight. It was also noted that the fishing community would benefit from receiving EAPL activities plotted on nautical charts rather than Bass Strait maps. [redacted] (EAPL) and [redacted] (EAPL) will action this request in the coming month. [redacted] (EAPL) and [redacted] (EAPL) then talked through a presentation on the upcoming Esso projects (see attached). These consist of West Barracouta and Kipper projects (including the Geotechnical & Geophysical campaign), potential plugging and abandonment at Blackback, Seahorse, Tarwhine, Whiting, Perch and Dolphin and drilling at Sculpin, East Pilchard, Wirrah & Sweetlips. Key items of discussion were; That there was only one new petroleum safety zone at West Barracouta and it was noted that this was not new and had been discussed previously. Esso's design had progressed and the arrangements within the PSZ were now available for discussion. These are two West Barracouta wells with a snag resistant design, a pipeline end manifold and umbilical termination structure, both also designed to be snag resistant and that the electrical and hydraulic flying leads would be protected with concrete matts. These would all be located well within the 500m PSZ that must be avoided, no concerns were raised with this approach. The pipeline to Barracouta will be snag resistant and has been designed to be overfished, the umbilical will be trenched to minimise potential damage.		☐	

Stakeholder ID	Correspondence Date	Correspondence ID	Summary	Objections/Claims/Issues/Merits	Follow Up Required?	Close Out Date
			Work at Kipper was wholly within the existing petroleum safety zone. Work at Seahorse, Tarwhine, Perch and Dolphin would also be within PSZs and that decommissioning options and potential removal of their PSZs was being considered. The Geotechnical & Geophysical EP has been revised to cover potential advance work at these locations to confirm the sea bed is suitable for a jack-up rig. Drilling at Wirrah, Sweetlips, and East Pilchard would require temporary PSZs and if commercial hydrocarbons are discovered then development plans would follow and further consultation would take place. Drilling at Sculpin is expected to start Q3/Q4 this year this is very deep water (2400m) and there is no known commercial fishing effort at this depth. [redacted] and [redacted] raised no concerns with any of this. As already discussed the level of consultation is significant and a commercial arrangement should be examined to help ensure appropriate consultation is conducted and that certain industry figures are not overloaded with work that they are not there to conduct. The proposed [redacted] campaign has caused problems and whilst consultation with EAPL has always been good, the industry as a whole has been damaged by the actions of the [redacted] campaign. Questions were asked and answered about EAPL involvement with [redacted] this included that the [redacted] is entirely separate from EAPL, however given its scope of work EAPL would be interested in the results of the [redacted] to better understand Bass Strait and to better ID areas that could contain commercial hydrocarbons. Drilling is very expensive and as evident from the recent Baldfish / Hairtail campaign is not always successful.			
34	06-May-19	2966	Email sent from [redacted] (EAPL) to relevant stakeholders: Please find attached a campaign information sheet detailing a number of offshore activities within the Gippsland Basin off the Victorian coastline collectively called the 2020 Jack Up Rig Campaign. The campaign sheet contains details including activity description, location, timing, impacts and risks.	No objections, claims or issues raised	☐	
34	14-May-19	3008	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11' 10", 147° 49' 02" (Wirrah), 38° 05' 42", 148° 02' 05" (Sweetlips), 38° 11' 54", 148° 33' 42" (East Pilchard), 38° 34' 14", 147° 19' 17" and 38° 29' 20", 147° 22' 34" (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised	☐	

Stakeholder ID	Correspondence Date	Correspondence ID	Summary	Objections/Claims/Issues/Merits	Follow Up Required?	Close Out Date
37	15-Feb-18	1573	[redacted] (EAPL) met with [redacted] ([redacted]) and [redacted] ([redacted]) at [redacted] offices in [redacted] on Thursday 15th Feb. Discussed West Barracouta G&G, Baldfish Drilling, Cobia pipeline repair and Kipper/Pilchard campaigns including the type of activity involved and the timing. [redacted] and [redacted] happy to hear that wells at WBT would probably be in the same PSZ. Asked about fishing activity in the area and [redacted] indicated that if we wanted he could investigate the type, nature and scale of fishing in the area subject to a commercial contract. [redacted] also indicated that PSZ may not be as rigorously complied with as he and oil and gas operators have assumed to date. Discussed if there was an opportunity for industry to develop a video explaining what PSZs are for and for this to be provided to fishermen – agreed to discuss this internally within Esso but noted that it should probably be something that APPEA should look into. Action raise issue of an Industry video with APPEA and internally within Esso. [redacted] raised the value of sending an SMS to all fishermen of campaigns and vessel activity in Bass Strait. [redacted] have been providing regular updates on the [redacted] project and their other assets, it seems to have been well received and as fishermen do not rigorously read navigation warnings and alerts from [redacted] it provides an alternate means of raising awareness of the projects and what is happening where. [redacted] was happy to send an SMS for the G&G campaign on approval from Esso, subsequent SMSs will be entail a small cost. Action to be discussed within Esso, with [redacted] to be given go ahead to send G&G SMS text and an ongoing SMS protocol developed, i.e. SMSs to be sent regularly, month before, day before and on completion of activity. Talked about Baldfish and proximity to the FIS locations. [redacted] agreed that the distance from Baldfish Hairtail probably wouldn't have a significant impact on the FIS location. He indicated that he was a bit annoyed that while Oil and Gas operators had been provided with the FIS locations and dates that they hadn't planned their activities better to avoid any overlap. We talked about schedules and use of rigs of opportunity to minimise mobilisation and demobilisation costs and how these can be significant impediments to scheduling these campaigns around third party requests. [redacted] and [redacted] acknowledged how this would be an issue. The FIS work may not occur this year as there has been little statistically significant results obtained to date with this work, the work is arranged by [redacted]? And is a significant cost that is sourced from the fishing industry that may be better spent / saved. Potential Blackback decommissioning following the Baldfish drilling campaign was also discussed. The temporary fairways recently announced by [redacted] to protect the rig will also provide protection at Blackback. A temporary PSZ will be gazetted at Blackback for this work. Some discussion on whether the fishermen fish in the shipping lanes, thought was that they probably do as its near the drop off. After all the projects add The level of consultation was raised again and [redacted] indicated that he was getting numerous emails and phone calls and that it was taking up a significant amount of	Refer to [redacted] consultation records regarding ISSUES / MERITS	☐	

Stakeholder ID	Correspondence Date	Correspondence ID	Summary	Objections/Claims/Issues/Merits	Follow Up Required?	Close Out Date
			his time and that he couldn't and wouldn't always respond. We discussed it was a regulatory requirement and a NOPSEMA expectation that consultation was documented and could be demonstrated hence why [redacted] was being chased for responses. Acknowledged that in some cases it may be frustrating but without being able to provide a response from stakeholders the oil and gas industry had potential difficulty in gaining EP acceptance. A single point of contact within the oil and gas industry would be good but the mechanisms and arrangements for this to be conducted are not currently available. Discussed Cobia pipeline repair, still scheduled for December this year with a DSV from Europe. Another candidate for SMS messages. Discussed Kipper infield drilling and adjacent (Pilchard) development that is being examined. Kipper infield drilling to be contained within existing PSZ, adjacent development may require an additional PSZ will discuss these projects further as they progress. Another candidate for SMS messages and review of fishing intensity. Given the quantity of work and activities going on [redacted] suggested a monthly phone call to advise progress, changes and the dates of key activities taking place. An invite was sent out for this to occur the last Friday of every month starting the 30th March. There are a number of issues raised so we'll need to add these and document our response ISSUE: Development of Video to raise awareness of PSZ and subsea assets – good idea has merits will need to be raised internally within Esso and possibly APPEA			

Stakeholder ID	Correspondence Date	Correspondence ID	Summary	Objections/Claims/Issues/Merits	Follow Up Required?	Close Out Date
37	20-Jul-18	2001	Phone call between [redacted] ([redacted]) and [redacted] (EAPL) to discuss EAPL activities. First activity will be Baldfish which will take place following [redacted] campaign at [redacted]. Early date is probably in August and EAPL will know this better once [redacted] have finished at [redacted]. The duration of the [redacted] activities are also unknown but EAPL will try and ask for an SMS message to fishermen about 2 weeks before moving to Baldfish. Baldfish EP was accepted a couple of weeks ago by NOPSEMA. Baldfish campaign will last about 60 days. Second activity will be Blackback P&A campaign this will follow Baldfish and EAPL will look to issue an SMS for this too. Blackback is relatively close to Baldfish and on the edge of the continental shelf. A PSZ will be gazetted and as per Baldfish the anchor chains will need to be avoided by fishermen. Blackback may last 2-3 months. Cobia pipeline repair is still scheduled for December and will be the subject of another SMS message in November, a temporary PSZ will be gazette to protect the divers, ROV and vessel when repairing the pipeline as she will have limited maneuverability. Other projects at West Barracouta and Kipper are being planned with some minor work potentially in 2019 and drilling in 2020. [redacted] had no major concerns with these projects and had completed the paperwork to be added to the EAPL system to enable payment for SMS messages to be processed. There are a number of seismic campaigns taking place in and around the south east area and these have potentially a more significant impact on where fishing can take place. [redacted] have been commissioned to undertake fishing assessments within the seismic areas and have issued some of the seismic operators with detailed reports listing the key fishermen and their contact details who work the areas. A lack of this information has led to Eps being rejected. [redacted] has also been sent recent emails on Prelude and Crux and wanted to know what these were for. We discussed that these were from Shell and were for projects on the NW shelf and would have no impact on [redacted] activities.	No objections, claims or issues raised	☐	

Stakeholder ID	Correspondence Date	Correspondence ID	Summary	Objections/Claims/Issues/Merits	Follow Up Required?	Close Out Date
37	06-Dec-18	2635	Email from [redacted] ([redacted]) to [redacted] (EAPL): Anything happening in the field that I should tell the fleet about?	Response from [redacted] (EAPL) to [redacted] ([redacted]): Not in the next week. Caught up with [redacted] yesterday in [redacted] at the Esso meeting. In summary Cobia to Halibut pipeline repair scheduled to start around 20th Dec for 10 days – will confirm timing next week so we can issue SMS before and then after. Blackback plug and abandon campaign will be Feb next year and this may be followed up by another drilling campaign in the same block as Baldfish Hairtail – deepwater and beyond the shipping lane. Will keep you informed and we will look to issue SMSs. Some geotechnical surveys to support West Barracouta are planned for mid next year Drilling at West Barracouta and Kipper end next year / beginning 2020. Let me know if you need any extra detail.		

Stakeholder ID	Correspondence Date	Correspondence ID	Summary	Objections/Claims/Issues/Merits	Follow Up Required?	Close Out Date
37	05-Apr-19	2945	Email from [redacted] (EAPL) to [redacted] ([redacted]): I'm providing some support to the Esso West Barracouta project and we are looking to undertake some more consultation on this project. Keen to discuss how best we can do this, what sort of information people would be like to know about, how we can better involve the fishing industry etc. Would like to work out if there is an opportunity to catch up with yourself, [redacted], [redacted] etc to discuss this together. West Barracouta will be a small (2 well) subsea development tied back to the Barracouta facilities. The plan is to drill the two wells in Q1 2020 and this will take about 3 months with a Jack-up drill rig. Installation of the pipeline will occur in Q3 and last about a month. Environment Plans covering this work are currently being developed. To prepare for these campaigns there may be some additional surveys and seabed checks conducted this year – details will be provided for SMS alerts. From our understanding there isn't a great deal of fishing at West Barracouta. There will however likely be a new petroleum safety zone at the subsea well site to protect the equipment and would appreciate ideas of how best to get this information out to all fishers in the area. The pipeline itself is being designed to be over trawlable and there shouldn't be any snag points except at the two ends. One end will be in the new PSZ the other is within the existing Barracouta PSZ. To keep you informed of other Esso activities. The work at Blackback is continuing with the Ocean Monarch. Once complete she is likely to be used by [redacted] for a couple of months and will then return to Esso to drill another exploration well. This well will be south of the shipping lanes and in about 2400mm of water, I think this will make it one of the deepest water wells drilled in Australia. An EP for this is currently with NOPSEMA. I don't think there are any other Esso projects occurring this year but if this changes will let you know.	No objections, claims or issues raised	☐	
37	10-Apr-19	2949	Email from [redacted] (EAPL) to [redacted] ([redacted]): As part of the Kipper project to drill two new subsea gas production wells, Esso is considering removal of two subsea protection frames at the existing Kipper Subsea Facility. These frames reduce the risk of snagging and protect equipment from inadvertent damage. Their removal is required to conduct maintenance and to drill the two new wells. The Kipper facility is within a gazetted Petroleum Safety Zone and vessels are prohibited from entering or being present in this area. Esso thanks you for your consideration and would welcome your thoughts on this proposal. If you would like any further details please contact the project via consultation@exxonmobil.com.	No objections, claims or issues raised	☐	
37	29-Apr-19	2998	Email sent from [redacted] (EAPL) to [redacted] ([redacted]): Just following up on earlier email – Esso are keen to discuss how we can better consult with the fishing industry and would like to arrange a meeting with yourself and other key parties to work out what this should look like as well as provide an update on our current activities. If you're going to be up in Melbourne in the next month or so that would be good to know or alternatively we can come down to [redacted].	No objections, claims or issues raised	☐	

Stakeholder ID	Correspondence Date	Correspondence ID	Summary	Objections/Claims/Issues/Merits	Follow Up Required?	Close Out Date
37	06-May-19	2967	Email sent from [redacted] (EAPL) to relevant stakeholders: Please find attached a campaign information sheet detailing a number of offshore activities within the Gippsland Basin off the Victorian coastline collectively called the 2020 Jack Up Rig Campaign. The campaign sheet contains details including activity description, location, timing, impacts and risks.	No objections, claims or issues raised	☐	
37	14-May-19	3031	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11' 10", 147° 49' 02" (Wirrah), 38° 05' 42", 148° 02' 05" (Sweetlips), 38° 11' 54", 148° 33' 42" (East Pilchard), 38° 34' 14", 147° 19' 17" and 38° 29' 20", 147° 22' 34" (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised	☐	
38	06-May-19	2968	Email sent from [redacted] (EAPL) to relevant stakeholders: Please find attached a campaign information sheet detailing a number of offshore activities within the Gippsland Basin off the Victorian coastline collectively called the 2020 Jack Up Rig Campaign. The campaign sheet contains details including activity description, location, timing, impacts and risks.	No objections, claims or issues raised	☐	
38	14-May-19	3033	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11' 10", 147° 49' 02" (Wirrah), 38° 05' 42", 148° 02' 05" (Sweetlips), 38° 11' 54", 148° 33' 42" (East Pilchard), 38° 34' 14", 147° 19' 17" and 38° 29' 20", 147° 22' 34" (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised	☐	

Stakeholder ID	Correspondence Date	Correspondence ID	Summary	Objections/Claims/Issues/Merits	Follow Up Required?	Close Out Date
40	06-May-19	2969	Email sent from [redacted] (EAPL) to relevant stakeholders: Please find attached a campaign information sheet detailing a number of offshore activities within the Gippsland Basin off the Victorian coastline collectively called the 2020 Jack Up Rig Campaign. The campaign sheet contains details including activity description, location, timing, impacts and risks.	No objections, claims or issues raised	☐	
40	14-May-19	3035	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11’ 10”, 147° 49’ 02” (Wirrah), 38° 05’ 42”, 148° 02’ 05” (Sweetlips), 38° 11’ 54”, 148° 33’ 42” (East Pilchard), 38° 34’ 14”, 147° 19’ 17” and 38° 29’ 20”, 147° 22’ 34” (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised	☐	
42	06-May-19	2970	Email sent from [redacted] (EAPL) to relevant stakeholders: Please find attached a campaign information sheet detailing a number of offshore activities within the Gippsland Basin off the Victorian coastline collectively called the 2020 Jack Up Rig Campaign. The campaign sheet contains details including activity description, location, timing, impacts and risks.	No objections, claims or issues raised	☐	
42	14-May-19	3020	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11’ 10”, 147° 49’ 02” (Wirrah), 38° 05’ 42”, 148° 02’ 05” (Sweetlips), 38° 11’ 54”, 148° 33’ 42” (East Pilchard), 38° 34’ 14”, 147° 19’ 17” and 38° 29’ 20”, 147° 22’ 34” (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised	☐	

Stakeholder ID	Correspondence Date	Correspondence ID	Summary	Objections/Claims/Issues/Merits	Follow Up Required?	Close Out Date
43	06-May-19	2971	Email sent from [redacted] (EAPL) to relevant stakeholders: Please find attached a campaign information sheet detailing a number of offshore activities within the Gippsland Basin off the Victorian coastline collectively called the 2020 Jack Up Rig Campaign. The campaign sheet contains details including activity description, location, timing, impacts and risks.	No objections, claims or issues raised	☐	
43	14-May-19	3011	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11’ 10”, 147° 49’ 02” (Wirrah), 38° 05’ 42”, 148° 02’ 05” (Sweetlips), 38° 11’ 54”, 148° 33’ 42” (East Pilchard), 38° 34’ 14”, 147° 19’ 17” and 38° 29’ 20”, 147° 22’ 34” (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised	☐	
44	06-May-19	2972	Email sent from [redacted] (EAPL) to relevant stakeholders: Please find attached a campaign information sheet detailing a number of offshore activities within the Gippsland Basin off the Victorian coastline collectively called the 2020 Jack Up Rig Campaign. The campaign sheet contains details including activity description, location, timing, impacts and risks.	No objections, claims or issues raised	☐	
44	14-May-19	3010	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11’ 10”, 147° 49’ 02” (Wirrah), 38° 05’ 42”, 148° 02’ 05” (Sweetlips), 38° 11’ 54”, 148° 33’ 42” (East Pilchard), 38° 34’ 14”, 147° 19’ 17” and 38° 29’ 20”, 147° 22’ 34” (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised	☐	

Stakeholder ID	Correspondence Date	Correspondence ID	Summary	Objections/Claims/Issues/Merits	Follow Up Required?	Close Out Date
45	06-May-19	2973	Email sent from [redacted] (EAPL) to relevant stakeholders: Please find attached a campaign information sheet detailing a number of offshore activities within the Gippsland Basin off the Victorian coastline collectively called the 2020 Jack Up Rig Campaign. The campaign sheet contains details including activity description, location, timing, impacts and risks.	No objections, claims or issues raised	☐	
46	06-May-19	2976	Email sent from [redacted] (EAPL) to relevant stakeholders: Please find attached a campaign information sheet detailing a number of offshore activities within the Gippsland Basin off the Victorian coastline collectively called the 2020 Jack Up Rig Campaign. The campaign sheet contains details including activity description, location, timing, impacts and risks.	No objections, claims or issues raised	☐	
46	14-May-19	3012	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11’ 10”, 147° 49’ 02” (Wirrah), 38° 05’ 42”, 148° 02’ 05” (Sweetlips), 38° 11’ 54”, 148° 33’ 42” (East Pilchard), 38° 34’ 14”, 147° 19’ 17” and 38° 29’ 20”, 147° 22’ 34” (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised	☐	
52	06-May-19	2977	Email sent from [redacted] (EAPL) to relevant stakeholders: Please find attached a campaign information sheet detailing a number of offshore activities within the Gippsland Basin off the Victorian coastline collectively called the 2020 Jack Up Rig Campaign. The campaign sheet contains details including activity description, location, timing, impacts and risks.	No objections, claims or issues raised	☐	

Stakeholder ID	Correspondence Date	Correspondence ID	Summary	Objections/Claims/Issues/Merits	Follow Up Required?	Close Out Date
52	14-May-19	3023	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11' 10", 147° 49' 02" (Wirrah), 38° 05' 42", 148° 02' 05" (Sweetlips), 38° 11' 54", 148° 33' 42" (East Pilchard), 38° 34' 14", 147° 19' 17" and 38° 29' 20", 147° 22' 34" (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised	☐	
55	06-May-19	2978	Email sent from [redacted] (EAPL) to relevant stakeholders: Please find attached a campaign information sheet detailing a number of offshore activities within the Gippsland Basin off the Victorian coastline collectively called the 2020 Jack Up Rig Campaign. The campaign sheet contains details including activity description, location, timing, impacts and risks.	No objections, claims or issues raised RESPONSE: 06/05/19 Email from [redacted] Victoria: Thanks for contacting the [redacted] Victoria office.	☐	
55	14-May-19	3026	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11' 10", 147° 49' 02" (Wirrah), 38° 05' 42", 148° 02' 05" (Sweetlips), 38° 11' 54", 148° 33' 42" (East Pilchard), 38° 34' 14", 147° 19' 17" and 38° 29' 20", 147° 22' 34" (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised	☐	
62	06-May-19	2980	Email sent from [redacted] (EAPL) to relevant stakeholders: Please find attached a campaign information sheet detailing a number of offshore activities within the Gippsland Basin off the Victorian coastline collectively called the 2020 Jack Up Rig Campaign. The campaign sheet contains details including activity description, location, timing, impacts and risks.	No objections, claims or issues raised	☐	

Stakeholder ID	Correspondence Date	Correspondence ID	Summary	Objections/Claims/Issues/Merits	Follow Up Required?	Close Out Date
62	14-May-19	3030	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11’ 10”, 147° 49’ 02” (Wirrah), 38° 05’ 42”, 148° 02’ 05” (Sweetlips), 38° 11’ 54”, 148° 33’ 42” (East Pilchard), 38° 34’ 14”, 147° 19’ 17” and 38° 29’ 20”, 147° 22’ 34” (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised	☐	
63	06-May-19	2981	Email sent from [redacted] (EAPL) to relevant stakeholders: Please find attached a campaign information sheet detailing a number of offshore activities within the Gippsland Basin off the Victorian coastline collectively called the 2020 Jack Up Rig Campaign. The campaign sheet contains details including activity description, location, timing, impacts and risks.	No objections, claims or issues raised	☐	
63	14-May-19	3014	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11’ 10”, 147° 49’ 02” (Wirrah), 38° 05’ 42”, 148° 02’ 05” (Sweetlips), 38° 11’ 54”, 148° 33’ 42” (East Pilchard), 38° 34’ 14”, 147° 19’ 17” and 38° 29’ 20”, 147° 22’ 34” (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised	☐	
64	06-May-19	2982	Email sent from [redacted] (EAPL) to relevant stakeholders: Please find attached a campaign information sheet detailing a number of offshore activities within the Gippsland Basin off the Victorian coastline collectively called the 2020 Jack Up Rig Campaign. The campaign sheet contains details including activity description, location, timing, impacts and risks.	No objections, claims or issues raised	☐	

Stakeholder ID	Correspondence Date	Correspondence ID	Summary	Objections/Claims/Issues/Merits	Follow Up Required?	Close Out Date
64	14-May-19	3029	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11’ 10”, 147° 49’ 02” (Wirrah), 38° 05’ 42”, 148° 02’ 05” (Sweetlips), 38° 11’ 54”, 148° 33’ 42” (East Pilchard), 38° 34’ 14”, 147° 19’ 17” and 38° 29’ 20”, 147° 22’ 34” (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised	☐	
70	06-May-19	2983	Email sent from [redacted] (EAPL) to relevant stakeholders: Please find attached a campaign information sheet detailing a number of offshore activities within the Gippsland Basin off the Victorian coastline collectively called the 2020 Jack Up Rig Campaign. The campaign sheet contains details including activity description, location, timing, impacts and risks.	No objections, claims or issues raised	☐	
70	14-May-19	3037	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11’ 10”, 147° 49’ 02” (Wirrah), 38° 05’ 42”, 148° 02’ 05” (Sweetlips), 38° 11’ 54”, 148° 33’ 42” (East Pilchard), 38° 34’ 14”, 147° 19’ 17” and 38° 29’ 20”, 147° 22’ 34” (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised	☐	
77	06-May-19	2984	Email sent from [redacted] (EAPL) to relevant stakeholders: Please find attached a campaign information sheet detailing a number of offshore activities within the Gippsland Basin off the Victorian coastline collectively called the 2020 Jack Up Rig Campaign. The campaign sheet contains details including activity description, location, timing, impacts and risks.	No objections, claims or issues raised	☐	

Stakeholder ID	Correspondence Date	Correspondence ID	Summary	Objections/Claims/Issues/Merits	Follow Up Required?	Close Out Date
77	14-May-19	3036	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11’ 10”, 147° 49’ 02” (Wirrah), 38° 05’ 42”, 148° 02’ 05” (Sweetlips), 38° 11’ 54”, 148° 33’ 42” (East Pilchard), 38° 34’ 14”, 147° 19’ 17” and 38° 29’ 20”, 147° 22’ 34” (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised	☐	
79	06-May-19	2985	Email sent from [redacted] (EAPL) to relevant stakeholders: Please find attached a campaign information sheet detailing a number of offshore activities within the Gippsland Basin off the Victorian coastline collectively called the 2020 Jack Up Rig Campaign. The campaign sheet contains details including activity description, location, timing, impacts and risks.	No objections, claims or issues raised	☐	
79	14-May-19	3017	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11’ 10”, 147° 49’ 02” (Wirrah), 38° 05’ 42”, 148° 02’ 05” (Sweetlips), 38° 11’ 54”, 148° 33’ 42” (East Pilchard), 38° 34’ 14”, 147° 19’ 17” and 38° 29’ 20”, 147° 22’ 34” (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised	☐	
81	06-May-19	2986	Email sent from [redacted] (EAPL) to relevant stakeholders: Please find attached a campaign information sheet detailing a number of offshore activities within the Gippsland Basin off the Victorian coastline collectively called the 2020 Jack Up Rig Campaign. The campaign sheet contains details including activity description, location, timing, impacts and risks.	No objections, claims or issues raised	☐	

Stakeholder ID	Correspondence Date	Correspondence ID	Summary	Objections/Claims/Issues/Merits	Follow Up Required?	Close Out Date
81	14-May-19	3005	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11’ 10”, 147° 49’ 02” (Wirrah), 38° 05’ 42”, 148° 02’ 05” (Sweetlips), 38° 11’ 54”, 148° 33’ 42” (East Pilchard), 38° 34’ 14”, 147° 19’ 17” and 38° 29’ 20”, 147° 22’ 34” (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised	☐	
82	06-May-19	2987	Email sent from [redacted] (EAPL) to relevant stakeholders: Please find attached a campaign information sheet detailing a number of offshore activities within the Gippsland Basin off the Victorian coastline collectively called the 2020 Jack Up Rig Campaign. The campaign sheet contains details including activity description, location, timing, impacts and risks.	No objections, claims or issues raised	☐	
82	14-May-19	3015	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11’ 10”, 147° 49’ 02” (Wirrah), 38° 05’ 42”, 148° 02’ 05” (Sweetlips), 38° 11’ 54”, 148° 33’ 42” (East Pilchard), 38° 34’ 14”, 147° 19’ 17” and 38° 29’ 20”, 147° 22’ 34” (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised	☐	
83	06-May-19	2988	Email sent from [redacted] (EAPL) to relevant stakeholders: Please find attached a campaign information sheet detailing a number of offshore activities within the Gippsland Basin off the Victorian coastline collectively called the 2020 Jack Up Rig Campaign. The campaign sheet contains details including activity description, location, timing, impacts and risks.	No objections, claims or issues raised	☐	

Stakeholder ID	Correspondence Date	Correspondence ID	Summary	Objections/Claims/Issues/Merits	Follow Up Required?	Close Out Date
87	06-May-19	2990	Email sent from [redacted] (EAPL) to relevant stakeholders: Please find attached a campaign information sheet detailing a number of offshore activities within the Gippsland Basin off the Victorian coastline collectively called the 2020 Jack Up Rig Campaign. The campaign sheet contains details including activity description, location, timing, impacts and risks.	No objections, claims or issues raised	☐	
87	14-May-19	3006	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11’ 10”, 147° 49’ 02” (Wirrah), 38° 05’ 42”, 148° 02’ 05” (Sweetlips), 38° 11’ 54”, 148° 33’ 42” (East Pilchard), 38° 34’ 14”, 147° 19’ 17” and 38° 29’ 20”, 147° 22’ 34” (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised	☐	
99	06-May-19	2996	Email sent from [redacted] (EAPL) to relevant stakeholders: Please find attached a campaign information sheet detailing a number of offshore activities within the Gippsland Basin off the Victorian coastline collectively called the 2020 Jack Up Rig Campaign. The campaign sheet contains details including activity description, location, timing, impacts and risks.	No objections, claims or issues raised	☐	
101	06-May-19	2991	Email sent from [redacted] (EAPL) to relevant stakeholders: Please find attached a campaign information sheet detailing a number of offshore activities within the Gippsland Basin off the Victorian coastline collectively called the 2020 Jack Up Rig Campaign. The campaign sheet contains details including activity description, location, timing, impacts and risks.	No objections, claims or issues raised	☐	

Stakeholder ID	Correspondence Date	Correspondence ID	Summary	Objections/Claims/Issues/Merits	Follow Up Required?	Close Out Date
101	14-May-19	3038	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11’ 10”, 147° 49’ 02” (Wirrah), 38° 05’ 42”, 148° 02’ 05” (Sweetlips), 38° 11’ 54”, 148° 33’ 42” (East Pilchard), 38° 34’ 14”, 147° 19’ 17” and 38° 29’ 20”, 147° 22’ 34” (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised	☐	
121	06-May-19	2992	Email sent from [redacted] (EAPL) to relevant stakeholders: Please find attached a campaign information sheet detailing a number of offshore activities within the Gippsland Basin off the Victorian coastline collectively called the 2020 Jack Up Rig Campaign. The campaign sheet contains details including activity description, location, timing, impacts and risks.	No objections, claims or issues raised	☐	
123	06-May-19	2995	Email sent from [redacted] (EAPL) to relevant stakeholders: Please find attached a campaign information sheet detailing a number of offshore activities within the Gippsland Basin off the Victorian coastline collectively called the 2020 Jack Up Rig Campaign. The campaign sheet contains details including activity description, location, timing, impacts and risks.	No objections, claims or issues raised	☐	
123	14-May-19	3027	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11’ 10”, 147° 49’ 02” (Wirrah), 38° 05’ 42”, 148° 02’ 05” (Sweetlips), 38° 11’ 54”, 148° 33’ 42” (East Pilchard), 38° 34’ 14”, 147° 19’ 17” and 38° 29’ 20”, 147° 22’ 34” (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised	☐	

Stakeholder ID	Correspondence Date	Correspondence ID	Summary	Objections/Claims/Issues/Merits	Follow Up Required?	Close Out Date
125	06-May-19	2993	Email sent from [redacted] (EAPL) to relevant stakeholders: Please find attached a campaign information sheet detailing a number of offshore activities within the Gippsland Basin off the Victorian coastline collectively called the 2020 Jack Up Rig Campaign. The campaign sheet contains details including activity description, location, timing, impacts and risks.	RESPONSE: 06/05/19 Please accept this email as acknowledgement that your email has been received by the [redacted]. The data you have supplied will now be registered, assessed, prioritised and validated in preparation for updating our Navigational Charting products. These adhere to International and Australian Charting Specifications and standards. These standards may result in some data generalisation or filtering due to the scale of existing charts, proximity to other features, and the level of risk a reported feature presents to mariners. No objections, claims or issues raised	☐	
125	14-May-19	3003	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11’ 10”, 147° 49’ 02” (Wirrah), 38° 05’ 42”, 148° 02’ 05” (Sweetlips), 38° 11’ 54”, 148° 33’ 42” (East Pilchard), 38° 34’ 14”, 147° 19’ 17” and 38° 29’ 20”, 147° 22’ 34” (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised	☐	
126	06-May-19	2974	Email sent from [redacted] (EAPL) to relevant stakeholders: Please find attached a campaign information sheet detailing a number of offshore activities within the Gippsland Basin off the Victorian coastline collectively called the 2020 Jack Up Rig Campaign. The campaign sheet contains details including activity description, location, timing, impacts and risks.	No objections, claims or issues raised	☐	

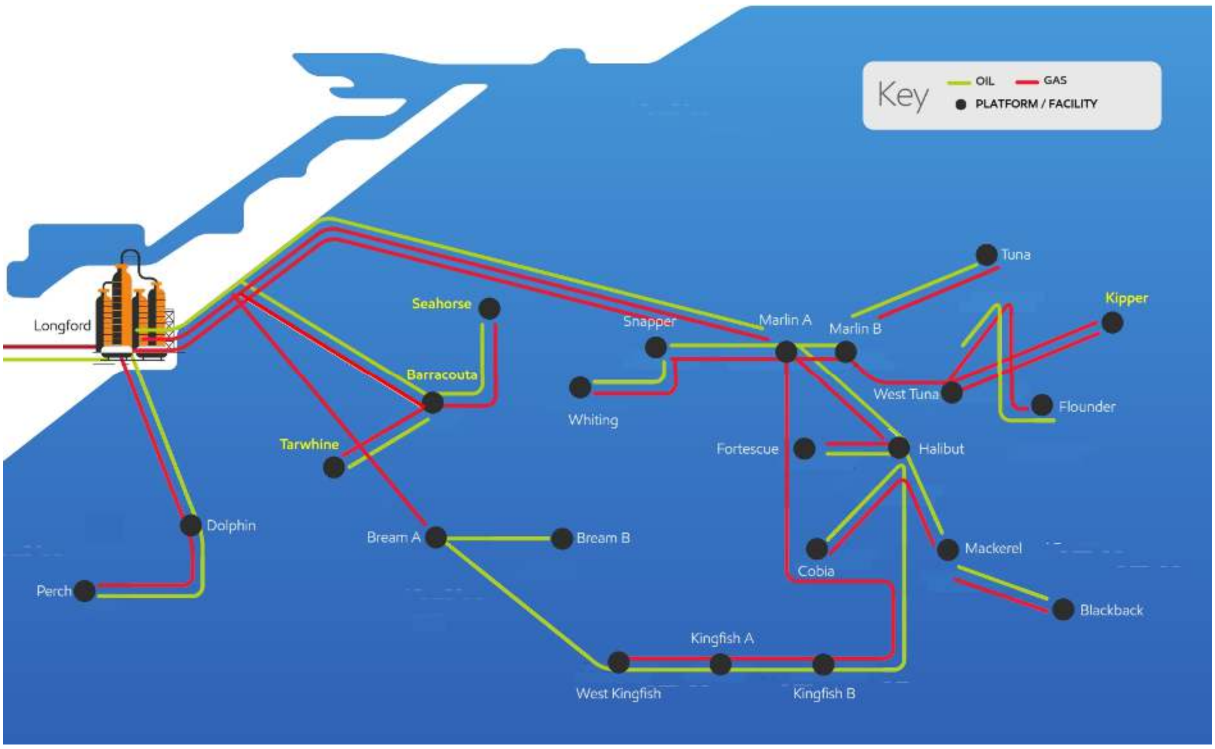
Stakeholder ID	Correspondence Date	Correspondence ID	Summary	Objections/Claims/Issues/Merits	Follow Up Required?	Close Out Date
126	14-May-19	3009	Stakeholder Update Email: Further to the fact sheet that was distributed on 6 August 2018 and emails late last year, Esso Australia will continue some seabed survey activity through 2019 and this will now extend into 2020. The scope of work has been extended to cover work at Wirrah, Sweetlips, East Pilchard, Perch and Dolphin as identified by the orange shaded areas on the map below. The additional work is likely to involve a number of short vessel campaigns at approximately 38° 11’ 10”, 147° 49’ 02” (Wirrah), 38° 05’ 42”, 148° 02’ 05” (Sweetlips), 38° 11’ 54”, 148° 33’ 42” (East Pilchard), 38° 34’ 14”, 147° 19’ 17” and 38° 29’ 20”, 147° 22’ 34” (Perch and Dolphin respectively, both within the existing petroleum safety zones). Esso Australia will provide advance notice to stakeholders of the proposed start dates, and confirm locations and vessel details for each campaign. A revision to the Geophysical and Geotechnical Survey Environment Plan is being developed and will be submitted to NOPSEMA for acceptance.	No objections, claims or issues raised	☐	

Stakeholder ID	Correspondence Date	Correspondence ID	Summary	Objections/Claims/Issues/Merits	Follow Up Required?	Close Out Date
128	18-Feb-19	2951	[redacted]		☐	

Stakeholder ID	Correspondence Date	Correspondence ID	Summary	Objections/Claims/Issues/Merits	Follow Up Required?	Close Out Date
			Kipper A geotechnical survey will be completed at a number of locations in Bass Strait including the BTW proposed well locations, Seahorse, Tarwhine and Kipper subsea facilities. The vessel to be used and timing are still being negotiated, but will be communicated to our stakeholders as soon as possible. Earliest start date will be April and latest start date will be July this year. The geotechnical campaign will take approximately 10 days. An ROV vessel will be contracted to complete inspection activities on the BTA450 approximately 400m from BTA (ie within the PSZ) at the proposed BTW hot tap location. The inspection activities will commence at the earliest mid-May for a duration of less than 10 days. Drilling EP preparation has commenced for BTW and KPA. Further details about the environmental impacts and risks from the drilling activity will be communicated separately. The earliest start date for drilling of BTW is January 2020. A ROV vessel will be conducting early inspection works at the KPA subsea facilities at the earliest June for a duration of 2 weeks. Another vessel will be contracted to continue the remaining geophysical survey in accordance with the Gippsland Basin Geophysical and Geotechnical Investigations EP. Esso will advise LEFCOL the start dates once confirmed. Cobia PRP update The Subsea 7 “Seven Eagle” Dive Support Vessel safely and successfully replaced the Cobia-to-Halibut 300mm diameter oil export pipeline with a new 150mm flexible pipeline. The offshore installation work started on Christmas Eve and lasted about 10 days. It took 20,000 work hours involving saturation divers and ROV activities to lay approximately 5.5 kilometres of flexible pipeline and tie it in to the Cobia and Halibut platforms. The work was completed with zero safety or environmental incidents. Teams are preparing Cobia’s facilities to return to production after about four years offline and Halibut platform is being prepared to receive oil-flow from Cobia. This preparation work includes pressure vessel inspections and repairs, piping inspections and replacements, valve checks and overhauls, instrumentation and electrical system works. Compressor and pump machinery will be reinstated, plugs removed from the wells with a wireline campaign and then finally commissioning and starting-up the facilities. Mackerel Platform Mackerel platform has reached the end of its producing life. The wells will be secured in 2019. Navigation lights and corrosion protection for the structure will be maintained until the decommissioning plan is approved and executed. Sculpin-1			

Stakeholder ID	Correspondence Date	Correspondence ID	Summary	Objections/Claims/Issues/Merits	Follow Up Required?	Close Out Date
			Esso is planning to drill the Sculpin-1 exploration well in block Vic P/70, about 90 km offshore in 2,300 m water depth. The target is a potential gas reservoir (with limited condensate) Drilling is scheduled to commence as early as June, 2019, utilising the Ocean Monarch MODU. The offshore activities are expected to take about 2 months. Seahorse / Tarwhine Esso is reviewing options to secure the Seahorse and Tarwhine wells using a jack-up drilling rig in 2020 Perch / Dolphin / Whiting Esso is reviewing options to secure the Perch, Dolphin and Whiting wells using a jack-up drilling rig in 2020/21 50 years in Bass Strait This year we will be celebrating two key milestones for our business – the 50th anniversary of first production from our Gippsland operations and the 70th anniversary of the opening of our Altona Refinery. [redacted]			

Esso Bass Strait 2020 Jack Up Rig Campaign



Esso Australia is planning to undertake a number of offshore activities within the Gippsland Basin off the Victorian coastline collectively called the 2020 Jack Up Rig Campaign and includes:

- Well Plug and Abandonment (P&A)
    - Two subsea wells, Seahorse -1 and Tarwhine – 1
    - 5 wells at the Whiting platform
- Drilling
    - Two subsea gas production wells in the West Barracouta field.
    - Two subsea gas production wells in the Kipper field.

There will be no seismic activity as part of this campaign.

All well abandonment and drilling activities will be undertaken by the jack-up drilling rig "Tom Prosser". The Tom Prosser was built in 2014 and operates to the latest international safety and environmental standards. The drilling rig will be supported by up to three support vessels.

Noble Tom Prosser Jack-Up Drilling Rig (Image courtesy of Noble Corporation)

The Tom Prosser does not have any propulsion capability and will be towed into position, then the legs lowered onto the seabed and the rig elevated above the sea surface.

Activity Description

Well Abandonment

The Seahorse-1, Tarwhine-1 and Whiting wells no longer produce a viable quantity of oil and gas, so permanent barriers will be installed to enable the wells to be safely abandoned in accordance with regulatory standards. Well 'abandonment' is a safe and long-standing practice.

For all wells, a Blowout Preventer (BOP) will be used to prevent the release of hydrocarbons during the plugging of the wells. Tubing and associated instruments and control valves will be removed, and permanent cement plugs / barriers installed to provide multiple physical barriers to prevent the release of any hydrocarbons that remain in the reservoir.

The Seahorse-1 and Tarwhine-1 wellheads will be cut at a depth of ~ 3 m beneath the seabed and removed. The remaining infrastructure, such as the Whiting platform jacket and topsides, well conductors, disconnected pipelines and umbilical control lines, will be removed as part of a separate campaign and will be the subject of further consultation.

Production Drilling

The drilling process uses a rotating bit attached to the end of a string of drill pipe to bore through the earth to reach the gas reservoirs. As the bit turns, it grinds off small pieces of rock, or drill cuttings, thus deepening the well.

In upper sections seawater-based fluids will be pumped down the drill string to remove the cuttings from the well, cool the drill bit, and maintain pressure control of the well. In lower sections, to assist well stability, low toxicity non-aqueous fluids (NAF) will be used. The NAF and cuttings are recirculated to the drilling rig where the fluids will be removed from the cuttings before being re-used. Once removed, drill cuttings will be discharged overboard where they will settle on the seabed near the rig.

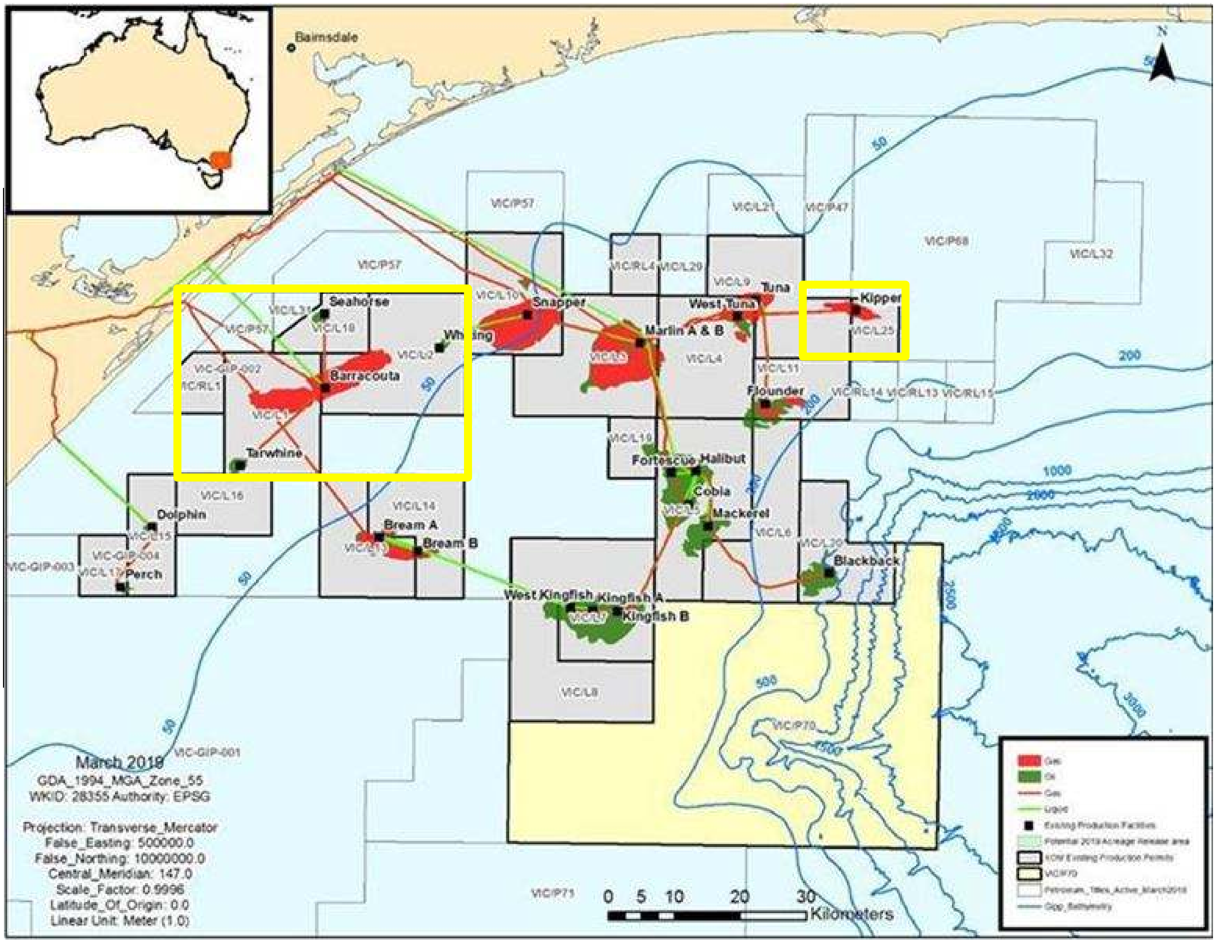
Once drilling has finished, steel casing will be installed in the wellbore and cemented in place. Then production tubing will be installed containing various instruments and flow control valves.

At Kipper the rig will also install the pipework and control valves attached to the top of the well on the seafloor called 'trees'. However, the West Barracouta wells will be suspended until the trees, which will sit ~ 5m above the seafloor, are installed in a separate campaign.

Activity Location

The Seahorse and Tarwhine wells and the proposed West Barracouta wells are located ~ 15km off the Gippsland coastline, south of Lakes Entrance in water depths of ~45m. The Whiting platform is located ~34km offshore in water depths of ~54m. The Kipper Subsea Facility is located ~45km east of Lakes Entrance in a water depth of ~95m.

The wells are not located within any established or proposed Commonwealth or State Marine Protected Areas, Critical Habitats or Threatened Ecological Communities, and are outside of established shipping fairways. It is recognised that the activities will overlap with existing fisheries.



Esso Bass Strait 2020 Jack Up Rig Campaign Activity Locations

Activity Timing

The following shows two indicative campaign timetables only. The earliest date of commencement of the campaign is January 2020 with all activity scheduled to be completed no later than December 2021.

Activities will be conducted 24 hours per day, seven days per week. It is expected to take ~30 days to plug and abandon each well and ~50 days to drill and complete each of the West Barracouta and Kipper wells.

The timing and order of activity may vary and is contingent on regulatory approvals, joint venture approvals, and weather and rig/vessel schedules.

Jack Up Rig Campaign ‘Early’ Activity Timeline

Jack Up Rig Campaign ‘Late’ Activity Timeline

Impacts and Risks

Provided in the table below are the key potential impacts relating to the Jack Up Rig Campaign to assist stakeholders in making an informed assessment on possible impacts to their activities, functions or interests in the area.

Potential Impacts	Potential Consequence	Impact/Risk Reduction & Mitigation Measures
Drill Rig and Vessel-based impacts		
Drill rig leg placement	Temporary and localised seabed disturbance	Seabed survey completed to identify obstructions. Rig move procedures in place. Small area affected by leg placement, rapidly filled after removal. Area is sandy bottom with no sensitive seabed features.
Planned discharges to the marine environment - Sewage and food waste - Treated bilge and deck wash - Cooling water and brine	Temporary and localised reduction in water quality Temporary change to predator / prey dynamics	Routine discharges and vessel waste treatment systems will meet MARPOL requirements and are routinely maintained. Food-scraps will be macerated prior to discharge. Discharged bilge water will have less than 15 ppm oil in water content. Any chemicals planned for discharge undergo an environmental assessment to confirm suitability for discharge prior to use.
Sound emissions	Temporary displacement of sound sensitive fauna around active vessels	Support vessels and helicopters will comply with EPBC Regulations 2000 – Part 8 Division 8.1 interacting with cetaceans.
Light emissions	Attraction of light sensitive species Change in fauna behaviour	Lighting will be kept to minimum while still meeting navigational and workplace safety requirements.
Air emissions	Temporary and localised reduction in air quality	Air emissions from marine engines will meet MARPOL requirements and are routinely maintained. Low sulphur content fuel will be used.
Unplanned interaction with marine fauna (vessel strike)	Injury or death of marine fauna	Support vessels will comply with EPBC Regulations 2000 – Part 8 Division 8.1 interacting with cetaceans. Any injury/mortality of EPBC-listed fauna will be reported to the Department of the Environment and Energy
Unplanned introduction of invasive marine species (IMS)	Displacement of native species and habitat domination	Jack Up Rig and all support vessels will have a Ballast Water Management Plan and Certificate. Jack Up Rig and all support vessels will comply with Australian Ballast Water Management requirements.

		A Biofouling Risk Assessment will be completed to confirm a low risk of IMS introduction. Submersible equipment will be cleaned prior to commencement of activity.
Accidental release of materials and waste	Temporary and localised: - Increase in turbidity - Burial of benthic habitat in immediate seabed area - Potential toxicity impacts	Waste handling, storage and disposal will meet MARPOL requirements. Lifting equipment is certified and routinely maintained. Bulk transfer equipment is certified and routinely maintained. Dropped objects will be recovered where safe and practicable.
Accidental release of fuel (vessel collision)	Tainting of commercial fisheries species (e.g. shellfish). Injury and death of species such as fish, marine reptiles, seabirds, cetaceans. Pathological effects on fish larvae and plankton.	All operational locations are within gazetted exclusion zones. Commencement of activity and exclusion zone will be communicated to other marine users via Notice to Mariners and via AMSA. Vessel will hold Dynamic Positioning (DP) System II Notation and watchkeeper-in-charge will hold DP Certification. Vessels will only travel at slow speeds within 500m of Jack Up Rig. Vessels will comply with their approved Shipboard Oil Pollution Emergency Plan (SOPEP) including maintaining spill kits, emergency response procedures and conducting spill response exercises Esso has a comprehensive Oil Pollution Emergency Plan (OPEP) which will be used in the event of a spill.
Drilling and Abandonment Activity Impacts		
Discharge of cement	Localised and temporary: - Reduction in water quality - Smothering of benthic habitat	Low toxicity cement additives have been selected for use. Cement hose flushing and slurry releases will be rapidly diluted and dispersed by the dynamic marine environment.
Drilling fluid and cuttings discharges	Localised and temporary: - Increase in turbidity - Burial of benthic habitat in immediate seabed area - Potential toxicity impacts	Seawater-based fluids will be used where practicable. Low toxicity non-aqueous fluids (NAF) and additives will be used when required. Solids control equipment will be used to remove NAF on cuttings to minimal residues prior to discharge overboard Dynamic seabed and marine environment will rapidly disperse discharged cuttings and drilling fluids.
Well fluid discharges	Increased salinity Potential toxicity effects	Low toxicity chemical additives have been selected for use in abandonment and completion fluids.

		Chemicals used in well fluids undergo environmental assessment to confirm suitability for discharge prior to use. Dynamic seabed and marine environment will rapidly disperse discharged well fluids.
–Disconnection / cutting discharges	Localised and temporary: - Reduction in water quality - Smothering of benthic habitats	Chemicals planned for discharge undergo environmental assessment to confirm suitability prior to use. Discharge will rapidly disperse in dynamic seabed and marine environment.
Naturally Occurring Radioactive Materials (NORM)	Temporary exposure of marine fauna to radioactive materials	Open ends of disconnected pipelines plugged to prevent fauna entry and leave NORM in a contained system.
Loss of well control	Tainting of commercial fisheries species (e.g. shellfish). Injury and death of species such as fish, marine reptiles, seabirds, cetaceans. Pathological effects on fish larvae and plankton. Pollution of shoreline habitats such as sandy beaches and rocky shores	West Barracouta and Kipper are gas wells. A loss of well control event may release condensate, which is generally not persistent in the environment, but not oil. Seahorse and Tarwhine are depleted light crude wells that mainly produce water. An accepted Environment Plan (EP), OPEP and Emergency Response Plan (ERP) will be in place and implemented in the event of a loss of well control. An accepted Safety Case and Well Operations Management Plan will be in place.

Petroleum Safety Zones

The Seahorse and Tarwhine subsea wells, the Whiting platform and the Kipper Subsea Facility are located within existing 500m Petroleum Safety Zones (PSZ) and a new PSZ will be gazetted around the West Barracouta subsea drill location. The exact location of the drill rig while at each location will be communicated to other marine vessels via a Notice to Mariners issued by the Australian Hydrographic Service (AHS) and AUSCOAST warnings issued by the Australian Maritime Safety Authority (AMSA).

The existing PSZ around the Seahorse and Tarwhine wells will be removed once all well abandonment activities have been carried out and removal of seabed infrastructure is complete.

Interaction with Commercial Fishing

The well sites are located within existing designated Commonwealth and State fisheries that may be used by commercial fishers. The 500 m PSZ will be communicated to Lakes Entrance Fisherman's Co-op (LEFCOL), South East Trawl Fishing Industry Association (SETFIA) and Seafood Industry Victoria (SIV) as it is a legal requirement that the area should be avoided during drilling.

Environment Plans

Under the Offshore Petroleum and Greenhouse Gas Storage Act 2006, before any petroleum related activities in Commonwealth waters can commence, an Environment Plan (EP) must be accepted by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

In the course of preparing an EP, Esso Australia must consult with relevant authorities, persons and organisations whose functions, interests or activities may be affected by the proposed activities (i.e. a relevant person) and provide the opportunity for any issues or concerns to be raised.

Three separate Environment Plans (EPs) are proposed to be developed for these different activities, however, to improve efficiencies for stakeholders, a single consultation process is being undertaken.

The EP is a comprehensive document that describes the existing environment, including stakeholders, and how Esso Australia will undertake the activities to avoid, minimise or manage potential environmental impacts to the "As Low As Reasonable Practicable" standard (ALARP) and meet Esso Australia's acceptability criteria.

Oil Pollution Emergency Plan (OPEP)

Under Commonwealth environment legislation, Esso Australia must demonstrate and document oil spill response arrangements. The OPEP forms part of an EP submission and demonstrates our capability to respond in the unlikely event of an oil spill.

Esso Australia is a member of the Australian Marine Oil Spill Centre (AMOSC), a co-operative national oil spill response organisation, which provides access to additional oil spill response resources if required.

Esso Australia's OPEP interfaces with national, state and industry response plans prepared and implemented by the Australian Government via AMSA (NATPLAN), the Victorian Government (Maritime Emergencies (non-search and rescue) Plan), the Tasmanian Government (TASPLAN), the NSW Government (NSW Marine Oil and Chemical Spill Contingency Plan) and the Australian Oil industry's Australian Marine Oil Spill Plan (AMOSPLAN) administered by AMOSC.

The OPEP defines spill response options which may be applied to a spill event. The selected spill response option(s) would depend upon the size and type of spill; environmental sensitivities within the spill path; prevailing weather conditions; access restrictions and available resources. In all instances, a Net Environmental Benefits Assessment (NEBA) is undertaken, in consultation with relevant government agencies, to consider the advantages and disadvantages of the available spill response options.

Consultation

Esso Australia is committed to engaging with the communities where we operate and helping our stakeholders to understand our business.

Esso has been consulting with stakeholders potentially affected by this campaign through a number of different channels.

While some community consultations have occurred, Esso welcomes the opportunity for more face-to-face meetings and will continue to keep interested stakeholders informed of the proposed activities throughout the planning phase and into operational phase.

We will address questions and consider feedback from stakeholders throughout this campaign.

If you have any specific questions or feedback about any of these activities please contact Esso at consultation@exxonmobil.com or call 03 9261 0260.

Appendix B – EPBC Act Listed Species

Table 1 - EPBC Act listed fish (bony) species or species habitat that may occur within the PEA
(Note: Shaded species denotes that they occur in both the OA and the PEA)

Scientific Name	Common Name	Threatened Species	Migratory Species	Listed Marine Species	Type of Presence
Fish					
Acentronura tentaculata	Shortpouch pygmy pipehorse			✓	MO
Cosmocampus howensis	Lord Howe pipefish			✓	MO
Epinephelus daemelii	Black rockcod	V			MO
Festucalex cinctus	Girdled Pipefish			✓	MO
Filicampus tigris	Tiger Pipefish			✓	MO
Halicampus boothae	Booth’s Pipefish			✓	MO
Heraldia nocturna	Upside-down pipefish			✓	MO
Hippichthys penicillus	Beady Pipefish,			✓	MO
Hippocampus abdominalis	Big-belly seahorse			✓	MO
Hippocampus breviceps	Short-head seahorse			✓	MO
Hippocampus kelloggi	Kellogg's Seahorse			✓	MO
Hippocampus minotaur	Bullneck seahorse			✓	MO
Hippocampus whitei	White's seahorse			✓	MO
Histiogamphelus briggsii	Briggs' crested pipefish			✓	MO
Histiogamphelus cristatus	Rhino pipefish			✓	MO
Hypselognathus rostratus	Knife-snout pipefish			✓	MO
Kaupus costatus	Deep-bodied pipefish			✓	MO
Kimblaeus bassensis	Trawl pipefish			✓	MO
Leptoichthys fistularius	Brushtail pipefish			✓	MO
Lissocampus caudalis	Smooth pipefish			✓	MO
Lissocampus runa	Javelin pipefish			✓	MO
Maroubra perserrata	Sawtooth pipefish			✓	MO
Mitotichthys mollisoni	Mollison’s pipefish			✓	MO
Mitotichthys semistriatus	Halfbanded pipefish			✓	MO

Mitotichthys tuckeri	Tucker's pipefish			✓	MO
Notiocampus ruber	Red pipefish			✓	MO
Phycodrus eques	Leafy seadragon			✓	MO
Phyllopteryx taeniolatus	Weedy seadragon			✓	MO
Prototroctes maraena	Australian grayling	V			LO
Pugnaso curtirostris	Pugnose pipefish			✓	MO
Solegnathus dunckeri	Duncker's Pipehorse			✓	MO
Solegnathus robustus	Robust spiny pipehorse			✓	MO
Solegnathus spinosissimus	Australian spiny pipehorse			✓	MO
Solenostomus cyanopterus	Robust ghostpipefish			✓	MO
Solenostomus paradoxus	Ornate Ghostpipefish			✓	MO
Stigmatopora argus	Spotted pipefish			✓	MO
Stigmatopora nigra	Widebody pipefish			✓	MO
Stipecampus cristatus	Ringback pipefish			✓	MO
Syngnathoides biaculeatus	Double-ended pipehorse			✓	MO
Trachyrhamphus bicoarctatus	Bentstick Pipefish			✓	MO
Urocampus carinirostris	Hairy pipefish			✓	MO
Vanacampus margaritifer	Mother-of-pearl pipefish			✓	MO
Vanacampus phillipi	Port Phillip pipefish			✓	MO
Vanacampus poecilolaemus	Australian long-snout pipefish			✓	MO
Threatened Species: *V Vulnerable* *CE Critically Endangered*	*Type of Presence:* *MO Species or species habitat may occur within the area*				

Table 2 - Fish species (cartilaginous) or species habitat that may occur within the PEA (Note: Shaded species denotes that they occur in both the OA and the PEA)

Scientific Name	Common Name	Threatened Species	Migratory Species	Listed Marine Species	BIA	Type of Presence
Sharks and Rays						
Carcharias Taurus (east coast population)	Grey Nurse Shark (east coast population)	CE			d	KO
Carcharodon carcharias	Great White Shark	V	✓		b, d	BKO
Isurus oxyrinchus	Shortfin Mako		✓			LO
Isurus paucus	Longfin Mako		✓			LO
Lamna nasus	Porbeagle		✓			LO
Manta birostris	Giant Manta Ray		✓			KO
Manta aldfredi	Reef Manta Ray		✓			KO
Rhincodon typus	Whale Shark	V	✓			MO
Threatened Species: *V Vulnerable* *CE Critically Endangered* *Biologically Important Areas*: *b Breeding* *d Distribution*	*Type of Presence*: *MO Species or species habitat may occur within the area* *LO Species or species habitat likely to occur within the area* *KO Species or species habitat known to occur within the area* *BKO Breeding known to occur within the area*					

Birds

Table 3 – Seabird and shorebird species or species habitat that may occur within the PEA (Note: Shaded species denotes that they occur in both the OA and the PEA)

Scientific Name	Common Name	Threatened Species	Migratory Species	Listed Marine Species	BIA O	BIA PEA	Type of Presence
Albatross							
Diomedia antipodensis	Antipodean Albatross	V	✓ (M)	✓	-	f	FLO
Diomedia epomophora	Southern Royal Albatross	V	✓ (M)	✓			FLO
Diomedia exulans	Wandering Albatross	V	✓ (M)	✓	f	f	FLO
Diomedia gibsoni	Gibson's Albatross	V		✓			FLO
Diomedia sanfordi	Northern Royal Albatross	E	✓ (M)	✓			FLO
Phoebetria fusca	Sooty Albatross	V	✓ (M)	✓			LO
Thalassarche bulleri	Buller's Albatross	V	✓ (M)	✓	f	f	FLO
Thalassarche bulleri platei	Northern Buller's Albatross	V		✓			FLO
Thalassarche cauta	Shy Albatross	V	✓ (M)	✓	f	f	FLO
Thalassarche chrysostoma	Grey-headed Albatross	E	✓ (M)	✓			MO
Thalassarche eremita	Chatham Albatross	E	✓ (M)	✓			FLO
Thalassarche impavida	Campbell Albatross	V	✓ (M)	✓	f	f	FLO
Thalassarche melanophris	Black-browed Albatross	V	✓ (M)	✓	f	f	FLO
Thalassarche salvini	Salvin's Albatross	V	✓ (M)	✓			FLO
Thalassarche steadi	White-capped Albatross	V	✓ (M)	✓	-	-	FLO
Petrels							
Fregetta grallaria grallaria	White-bellied Storm-Petrel	V			-	b f	LO

Scientific Name	Common Name	Threatened Species	Migratory Species	Listed Marine Species	BIA		Type of Presence
					O	PEA	
Halobaena caerulea	Blue Petrel	V		✓			MO
Macronectes giganteus	Southern Giant Petrel	E	✓ (M)	✓	-	f	FLO
Macronectes halli	Northern Giant Petrel	V	✓ (M)	✓	-	f	MO
Pelagodroma marina	White-faced Storm Petrel			✓			BKO
Pelecanoides urinatrix	Common Diving-Petrel			✓	f	f	BKO
Pterodroma heraldica	Herald Petrel	CE		✓			LO
Pterodroma leucoptera leucoptera	Gould's Petrel	E					BKO
Pterodroma mollis	Soft-plumaged Petrel	V		✓			MO
Pterodromoa neglecta neglecta	Kermadec Petrel (western)	V					FMO
Plover							
Charadrius bicinctus	Double-banded Plover		✓ (W)	✓			RKO
Charadrius leschenaultii	Greater Sand Plover	V	✓ (W)	✓			FKO
Charadrius mongolus	Lesser Sand Plover	E	✓ (W)	✓			FKO
Charadrius ruficapillus	Red-capped Plover			✓			RKO
Charadrius veredus	Oriental Plover		✓ (W)	✓			FKO
Pluvialis fulva	Pacific Golden Plover		✓ (W)	✓			RKO
Pluvialis squatarola	Grey Plover		✓ (W)	✓			RKO
Thinornis rubricollis	Hooded Plover			✓			KO
Thinornis rubricollis rubricollis	Hooded Plover (eastern)	V		✓			KO
Scolopacidae - Sandpipers							

Scientific Name	Common Name	Threatened Species	Migratory Species	Listed Marine Species	BIA O	BIA PEA	Type of Presence
Actitis hypoleucos	Common Sandpiper		✓ (W)	✓			KO
Calidris acuminata	Sharp-tailed Sandpiper		✓ (W)	✓			RKO
Calidris ferruginea	Curlew Sandpiper	CE	✓ (W)	✓			KO
Calidris melanotos	Pectoral Sandpiper		✓ (W)	✓			KO
Tringa glareola	Wood Sandpiper		✓ (W)	✓			FKO
Tringa stagnatilis	Marsh Sandpiper		✓ (W)	✓			FKO
Xenus cinereus	Terek Sandpiper		✓ (W)	✓			FKO
Scolopacidae - Other							
Arenaria interpres	Ruddy Turnstone		✓ (W)	✓			RKO
Calidris alba	Sanderling		✓ (W)	✓			RKO
Calidris canutus	Red Knot	E	✓ (W)	✓			KO
Calidris ruficollis	Red-necked Stint		✓ (W)	✓			RKO
Calidris tenuirostris	Great Knot	CE	✓ (W)	✓			RKO
Gallinago hardwickii	Latham's Snipe		✓ (W)	✓			RMO
Gallinago megala	Swinhoe's Snipe		✓ (W)	✓			RLO
Gallinago stenura	Pin-tailed Snipe		✓ (W)	✓			RLO
Heteroscelus brevipes	Grey-tailed Tattler			✓			RKO
Limosa lapponica	Bar-tailed Godwit		✓ (W)	✓			KO
Limosa lapponica baueri	Bar-tailed Godwit (auera)	V					KO
Limosa lapponica menzbieri	Northern Siberian Bar-tailed Godwit	CE					MO
Limosa limosa	Black-tailed Godwit		✓ (W)	✓			FKO

Scientific Name	Common Name	Threatened Species	Migratory Species	Listed Marine Species	BIA		Type of Presence
					O	PEA	
Numenius madagascariensis	Eastern Curlew	CE	✓ (W)	✓			KO
Numenius minutus	Little Curlew		✓ (W)	✓			RLO
Numenius phaeopus	Whimbrel		✓ (W)	✓			RKO
Philmachus pugnax	Ruff		✓ (W)	✓			FKO
Tringa brevipes	Grey-tailed Tattler		✓ (W)	✓			KO
Tringa nebularia	Common Greenshank		✓ (W)	✓			KO
Shearwaters							
Calonectris leucomelas	Streaked Shearwater		✓ (M)				MO
Puffinus carneipes	Flesh-footed Shearwater		✓ (M)	✓	-	f	FLO
Puffinus griseus	Sooty Shearwater		✓ (M)	✓			BKO
Puffinus pacificus	Wedge-tailed Shearwater		✓ (M)	✓	-	f b	BKO
Puffinus tenuirostris	Short-tailed Shearwater		✓ (M)	✓	-	f	BKO
Terns							
Sterna albifrons	Little Tern		✓ (M)	✓			BKO
Sterna bergii	Crested Tern		✓ (M)	✓	-	f b	BKO
Sterna caspia	Caspian Tern		✓ (M)	✓			BKO
Sterna fuscata	Sooty Tern			✓			BKO
Sterna nereis	Fairy Tern			✓			BKO
Sterna striata	White-fronted Tern			✓			BKO
Sternula nereis nereis	Australian Fairy Tern	V					BKO
Others							
Anthohaera Phrygia	Regent Honeyeater	CE					KO
Anous stolidus	Common Noddy		✓ (M)	✓			MO
Apus pacificus	Fork-tailed Swift		✓ (M)	✓			LO

Scientific Name	Common Name	Threatened Species	Migratory Species	Listed Marine Species	BIA		Type of Presence
					O	PEA	
Ardea alba	Great Egret			✓			BKO
Ardea ibis	Cattle Egret			✓			MO
Aulia audax fleayi	Tasmanian Wedge-tailed Eagle	E					BLO
Botaurus poiciloptilus	Australasian Bittern	E					KO
Catharacta skua	Great Skua			✓			MO
Ceyx azureus	Tasmanian Azure Kingfisher	E					BKO
Dasyomis brachypterus	Eastern Bristlebird	E					KO
Eudyptula minor	Little Penguin			✓	-	b f	BKO
Fregata ariel	Least Frigatebird		✓ (M)	✓			LO
Fregata minor	Great Frigatebird		✓ (M)	✓			MO
Grantiella picta	Painted Honeyeater	V					BKO
Haliaeetus leucogaster	White-bellied Sea Eagle			✓			BKO
Himantopus himantopus	Black-winged Stilt			✓			RKO
Hirundapus caudacutus	White-throated Needletail		✓ (T)	✓			KO
Larus dominicanus	Kelp Gull			✓			BKO
Larus novaehollandiae	Silver Gull			✓			BKO
Larus pacificus	Pacific Gull			✓			BKO
Lathamus discolor	Swift Parrot	CE		✓			KO
Merops ornatus	Rainbow Bee-eater			✓			MO
Monarcha melanopsis	Black-faced Monach		✓ (T)	✓			KO
Monarcha trivirgatus	Spectacled Monach		✓ (T)	✓			KO

Scientific Name	Common Name	Threatened Species	Migratory Species	Listed Marine Species	BIA		Type of Presence
					O	PEA	
Morus serrator	Australian Gannet			✓			BKO
Motacilla flava	Yellow Wagtail		✓ (T)	✓			MO
Myiagra cyanoleuca	Satin Flycatcher		✓ (T)	✓			KO
Neophema chrysogaster	Orange-bellied Parrot	CE		✓			KO
Pachyptila turtur	Fairy Prion			✓			KO
Pachyptila turtur subantartica	Fairy Prion (southern)	V					KO
Pandion haliaetus	Osprey		✓ (W)	✓			KO
Pardalotus quadragintus	Forty-spotted Pardalote	E					KO
Phalacrocorax fuscescens	Black-faced Cormorant			✓			BKO
Recurvirostra novaehollandiae	Red-necked Avocet			✓			FKO
Rhipidura rufifrons	Rufous Fantail		✓ (T)	✓			LO
Rostratula australis	Australian Painted Snipe	E		✓			LO

Threatened Species:
V Vulnerable
E Endangered
CE Critically Endangered
Migratory Species:
M Marine
W Wetland
T Terrestrial
Biologically Important Areas:
b Breeding
f Foraging

Type of Presence:
MO Species or species habitat may occur within the area
LO Species or species habitat likely to occur within the area
KO Species or species habitat known to occur within the area
FMO Foraging, feeding or related behaviour may occur within the area
FLO Foraging, feeding or related behaviour likely to occur within the area
FKO Foraging, feeding or related behaviour known to occur within the area
BKO Breeding known to occur within the area
RMO Roosting may occur within the area
RLO Roosting likely to occur within the area
RKO Roosting known to occur within the area

Marine Mammals

Table 4 – Marine Mammals (Cetacean) or species habitat that may occur within the PEA (Note: Shaded species denotes that they occur in both the OA and the PEA)

Scientific Name	Common Name	Threatened Species	Migratory Species	Listed Marine Species	BIA		Type of Presence
					O	PEA	
Whales							
Balaenoptera acutorostrata	Minke Whale						MO
Balaenoptera bonaerensis	Antartic Minke Whale		✓				LO
Balaenoptera borealis	Sie Whale	V	✓				FLO
Balaenoptera edeni	Bryde's Whale		✓				LO
Balaenoptera musculus	Blue Whale	E	✓		f	f	LO
Balaenoptera physalus	Fin Whale	V	✓				FLO
Berardius arnuxii	Arnoux's Beaked Whale						MO
Caperea marginata	Pygmy Right Whale		✓				FLO
Eubalaena australis	Southern Right Whale	E	✓				KO
Globicephala macrorhynchus	Short-finned Pilot Whale						MO
Globicephala melas	Long-finned Pilot Whale						MO
Hyperoodon planifrons	Southern Bottlenose Whale						MO
Kogia breviceps	Pygmy Sperm Whale						MO
Kogia simus	Dwarf Sperm Whale						MO
Megaptera novaeangliae	Humpback Whale	V	✓		-	f	FKO
Mesoplodon bowdoini	Andrew's Beaked Whale						MO
Mesoplodon densirostris	Blainville's Beaked Whale						MO
Mesoplodon ginkgodens	Gingko-toothed Beaked Whale						MO
Mesoplodon grayi	Gray's Beaked Whale						MO
Mesoplodon hectori	Hector's Beaked Whale						MO
Mesoplodon layardii	Strap-toothed Beaked Whale						MO

Scientific Name	Common Name	Threatened Species	Migratory Species	Listed Marine Species	BIA		Type of Presence
					O	PEA	
Mesoplodon mirus	True's Beaked Whale						MO
Physeter microcephalus	Sperm Whale		✓				MO
Tasmacetus shepherdi	Shepherd's Beaked Whale						MO
Ziphius cavirostris	Cuvier's Beaked Whale						MO
Dolphins							
Delphinus delphis	Common Dolphin						MO
Feresa attenuata	Pygmy Killer Whale						MO
Grampus griseus	Risso's Dolphin						MO
Lagenorhynchus obscurus	Dusky Dolphin		✓				LO
Lissodelphiss peronii	Southern Right Whale Dolphin				-	m	MO
Orcinus orca	Killer Whale		✓				LO
Pseudorca crassidens	False Killer Whale						MO
Sousa chinensis	Indo-Pacific Humpback Dolphin		✓				LO
Stenalla attenuata	Spotted Dolphin						MO
Stenalla coeruleoalba	Striped Dolphin						MO
Stenalla logirostris	Long-snouted Spinner Dolphin						MO
Steno bredanensis	Rough-toothed Dolphin						MO
Tursiops aduncus	Indian Ocean Bottlenose Dolphin						LO
Tursiops truncatus s. str.	Bottlenose Dolphin						MO

Threatened Species:
V Vulnerable
E Endangered
Biologically Important Areas:
bc Breeding, calving
f Foraging
m Migration

Type of Presence:
MO Species or species habitat may occur within the area
LO Species or species habitat likely to occur within the area
KO Species or species habitat known to occur within the area
FLO Foraging, feeding or related behaviour likely to occur within the area
FKO Foraging, feeding or related behaviour known to occur within the area
BKO Breeding known to occur within the area

Table 5 – Marine Mammal (Pinnipeds) or species habitat that may occur within the PEA

Scientific Name	Common Name	Threatened Species	Migratory Species	Listed Marine Species	BIA	Type of Presence
Arctocephalus forsteri	New Zealand Fur-seal			✓		MO
Arctocephalus pusillus	Australian Fur-seal			✓		BKO
Threatened Species: V - Vulnerable *Biologically Important Areas*:	*Type of Presence*: *MO Species or species habitat may occur within the area* *BKO Breeding known to occur within the area*					

Table 6 – Marine Mammal (Sirenia) or species habitat that may occur within the PEA (Note: Shaded species denotes that they occur in both the OA and the PEA)

Scientific Name	Common Name	Threatened Species	Migratory Species	Listed Marine Species	BIA	Type of Presence
Dugong dugon	Dugong		✓	✓		MO
Threatened Species: *Biologically Important Areas*:	*Type of Presence*: *MO Species or species habitat may occur within the area*					

Marine Reptiles

Table 7 – Marine Reptiles (Turtles) or species habitat that may occur within the PEA (Note: Shaded species denotes that they occur in both the OA and the PEA)

Scientific Name	Common Name	Threatened Species	Migratory Species	Listed Marine Species	BIA	Type of Presence
Turtles						
Caretta caretta	Loggerhead Turtle	E	✓	✓		BLO
Chelonia mydas	Green Turtle	V	✓	✓		FKO
Dermochelys coriacea	Leatherback Turtle	E	✓	✓		FKO
Eretmochelys imbricata	Hawksbill Turtle	V	✓	✓		FKO
Natator depressus	Flatback Turtle	V	✓	✓		FKO
Threatened Species: *V Vulnerable* *E Endangered*	*Type of Presence*: *FKO Foraging, feeding or related behaviour known to occur within the area* *BLO Breeding likely to occur within the area*					

Australian Government

Department of the Environment and Energy

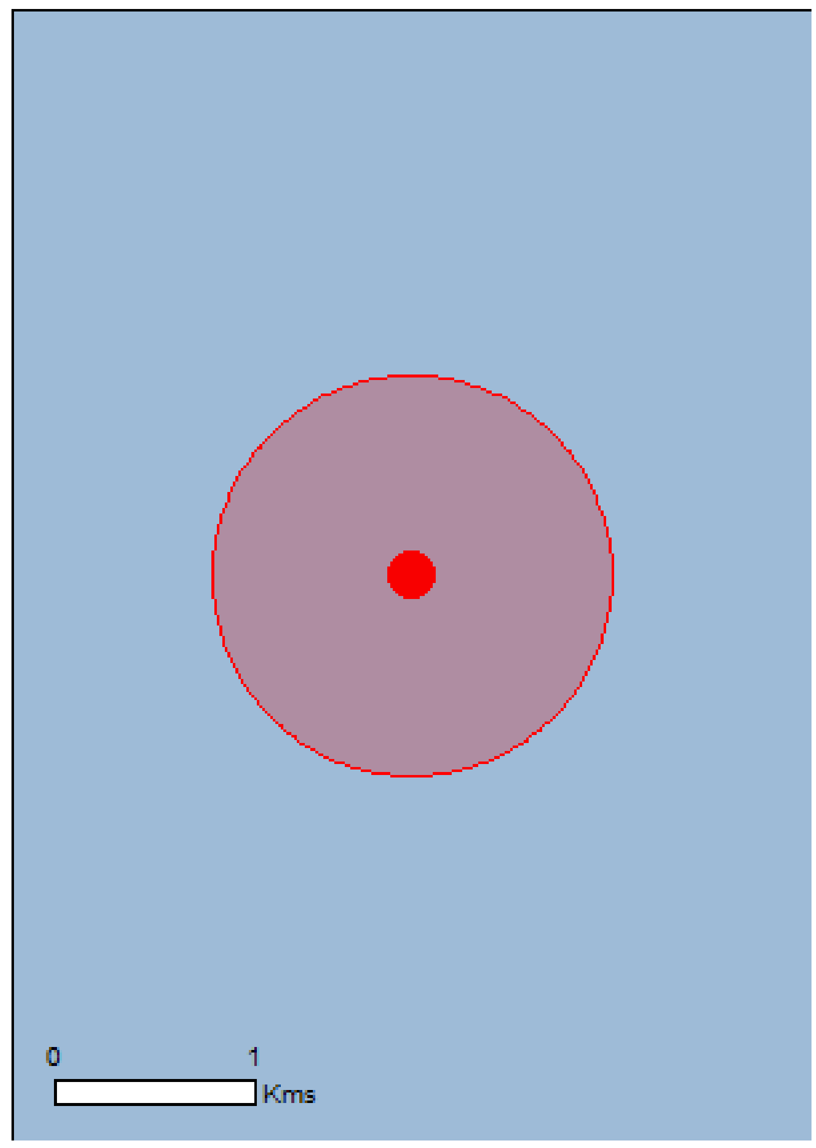
EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

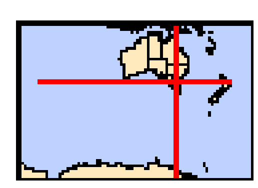
Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 29/06/19 13:03:09



Coordinates

Buffer: 1.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	1
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	33
Listed Migratory Species:	35

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	58
Whales and Other Cetaceans:	10
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	None
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Commonwealth Marine Area [Resource Information]

Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside the Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area. Generally the Commonwealth Marine Area stretches from three nautical miles to two hundred nautical miles from the coast.

Name
EEZ and Territorial Sea

Marine Regions [Resource Information]

If you are planning to undertake action in an area in or close to the Commonwealth Marine Area, and a marine bioregional plan has been prepared for the Commonwealth Marine Area in that area, the marine bioregional plan may inform your decision as to whether to refer your proposed action under the EPBC Act.

Name
South-east

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea antipodensis gibsoni Gibson's Albatross [82270]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Fregetta grallaria grallaria White-bellied Storm-Petrel (Tasman Sea), White-bellied Storm-Petrel (Australasian) [64438]	Vulnerable	Species or species habitat likely to occur within area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within

Name	Status	Type of Presence
		area
[Macronectes giganteus](#) Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat may occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Pterodroma leucoptera leucoptera Gould's Petrel, Australian Gould's Petrel [26033]	Endangered	Species or species habitat may occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche bulleri platei Northern Buller's Albatross, Pacific Albatross [82273]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta cauta Shy Albatross, Tasmanian Shy Albatross [82345]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche cauta steadi White-capped Albatross [82344]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche chrysostoma Grey-headed Albatross [66491]	Endangered	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Fish		
Prototroctes maraena Australian Grayling [26179]	Vulnerable	Species or species habitat may occur within area
Mammals		
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species

Name	Status	Type of Presence
		habitat known to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat likely to occur within area
Sharks		
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Breeding known to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Ardenna carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Species or species habitat likely to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta Tasmanian Shy Albatross [89224]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area

Name	Threatened	Type of Presence
Thalassarche chrysostoma Grey-headed Albatross [66491]	Endangered	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Migratory Marine Species		
Balaena glacialis australis Southern Right Whale [75529]	Endangered*	Species or species habitat known to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Caperea marginata Pygmy Right Whale [39]		Foraging, feeding or related behaviour may occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Breeding known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat likely to occur within area
Isurus oxyrinchus Shortfin Mako, Mako Shark [79073]		Species or species habitat likely to occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat likely to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat likely to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Migratory Wetlands Species		

Name	Threatened	Type of Presence
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Catharacta skua Great Skua [59472]		Species or species habitat may occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area

Name	Threatened	Type of Presence
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea gibsoni Gibson's Albatross [64466]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Species or species habitat likely to occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta Tasmanian Shy Albatross [89224]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thalassarche chrysostoma Grey-headed Albatross [66491]	Endangered	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche sp. nov. Pacific Albatross [66511]	Vulnerable*	Species or species habitat may occur within area

Name	Threatened	Type of Presence
Thalassarche steadi White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Fish		
Heraldia nocturna Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area
Hippocampus abdominalis Big-belly Seahorse, Eastern Potbelly Seahorse, New Zealand Potbelly Seahorse [66233]		Species or species habitat may occur within area
Hippocampus breviceps Short-head Seahorse, Short-snouted Seahorse [66235]		Species or species habitat may occur within area
Hippocampus minotaur Bullneck Seahorse [66705]		Species or species habitat may occur within area
Histiogamphelus briggsii Crested Pipefish, Briggs' Crested Pipefish, Briggs' Pipefish [66242]		Species or species habitat may occur within area
Histiogamphelus cristatus Rhino Pipefish, Macleay's Crested Pipefish, Ring-back Pipefish [66243]		Species or species habitat may occur within area
Hypselognathus rostratus Knifesnout Pipefish, Knife-snouted Pipefish [66245]		Species or species habitat may occur within area
Kaupus costatus Deepbody Pipefish, Deep-bodied Pipefish [66246]		Species or species habitat may occur within area
Kimblaeus bassensis Trawl Pipefish, Bass Strait Pipefish [66247]		Species or species habitat may occur within area
Leptoichthys fistularius Brushtail Pipefish [66248]		Species or species habitat may occur within area
Lissocampus runa Javelin Pipefish [66251]		Species or species habitat may occur within area
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area
Mitotichthys semistriatus Halfbanded Pipefish [66261]		Species or species habitat may occur within area
Mitotichthys tuckeri Tucker's Pipefish [66262]		Species or species habitat may occur within area
Notiocampus ruber Red Pipefish [66265]		Species or species habitat may occur within area
Phyllopteryx taeniolatus Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area
Solegnathus robustus Robust Pipehorse, Robust Spiny Pipehorse [66274]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Solegnathus spinosissimus Spiny Pipehorse, Australian Spiny Pipehorse [66275]		Species or species habitat may occur within area
Stigmatopora argus Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area
Stipecampus cristatus Ringback Pipefish, Ring-backed Pipefish [66278]		Species or species habitat may occur within area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Urocampus carinirostris Hairy Pipefish [66282]		Species or species habitat may occur within area
Vanacampus margaritifer Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area
Vanacampus phillipi Port Phillip Pipefish [66284]		Species or species habitat may occur within area
Vanacampus poecilolaemus Longsnout Pipefish, Australian Long-snout Pipefish, Long-snouted Pipefish [66285]		Species or species habitat may occur within area
Mammals		
Arctocephalus forsteri Long-nosed Fur-seal, New Zealand Fur-seal [20]		Species or species habitat may occur within area
Arctocephalus pusillus Australian Fur-seal, Australo-African Fur-seal [21]		Species or species habitat may occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat likely to occur within area

Whales and other Cetaceans [Resource Information]

Name	Status	Type of Presence
Mammals		
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Caperea marginata Pygmy Right Whale [39]		Foraging, feeding or related behaviour may

Name	Status	Type of Presence
		occur within area
Delphinus delphis Common Dophin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat known to occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat likely to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area

Extra Information

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-38.3151 147.61649

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

Department of the Environment
GPO Box 787
Canberra ACT 2601 Australia
+61 2 6274 1111

Australian Government

Department of the Environment and Energy

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

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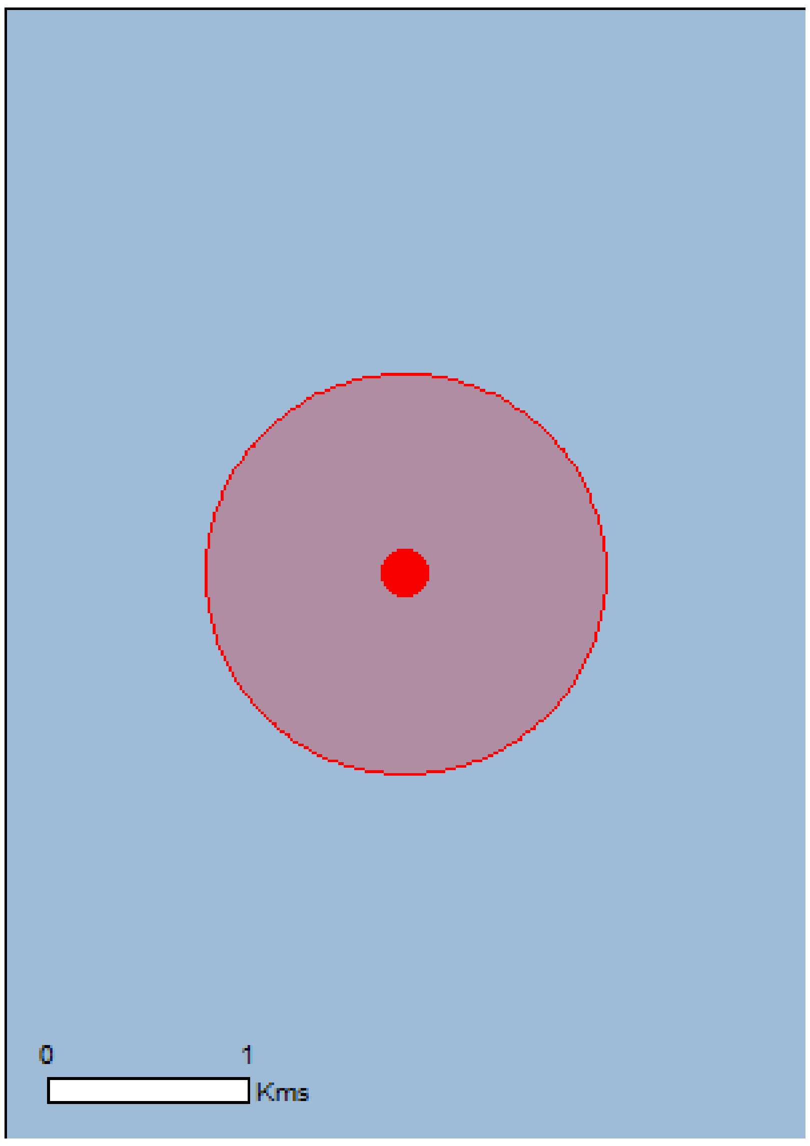

Coordinates

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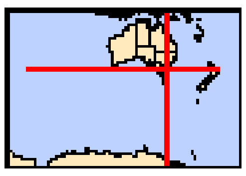


Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	1
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	35
Listed Migratory Species:	38

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	58
Whales and Other Cetaceans:	14
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	None
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	1

Details

Matters of National Environmental Significance

Commonwealth Marine Area [Resource Information]

Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside the Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area. Generally the Commonwealth Marine Area stretches from three nautical miles to two hundred nautical miles from the coast.

Name
EEZ and Territorial Sea

Marine Regions [Resource Information]

If you are planning to undertake action in an area in or close to the Commonwealth Marine Area, and a marine bioregional plan has been prepared for the Commonwealth Marine Area in that area, the marine bioregional plan may inform your decision as to whether to refer your proposed action under the EPBC Act.

Name
South-east

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Calidris canutus		
Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Diomedea antipodensis		
Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea antipodensis gibsoni		
Gibson's Albatross [82270]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora		
Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans		
Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi		
Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Fregetta grallaria grallaria		
White-bellied Storm-Petrel (Tasman Sea), White-bellied Storm-Petrel (Australasian) [64438]	Vulnerable	Species or species habitat likely to occur within area
Halobaena caerulea		
Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within

Name	Status	Type of Presence
		area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat may occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Pterodroma leucoptera leucoptera Gould's Petrel, Australian Gould's Petrel [26033]	Endangered	Species or species habitat may occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche bulleri platei Northern Buller's Albatross, Pacific Albatross [82273]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta cauta Shy Albatross, Tasmanian Shy Albatross [82345]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche cauta steadi White-capped Albatross [82344]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche chrysostoma Grey-headed Albatross [66491]	Endangered	Species or species habitat may occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Mammals		
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur

Name	Status	Type of Presence
		within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat known to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat likely to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat likely to occur within area
Sharks		
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Ardenna carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Species or species habitat likely to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area

Name	Threatened	Type of Presence
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta Tasmanian Shy Albatross [89224]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thalassarche chrysostoma Grey-headed Albatross [66491]	Endangered	Species or species habitat may occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Migratory Marine Species		
Balaena glacialis australis Southern Right Whale [75529]	Endangered*	Species or species habitat known to occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Caperea marginata Pygmy Right Whale [39]		Foraging, feeding or related behaviour likely to occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat likely to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Isurus oxyrinchus Shortfin Mako, Mako Shark [79073]		Species or species habitat likely to occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat likely to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat likely to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area

Name	Threatened	Type of Presence
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Catharacta skua Great Skua [59472]		Species or species habitat may occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea gibsoni Gibson's Albatross [64466]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat may occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Species or species habitat likely to occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta Tasmanian Shy Albatross [89224]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thalassarche chrysostoma Grey-headed Albatross [66491]	Endangered	Species or species habitat may occur within area

Name	Threatened	Type of Presence
Thalassarche eremita Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche sp. nov. Pacific Albatross [66511]	Vulnerable*	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Fish		
Heraldia nocturna Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area
Hippocampus abdominalis Big-belly Seahorse, Eastern Potbelly Seahorse, New Zealand Potbelly Seahorse [66233]		Species or species habitat may occur within area
Hippocampus breviceps Short-head Seahorse, Short-snouted Seahorse [66235]		Species or species habitat may occur within area
Hippocampus minotaur Bullneck Seahorse [66705]		Species or species habitat may occur within area
Histiogamphelus briggsii Crested Pipefish, Briggs' Crested Pipefish, Briggs' Pipefish [66242]		Species or species habitat may occur within area
Histiogamphelus cristatus Rhino Pipefish, Macleay's Crested Pipefish, Ring-back Pipefish [66243]		Species or species habitat may occur within area
Hypselognathus rostratus Knifesnout Pipefish, Knife-snouted Pipefish [66245]		Species or species habitat may occur within area
Kaupus costatus Deepbody Pipefish, Deep-bodied Pipefish [66246]		Species or species habitat may occur within area
Kimblaeus bassensis Trawl Pipefish, Bass Strait Pipefish [66247]		Species or species habitat may occur within area
Leptoichthys fistularius Brushtail Pipefish [66248]		Species or species habitat may occur within area
Lissocampus runa Javelin Pipefish [66251]		Species or species habitat may occur within area
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Mitotichthys semistriatus Halfbanded Pipefish [66261]		Species or species habitat may occur within area
Mitotichthys tuckeri Tucker's Pipefish [66262]		Species or species habitat may occur within area
Notiocampus ruber Red Pipefish [66265]		Species or species habitat may occur within area
Phyllopteryx taeniolatus Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area
Solegnathus robustus Robust Pipehorse, Robust Spiny Pipehorse [66274]		Species or species habitat may occur within area
Solegnathus spinosissimus Spiny Pipehorse, Australian Spiny Pipehorse [66275]		Species or species habitat may occur within area
Stigmatopora argus Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area
Stipecampus cristatus Ringback Pipefish, Ring-backed Pipefish [66278]		Species or species habitat may occur within area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Urocampus carinirostris Hairy Pipefish [66282]		Species or species habitat may occur within area
Vanacampus margaritifer Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area
Vanacampus phillipi Port Phillip Pipefish [66284]		Species or species habitat may occur within area
Vanacampus poecilolaemus Longsnout Pipefish, Australian Long-snout Pipefish, Long-snouted Pipefish [66285]		Species or species habitat may occur within area
Mammals		
Arctocephalus forsteri Long-nosed Fur-seal, New Zealand Fur-seal [20]		Species or species habitat may occur within area
Arctocephalus pusillus Australian Fur-seal, Australo-African Fur-seal [21]		Species or species habitat may occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat likely to occur

Name	Threatened	Type of Presence
		within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat likely to occur within area

Whales and other Cetaceans [Resource Information]

Name	Status	Type of Presence
Mammals		
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Caperea marginata Pygmy Right Whale [39]		Foraging, feeding or related behaviour likely to occur within area
Delphinus delphis Common Dophin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat known to occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat likely to occur within area
Pseudorca crassidens False Killer Whale [48]		Species or species habitat likely to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area

Extra Information

Key Ecological Features (Marine) [Resource Information]

Key Ecological Features are the parts of the marine ecosystem that are considered to be important for the biodiversity or ecosystem functioning and integrity of the Commonwealth Marine Area.

Name	Region
Upwelling East of Eden	South-east

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-38.17491 148.5966

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

Department of the Environment
GPO Box 787
Canberra ACT 2601 Australia
+61 2 6274 1111

Australian Government

Department of the Environment and Energy

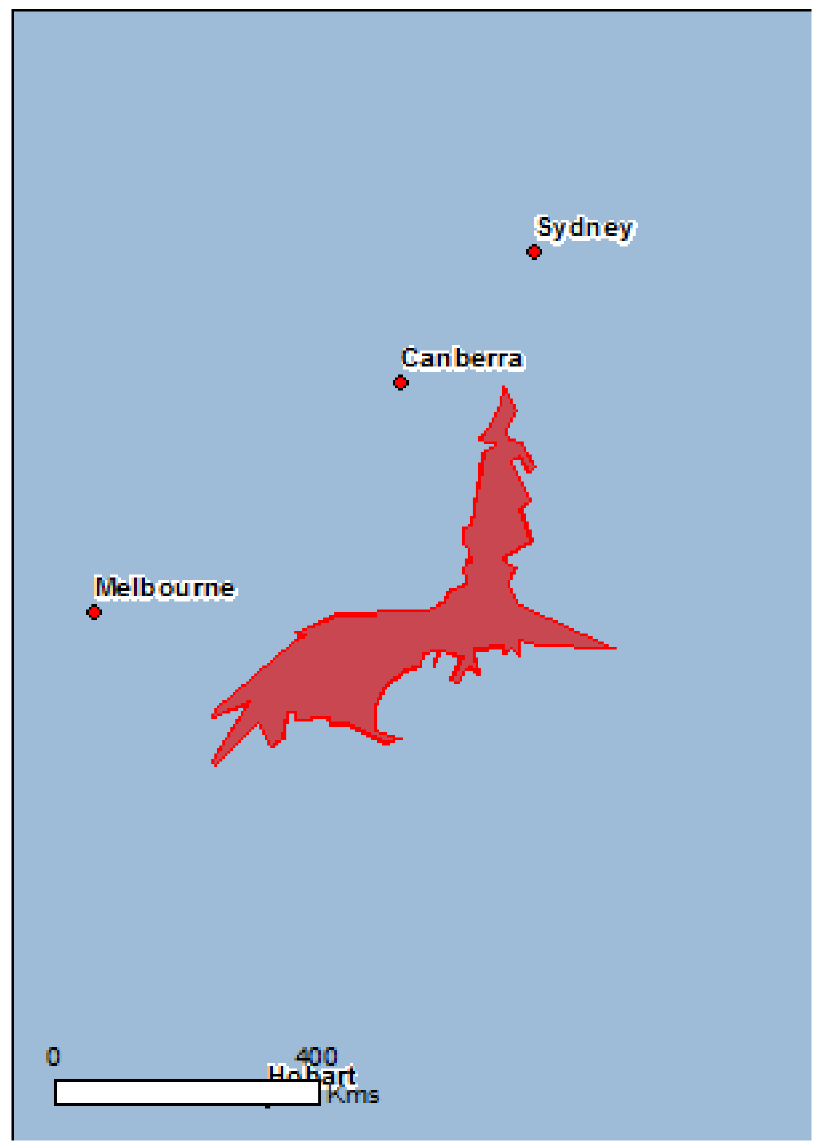
EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

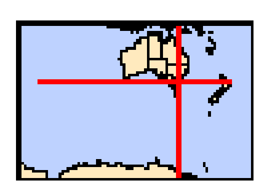
Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 01/07/19 14:18:18



Coordinates

Buffer: 1.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	2
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	1
Listed Threatened Ecological Communities:	7
Listed Threatened Species:	83
Listed Migratory Species:	80

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	1
Commonwealth Heritage Places:	2
Listed Marine Species:	120
Whales and Other Cetaceans:	33
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	2

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	7
Regional Forest Agreements:	4
Invasive Species:	45
Nationally Important Wetlands:	3
Key Ecological Features (Marine)	4

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar) [Resource Information]

Name	Proximity
Corner inlet	Within Ramsar site
Gippsland lakes	Within 10km of Ramsar

Commonwealth Marine Area [Resource Information]

Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside the Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area. Generally the Commonwealth Marine Area stretches from three nautical miles to two hundred nautical miles from the coast.

Name
EEZ and Territorial Sea

Marine Regions [Resource Information]

If you are planning to undertake action in an area in or close to the Commonwealth Marine Area, and a marine bioregional plan has been prepared for the Commonwealth Marine Area in that area, the marine bioregional plan may inform your decision as to whether to refer your proposed action under the EPBC Act.

Name
South-east
Temperate East

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community	Endangered	Community may occur within area
Giant Kelp Marine Forests of South East Australia	Endangered	Community may occur within area
Illawarra and south coast lowland forest and woodland ecological community	Critically Endangered	Community may occur within area
Littoral Rainforest and Coastal Vine Thickets of Eastern Australia	Critically Endangered	Community likely to occur within area
Lowland Grassy Woodland in the South East Corner Bioregion	Critically Endangered	Community likely to occur within area
Natural Damp Grassland of the Victorian Coastal Plains	Critically Endangered	Community may occur within area
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Anthochaera phrygia		
Regent Honeyeater [82338]	Critically Endangered	Species or species habitat known to occur within area
Botaurus poiciloptilus		
Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Calidris canutus		
Red Knot, Knot [855]	Endangered	Species or species

Name	Status	Type of Presence
		habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Roosting known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Roosting known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area
Dasyornis brachypterus Eastern Bristlebird [533]	Endangered	Species or species habitat known to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea antipodensis gibsoni Gibson's Albatross [82270]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Fregetta grallaria grallaria White-bellied Storm-Petrel (Tasman Sea), White-bellied Storm-Petrel (Australasian) [64438]	Vulnerable	Species or species habitat likely to occur within area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area
Limosa lapponica baueri Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat known to occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Bar-tailed Godwit (menzbieri) [86432]	Critically Endangered	Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Neophema chrysogaster Orange-bellied Parrot [747]	Critically Endangered	Migration route likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur

Name	Status	Type of Presence
		within area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat known to occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area
Pterodroma leucoptera leucoptera Gould's Petrel, Australian Gould's Petrel [26033]	Endangered	Breeding known to occur within area
Pterodroma neglecta neglecta Kermadec Petrel (western) [64450]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Rostratula australis Australian Painted-snipe, Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Breeding likely to occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche bulleri platei Northern Buller's Albatross, Pacific Albatross [82273]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche cauta cauta Shy Albatross, Tasmanian Shy Albatross [82345]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche cauta steadi White-capped Albatross [82344]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche chrysostoma Grey-headed Albatross [66491]	Endangered	Species or species habitat may occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thinornis rubricollis rubricollis Hooded Plover (eastern) [66726]	Vulnerable	Species or species habitat known to occur within area
Fish		
Epinephelus daemelii Black Rockcod, Black Cod, Saddled Rockcod [68449]	Vulnerable	Species or species habitat likely to occur within area
Maccullochella peelii Murray Cod [66633]	Vulnerable	Species or species habitat may occur within area

Name	Status	Type of Presence
Prototroctes maraena Australian Grayling [26179]	Vulnerable	Species or species habitat known to occur within area
Frogs		
Heleioporus australiacus Giant Burrowing Frog [1973]	Vulnerable	Species or species habitat likely to occur within area
Litoria aurea Green and Golden Bell Frog [1870]	Vulnerable	Species or species habitat known to occur within area
Litoria littlejohni Littlejohn's Tree Frog, Heath Frog [64733]	Vulnerable	Species or species habitat likely to occur within area
Litoria raniformis Growling Grass Frog, Southern Bell Frog, Green and Golden Frog, Warty Swamp Frog [1828]	Vulnerable	Species or species habitat likely to occur within area
Mammals		
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat likely to occur within area
Dasyurus maculatus maculatus (SE mainland population) Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat known to occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat known to occur within area
Isoodon obesulus obesulus Southern Brown Bandicoot (eastern), Southern Brown Bandicoot (south-eastern) [68050]	Endangered	Species or species habitat likely to occur within area
Mastacomys fuscus mordicus Broad-toothed Rat (mainland), Tooarrana [87617]	Vulnerable	Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Petauroides volans Greater Glider [254]	Vulnerable	Species or species habitat likely to occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat likely to occur within area
Potorous longipes Long-footed Potoroo [217]	Endangered	Species or species habitat may occur within area
Potorous tridactylus tridactylus Long-nosed Potoroo (SE mainland) [66645]	Vulnerable	Species or species habitat likely to occur

Name	Status	Type of Presence
		within area
Pseudomys fumeus Smoky Mouse, Konoom [88]	Endangered	Species or species habitat likely to occur within area
Pseudomys novaehollandiae New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat may occur within area
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Plants		
Acacia constablei Narrabarba Wattle [10798]	Vulnerable	Species or species habitat known to occur within area
Amphibromus fluitans River Swamp Wallaby-grass, Floating Swamp Wallaby-grass [19215]	Vulnerable	Species or species habitat likely to occur within area
Caladenia tessellata Thick-lipped Spider-orchid, Daddy Long-legs [2119]	Vulnerable	Species or species habitat likely to occur within area
Cryptostylis hunteriana Leafless Tongue-orchid [19533]	Vulnerable	Species or species habitat likely to occur within area
Glycine latrobeana Clover Glycine, Purple Clover [13910]	Vulnerable	Species or species habitat may occur within area
Pomaderris parrisiae Parris' Pomaderris [22119]	Vulnerable	Species or species habitat likely to occur within area
Prasophyllum frenchii Maroon Leek-orchid, Slaty Leek-orchid, Stout Leek-orchid, French's Leek-orchid, Swamp Leek-orchid [9704]	Endangered	Species or species habitat likely to occur within area
Prasophyllum spicatum Dense Leek-orchid [55146]	Vulnerable	Species or species habitat known to occur within area
Pterostylis chlorogramma Green-striped Greenhood [56510]	Vulnerable	Species or species habitat likely to occur within area
Pterostylis gibbosa Illawarra Greenhood, Rufa Greenhood, Pouched Greenhood [4562]	Endangered	Species or species habitat may occur within area
Syzygium paniculatum Magenta Lilly Pilly, Magenta Cherry, Daguba, Scrub Cherry, Creek Lilly Pilly, Brush Cherry [20307]	Vulnerable	Species or species habitat likely to occur within area
Thelymitra matthewsii Spiral Sun-orchid [4168]	Vulnerable	Species or species habitat may occur within area
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat likely to occur within area
Xerochrysum palustre Swamp Everlasting, Swamp Paper Daisy [76215]	Vulnerable	Species or species habitat likely to occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species

Name	Status	Type of Presence
		habitat known to occur within area
Chelonia mydas		
Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Eretmochelys imbricata		
Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Natator depressus		
Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area
Sharks		
Carcharias taurus (east coast population)		
Grey Nurse Shark (east coast population) [68751]	Critically Endangered	Species or species habitat known to occur within area
Carcharodon carcharias		
White Shark, Great White Shark [64470]	Vulnerable	Breeding known to occur within area
Rhincodon typus		
Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardenna carneipes		
Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Foraging, feeding or related behaviour likely to occur within area
Ardenna grisea		
Sooty Shearwater [82651]		Breeding known to occur within area
Ardenna pacifica		
Wedge-tailed Shearwater [84292]		Breeding known to occur within area
Ardenna tenuirostris		
Short-tailed Shearwater [82652]		Breeding known to occur within area
Diomedea antipodensis		
Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora		
Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans		
Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi		
Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Hydroprogne caspia		
Caspian Tern [808]		Breeding known to occur within area

Name	Threatened	Type of Presence
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area
Sternula albifrons Little Tern [82849]		Breeding known to occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche cauta Tasmanian Shy Albatross [89224]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thalassarche chrysostoma Grey-headed Albatross [66491]	Endangered	Species or species habitat may occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Migratory Marine Species		
Balaena glacialis australis Southern Right Whale [75529]	Endangered*	Species or species habitat known to occur within area
Balaenoptera bonaerensis Antarctic Minke Whale, Dark-shoulder Minke Whale [67812]		Species or species habitat likely to occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area

Name	Threatened	Type of Presence
Caperea marginata Pygmy Right Whale [39]		Foraging, feeding or related behaviour likely to occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Breeding known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Isurus oxyrinchus Shortfin Mako, Mako Shark [79073]		Species or species habitat likely to occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat likely to occur within area
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat likely to occur within area
Manta birostris Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat known to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat likely to occur within area
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Migratory Terrestrial Species		
Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat known to occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Arenaria interpres Ruddy Turnstone [872]		Roosting known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Roosting known to occur within area
Calidris alba Sanderling [875]		Roosting known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Calidris ruficollis Red-necked Stint [860]		Roosting known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Roosting known to occur within area
Charadrius bicinctus Double-banded Plover [895]		Roosting known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Roosting known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Roosting may occur within area
Gallinago megala Swinhoe's Snipe [864]		Roosting likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Roosting likely to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Roosting known to occur

Name	Threatened	Type of Presence
		within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Roosting likely to occur within area
Numenius phaeopus Whimbrel [849]		Roosting known to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Philomachus pugnax Ruff (Reeve) [850]		Roosting known to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Roosting known to occur within area
Pluvialis squatarola Grey Plover [865]		Roosting known to occur within area
Thalasseus bergii Crested Tern [83000]		Breeding known to occur within area
Tringa brevipes Grey-tailed Tattler [851]		Roosting known to occur within area
Tringa glareola Wood Sandpiper [829]		Roosting known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Roosting known to occur within area
Xenus cinereus Terek Sandpiper [59300]		Roosting known to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land -

Commonwealth Heritage Places [Resource Information]

Name	State	Status
Historic		
Gabo Island Lighthouse	VIC	Listed place
Montague Island Lighthouse	NSW	Listed place

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species

Name	Threatened	Type of Presence
		habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Breeding known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Arenaria interpres Ruddy Turnstone [872]		Roosting known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Roosting known to occur within area
Calidris alba Sanderling [875]		Roosting known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Calidris ruficollis Red-necked Stint [860]		Roosting known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Roosting known to occur within area
Catharacta skua Great Skua [59472]		Species or species habitat may occur within area
Charadrius bicinctus Double-banded Plover [895]		Roosting known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Roosting known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area
Charadrius ruficapillus Red-capped Plover [881]		Roosting known to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea gibsoni Gibson's Albatross [64466]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area

Name	Threatened	Type of Presence
Eudyptula minor Little Penguin [1085]		Breeding known to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Roosting may occur within area
Gallinago megala Swinhoe's Snipe [864]		Roosting likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Roosting likely to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Breeding known to occur within area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area
Heteroscelus brevipes Grey-tailed Tattler [59311]		Roosting known to occur within area
Himantopus himantopus Pied Stilt, Black-winged Stilt [870]		Roosting known to occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat known to occur within area
Larus novaehollandiae Silver Gull [810]		Breeding known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Roosting known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Neophema chrysogaster Orange-bellied Parrot [747]	Critically Endangered	Migration route likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Roosting likely to occur within area
Numenius phaeopus Whimbrel [849]		Roosting known to occur within area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Pelagodroma marina White-faced Storm-Petrel [1016]		Breeding known to occur within area
Philomachus pugnax Ruff (Reeve) [850]		Roosting known to occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Roosting known to occur within area
Pluvialis squatarola Grey Plover [865]		Roosting known to occur within area
Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Foraging, feeding or related behaviour likely to occur within area
Puffinus griseus Sooty Shearwater [1024]		Breeding known to occur within area
Puffinus pacificus Wedge-tailed Shearwater [1027]		Breeding known to occur within area
Puffinus tenuirostris Short-tailed Shearwater [1029]		Breeding known to occur within area
Recurvirostra novaehollandiae Red-necked Avocet [871]		Roosting known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area
Sterna albifrons Little Tern [813]		Breeding known to occur within area
Sterna bergii Crested Tern [816]		Breeding known to occur within area
Sterna caspia Caspian Tern [59467]		Breeding known to occur within area
Sterna fuscata Sooty Tern [794]		Breeding known to occur

Name	Threatened	Type of Presence
		within area
Sterna nereis Fairy Tern [796]		Breeding known to occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche cauta Tasmanian Shy Albatross [89224]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thalassarche chrysostoma Grey-headed Albatross [66491]	Endangered	Species or species habitat may occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche sp. nov. Pacific Albatross [66511]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thinornis rubricollis Hooded Plover [59510]		Species or species habitat known to occur within area
Thinornis rubricollis rubricollis Hooded Plover (eastern) [66726]	Vulnerable	Species or species habitat known to occur within area
Tringa glareola Wood Sandpiper [829]		Roosting known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Roosting known to occur within area
Xenus cinereus Terek Sandpiper [59300]		Roosting known to occur within area
Fish		
Acentronura tentaculata Shortpouch Pygmy Pipehorse [66187]		Species or species habitat may occur within area
Cosmocampus howensis Lord Howe Pipefish [66208]		Species or species habitat may occur within area
Heraldia nocturna Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within

Name	Threatened	Type of Presence
		area
Hippocampus abdominalis Big-belly Seahorse, Eastern Potbelly Seahorse, New Zealand Potbelly Seahorse [66233]		Species or species habitat may occur within area
Hippocampus breviceps Short-head Seahorse, Short-snouted Seahorse [66235]		Species or species habitat may occur within area
Hippocampus minotaur Bullneck Seahorse [66705]		Species or species habitat may occur within area
Hippocampus whitei White's Seahorse, Crowned Seahorse, Sydney Seahorse [66240]		Species or species habitat likely to occur within area
Histiogamphelus briggsii Crested Pipefish, Briggs' Crested Pipefish, Briggs' Pipefish [66242]		Species or species habitat may occur within area
Histiogamphelus cristatus Rhino Pipefish, Macleay's Crested Pipefish, Ring-back Pipefish [66243]		Species or species habitat may occur within area
Hypselognathus rostratus Knifesnout Pipefish, Knife-snouted Pipefish [66245]		Species or species habitat may occur within area
Kaupus costatus Deepbody Pipefish, Deep-bodied Pipefish [66246]		Species or species habitat may occur within area
Kimblaeus bassensis Trawl Pipefish, Bass Strait Pipefish [66247]		Species or species habitat may occur within area
Leptoichthys fistularius Brushtail Pipefish [66248]		Species or species habitat may occur within area
Lissocampus caudalis Australian Smooth Pipefish, Smooth Pipefish [66249]		Species or species habitat may occur within area
Lissocampus runa Javelin Pipefish [66251]		Species or species habitat may occur within area
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area
Mitotichthys semistriatus Halfbanded Pipefish [66261]		Species or species habitat may occur within area
Mitotichthys tuckeri Tucker's Pipefish [66262]		Species or species habitat may occur within area
Notiocampus ruber Red Pipefish [66265]		Species or species habitat may occur within area
Phycodurus eques Leafy Seadragon [66267]		Species or species habitat may occur within area
Phyllopteryx taeniolatus Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Pugnaso curtirostris Pugnose Pipefish, Pug-nosed Pipefish [66269]		Species or species habitat may occur within area
Solegnathus robustus Robust Pipehorse, Robust Spiny Pipehorse [66274]		Species or species habitat may occur within area
Solegnathus spinosissimus Spiny Pipehorse, Australian Spiny Pipehorse [66275]		Species or species habitat may occur within area
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
Stigmatopora argus Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area
Stipecampus cristatus Ringback Pipefish, Ring-backed Pipefish [66278]		Species or species habitat may occur within area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Urocampus carinirostris Hairy Pipefish [66282]		Species or species habitat may occur within area
Vanacampus margaritifer Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area
Vanacampus phillipi Port Phillip Pipefish [66284]		Species or species habitat may occur within area
Vanacampus poecilolaemus Longsnout Pipefish, Australian Long-snout Pipefish, Long-snouted Pipefish [66285]		Species or species habitat may occur within area
Mammals		
Arctocephalus forsteri Long-nosed Fur-seal, New Zealand Fur-seal [20]		Species or species habitat may occur within area
Arctocephalus pusillus Australian Fur-seal, Australo-African Fur-seal [21]		Species or species habitat likely to occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour known

Name	Threatened	Type of Presence
		to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area

Whales and other Cetaceans [Resource Information]

Name	Status	Type of Presence
Mammals		
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera bonaerensis Antarctic Minke Whale, Dark-shoulder Minke Whale [67812]		Species or species habitat likely to occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Berardius arnuxii Arnoux's Beaked Whale [70]		Species or species habitat may occur within area
Caperea marginata Pygmy Right Whale [39]		Foraging, feeding or related behaviour likely to occur within area
Delphinus delphis Common Dophin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat known to occur within area
Globicephala macrorhynchus Short-finned Pilot Whale [62]		Species or species habitat may occur within area
Globicephala melas Long-finned Pilot Whale [59282]		Species or species habitat may occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Hyperoodon planifrons Southern Bottlenose Whale [71]		Species or species habitat may occur within area
Kogia breviceps Pygmy Sperm Whale [57]		Species or species habitat may occur within area
Kogia simus Dwarf Sperm Whale [58]		Species or species habitat may occur within area

Name	Status	Type of Presence
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat likely to occur within area
Lissodelphis peronii Southern Right Whale Dolphin [44]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Mesoplodon bowdoini Andrew's Beaked Whale [73]		Species or species habitat may occur within area
Mesoplodon densirostris Blainville's Beaked Whale, Dense-beaked Whale [74]		Species or species habitat may occur within area
Mesoplodon ginkgodens Gingko-toothed Beaked Whale, Gingko-toothed Whale, Gingko Beaked Whale [59564]		Species or species habitat may occur within area
Mesoplodon grayi Gray's Beaked Whale, Scamperdown Whale [75]		Species or species habitat may occur within area
Mesoplodon hectori Hector's Beaked Whale [76]		Species or species habitat may occur within area
Mesoplodon layardii Strap-toothed Beaked Whale, Strap-toothed Whale, Layard's Beaked Whale [25556]		Species or species habitat may occur within area
Mesoplodon mirus True's Beaked Whale [54]		Species or species habitat may occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat likely to occur within area
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area
Pseudorca crassidens False Killer Whale [48]		Species or species habitat likely to occur within area
Tasmacetus shepherdi Shepherd's Beaked Whale, Tasman Beaked Whale [55]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area
Ziphius cavirostris Cuvier's Beaked Whale, Goose-beaked Whale [56]		Species or species habitat may occur within area

Australian Marine Parks [Resource Information]

Name	Label
Beagle	Multiple Use Zone (IUCN VI)
East Gippsland	Multiple Use Zone (IUCN VI)

Extra Information

State and Territory Reserves [Resource Information]

Name	State
Ben Boyd	NSW
Cape Conran Coastal Park	VIC
Cape Howe	VIC
Croajingolong National Park	VIC
Montague Island	NSW
Nadgee	NSW
Rame Head	VIC

Regional Forest Agreements [Resource Information]

Note that all areas with completed RFAs have been included.

Name	State
East Gippsland RFA	Victoria
Eden RFA	New South Wales
Gippsland RFA	Victoria
Southern RFA	New South Wales

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Alauda arvensis Skylark [656]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Carduelis chloris European Greenfinch [404]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Turdus philomelos Song Thrush [597]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Asparagus aethiopicus Asparagus Fern, Ground Asparagus, Basket Fern, Sprengi's Fern, Bushy Asparagus, Emerald		Species or species habitat likely to occur

Name	Status	Type of Presence
Asparagus [62425]		within area
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Asparagus scandens Asparagus Fern, Climbing Asparagus Fern [23255]		Species or species habitat likely to occur within area
Carrichtera annua Ward's Weed [9511]		Species or species habitat may occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera subsp. rotundata Bitou Bush [16332]		Species or species habitat likely to occur within area
Cytisus scoparius Broom, English Broom, Scotch Broom, Common Broom, Scottish Broom, Spanish Broom [5934]		Species or species habitat likely to occur within area
Eichhornia crassipes Water Hyacinth, Water Orchid, Nile Lily [13466]		Species or species habitat likely to occur within area
Genista monspessulana Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Nassella neesiana Chilean Needle grass [67699]		Species or species habitat may occur within area
Nassella trichotoma Serrated Tussock, Yass River Tussock, Yass Tussock, Nassella Tussock (NZ) [18884]		Species or species habitat likely to occur within area
Olea europaea Olive, Common Olive [9160]		Species or species habitat may occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur

Name	Status	Type of Presence
		within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Senecio madagascariensis Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area
Ulex europaeus Gorse, Furze [7693]		Species or species habitat likely to occur within area

Nationally Important Wetlands

[Resource Information]

Name	State
Corner Inlet	VIC
Mallacoota Inlet Wetlands	VIC
Thurra River	VIC

Key Ecological Features (Marine)

[Resource Information]

Key Ecological Features are the parts of the marine ecosystem that are considered to be important for the biodiversity or ecosystem functioning and integrity of the Commonwealth Marine Area.

Name	Region
Big Horseshoe Canyon	South-east
Upwelling East of Eden	South-east
Canyons on the eastern continental slope	Temperate east
Shelf rocky reefs	Temperate east

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-35.357641 150.499004,-35.3666 150.488017,-35.357641 150.499004,-35.60813 150.663798,-35.804394 150.520976,-35.937933 150.564922,-35.955722 150.740703,-36.230926 150.916484,-36.275224 150.83958,-36.097883 150.707744,-36.159998 150.608867,-36.593424 150.83958,-36.690392 150.729716,-37.0332 150.872539,-37.199652 150.50999,-37.269627 150.520976,-37.322066 150.652812,-37.505314 150.564922,-37.731571 150.71873,-38.190651 151.971172,-38.164742 150.982402,-38.095606 150.707744,-38.268323 150.707744,-38.182016 150.586894,-38.242441 150.50999,-38.164742 150.499004,-38.199285 150.092509,-38.475041 150.147441,-38.397591 150.070537,-38.406201 149.982646,-38.560999 149.861797,-38.526628 149.795879,-38.285572 149.938701,-38.216551 149.675029,-38.38898 149.554179,-38.216551 149.609111,-38.251069 149.411357,-38.380368 149.367412,-38.423417 149.147685,-38.595354 148.895,-38.801136 148.763164,-39.074591 148.741191,-39.15131 149.070781,-39.185381 148.905986,-38.98925 148.345683,-38.98925 148.136943,-38.920903 148.125957,-38.937996 147.664531,-38.869599 147.664531,-38.869599 147.543681,-39.15131 147.499736,-39.236455 147.356914,-38.98071 147.148173,-39.414925 146.576884,-39.380966 146.554912,-38.758314 147.049297,-38.920903 146.554912,-38.852489 146.576884,-38.138824 147.642558,-38.043712 147.796367,-38.026405 147.719463,-37.835765 148.257793,-37.835765 148.752177,-37.80105 148.785136,-37.783686 149.488261,-37.688114 149.707988,-37.557589 149.773906,-37.540168 149.938701,-37.487881 149.982646,-37.444281 150.004619,-37.357005 149.960673,-37.304591 150.004619,-37.287111 149.982646,-37.243394 149.982646,-37.260884 150.048564,-37.129612 150.026591,-37.068273 149.960673,-36.892747 149.960673,-36.857593 150.070537,-36.071247 150.224345,-35.991286 150.400127,-35.955722 150.38914,-35.946828 150.268291,-35.920141 150.191386,-35.813304 150.268291,-35.545581 150.466045,-35.357641 150.499004

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-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
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-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

Department of the Environment
GPO Box 787
Canberra ACT 2601 Australia
+61 2 6274 1111

Esso Australia Resources Pty Ltd

EMERGENCY RESPONSE IMPACTS AND RISKS

BASS STRAIT ENVIRONMENT PLAN

Volume 3

Document Number: AUGO-EV-EMM-003

OIMS MANUAL - DOCUMENT CONTROL DETAILS

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REVISION STATUS:	Issued to NOPSEMA for acceptance
DATE OF ISSUE:	19 August 2019
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OIMS DOCUMENT CATEGORY:	Special Controls Mandatory
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APPROVALS:

Rev 0	Name	Position	Signature	Date
Prepared by:	Dawn Forsyth	Env & Reg. Advisor		
Endorsed By:	Carolyn Thomas	Offshore RER Supervisor	On File	
Document Owner:	Carolyn Thomas	Offshore Risk, Env. & Regulatory Supervisor		
Approved By	Simon Kemp	Offshore Asset Manager	On File	

Endorsed / approved by Esso Australia Pty Ltd, for and on behalf of Esso Australia Resources Pty Ltd.

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DOCUMENT REVIEW AND UPDATE:

The Document Owner is responsible for maintaining and controlling changes to this document in accordance with the Document Management Manual (AUGO-PO-DMM-001). In the course of using this document, users may identify opportunities to improve its content. They are requested to provide suggestions to the Document Owner.

This document should be reviewed for accuracy and currency on a 5 yearly basis commencing from the original formal issue date. Major revisions to this manual are to comply with the OIMS System Manual/Process Management of Change procedures.

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Abbreviations

ADIOS	Automated Data Inquiry for Oil Spills
AHS	Australian Hydrographic Service
ALARP	As Low As Reasonably Practicable
AMOSC	Australian Marine Oil Spill Centre
AMSA	Australian Maritime Safety Authority
APPEA	Australian Petroleum Production and Exploration Association
BBMT	Barry Beach Marine Terminal
BOP	Blowout Preventer
CSV	Construction Support Vessel
C&R	Containment and Recovery
DAWR	Department of Agriculture and Water Resources
DELWP	Department of Environment, Land, Water and Planning Victoria
DNA	Deoxyribonucleic Acid
DPAW	Department of Parks and Wildife
EMBSI	ExxonMobil Biomedical Sciences
EMPLAN	NSW State Emergency Management Plan
EP	Environment Plan
EPA	Environmnetal Protection Agency
EPBC	Environmental Protection and Biodiversity Conservation Act
EPO	Environmental Performance Objectives
EPS	Environmental Performance Standards
ERT	Emergency Response Team
ESD	Ecologically Sustainable Development
FWADC	Fixed Wing Aerial Dispersant Contract
GIS	Global Information System
IMO	International Maritime Organisation
IMT	Incident Management Team
IPECA	International Petroleum Industry Environmental Conservation Association
ITOPF	International Tanker Owners Pollution Fund
JRCC	Joint Rescue Coordination Centre
KSAT	Kongsberg Satellite Services
MARPOL	International Convention for the Prevention of Pollution from Ships
MoU	Memorandum of Understanding
NAF	Non Aqueous Fluid
NATA	National Association of Testing Authorities
NEBA	Net Environmental Benefit Analysis

NOPSEMA	National Offshore Petroleum Safety and Environmental Management Authority
NRDA	Natural Resource Damage Assessment
NSW	New South Wales
OIMS	Operations Integrity Management System (OIMS) Objectives.
OPEP	Oil Pollution Emergency Plan
OPGGS Act	Offshore Petroleum and Greenhouse Gas Storage Act 2006
OPGGS(E)R	Offshore Petroleum and Greenhouse Gas Storage Environment Regulations 2009
(OPGGS(S))	Offshore Petroleum and Greenhouse Gas Storage Regulations
OSMP	Operational and Scientific Monitoring Program
OSR	Oil Spill Response
OSRL	Oile Spill response Limited
OWR	Oiled Wildlife Response
PSZ	Petroleum Safety Zone
ROC	Oil Retained On Cuttings
ROV	Remotely Operated Vehicle
RPS	RPS Group PLC
SCAT	Shoreline Clean-up Assessment Technique
SFRT	Subsea First Response Toolkit
SOLAS	Safety of Life At Sea
SMEP	Victorian State Maritime Emergencies (non-search and rescue) Plan
SSDI	Subsea Dispersant Injection
Tas	Tasmania
TasPlan	Tasmanian Marine Oil Spill Contingency Plan
TasPorts	Tasmanian Ports Corporation
TRP	Tactical Response Plans
Vic	Victoria
VOC	Volatile Organic Compounds
WCDS	Worst Credible Discharge Scenario
WildPlan	Tasmanian Oiled Wildlife Response Plan

1. Introduction

This volume of the Environment Plan describes potential response options available for an oil spill occurring from any of Esso's activities within Gippsland Basin. It also assesses potential environmental impacts resulting from implementing response options in accordance with Regulation 13 (6) of the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations (OPGGS(E) Regulations) and evaluates Esso's capability to mobilise each response option in accordance with Regulation 14 (8AA). This volume does not select the type of response required for specific oil types e.g. Marine Diesel Oil, condensate, or crude; guidelines for selection of response can be found in the OPEP.

The Oil Pollution Emergency Plan (OPEP) details the initial and ongoing actions to take following a spill incident, the response framework and organization structure, and step by step guides for key roles and responsibilities. The OPEP is an operational document which provides the response resources available for all levels of incidents, tools for spill response assessment, timeframes to initiate a response, notifications, and steps for response escalation, monitoring and stand down.

The Oil Spill Monitoring Plan (OSMP) outlines environmental monitoring that may be implemented in the event of an oil spill to the marine or coastal environment. Information from oil spill monitoring enables the Incident Management Team (IMT) to make informed decisions regarding response options. Oil spill monitoring provides the principle tools for determining the extent, severity and persistence of environmental impacts from a hydrocarbon spill and associated response and/or remediation activities.

2. Overview of Emergency Oil Spill Response Strategies

In an oil spill event, response options and tactics employed will vary depending on a number of factors related to the specific spill incident including: oil types, volumes, location of spill and whether it is a discrete spill or an ongoing flow.
The main response options are listed below:

- Source Control;
- Surveillance and Monitoring;
- Application of Dispersant;
- Containment & Recovery (Offshore and Nearshore);
- In-situ Burning;
- Shoreline Protection and Clean-up; and
- Oiled Wildlife Response.

An effective response strategy may require a combination of different response options and may be scaled up or down depending on the oil spill event.

2.1 Net Environmental Benefit Analysis

The process of comparing the advantages and disadvantages of different oil spill responses is termed Net Environmental Benefit Analysis (NEBA). Esso has developed a preliminary NEBA for the Gippsland Basin to assist the development of Environment Plans. A summary of the NEBA is provided in the OPEP. The NEBA process takes into account the circumstances of the spill, the practicalities of clean-up response, the relative impacts of oil and clean-up options and considers relative social, economic and environmental factors.

In a spill event, an incident specific NEBA will be developed as part of the incident response and will consider location, oil type, priorities for protection, potential impacts and preferred response strategies. The event specific NEBA will use incident-specific trajectory modelling and real-time conditions to determine the most appropriate incident-specific response. The OPEP provides detailed response resources and the NEBA will inform and assist the IMT when making decisions during the response.

2.2 Environmental Impact Assessment of Oil Spill Response Options

All oil spill response activities are implemented with the aim of reducing the overall environmental impact of the spill however, each activity in itself can also impact the environment. Therefore it is important to understand impacts, assess the level and acceptability of impacts, and reduce impacts to as low as reasonably practicable (ALARP).

After identifying and describing the possible response options, an assessment was carried out to identify environmental receptors and potential interactions between the response activities and the receiving environment. The environmental receptors identified as occurring in the area are described in the Description of Environment Volume 1. The environmental aspects associated with each oil spill response option were identified as shown in Table 2-1.

Based upon an understanding of the environmental aspects, potential impacts were defined and ecological and social receptors identified enabling a systematic evaluation to be undertaken. Many aspects align with those already described in Volume 2 (e.g. aspects associated with vessels), therefore this volume only evaluates aspects that are unique to oil spill response (refer to Table 2-1).

Table 2-1 Environmental Impact Screening of Response Options

Response Strategies	Environmental Aspect	Environmental Impact Assessment
• Source Control • Monitoring and Surveillance • Dispersant Application • Containment and Recovery • In situ Burning • Shoreline Protection and Clean-up • Oiled Wildlife Response	Emissions to Air	See Volume 2
• Source Control • Monitoring and • Surveillance • Dispersant Application • In situ Burning	Physical Interaction - Other Marine Users	See Volume 2
• Containment and Recovery • Shoreline Protection and Clean-up • Oiled Wildlife Response	Physical Interaction - Nearshore and Shoreline Users	Detailed assessment within this section.
• Source Control • Monitoring and Surveillance • Dispersant Application • Containment and Recovery • In situ Burning	Planned Discharge – Treated Bilge	See Volume 2
• Source Control	Planned Discharge - Cement	See Volume 2
• Source Control • Monitoring and Surveillance • Dispersant Application • Containment and Recovery • In situ Burning	Planned Discharge - Deck Drainage	See Volume 2
• Source Control	Planned Discharge - Drilling Muds & Cuttings	See Volume 2
• Source Control	Planned Discharge - Food waste	See Volume 2

• Monitoring and Surveillance • Dispersant Application • Containment and Recovery • In situ Burning		
• Source Control	Planned Discharge - Operational Fluids (surface and subsurface)	See Volume 2
• Source Control • Monitoring and Surveillance • Dispersant Application • Containment and Recovery • In situ Burning	Planned Discharge - Sewage and Greywater	See Volume 2
• Source Control	Physical Presence - Seabed Disturbance	See Volume 2
• Source Control • Dispersant Application	Sound Emissions	See Volume 2
• Dispersant Application •	Planned Discharge – Toxicity of dispersant and dispersed oil	Detailed assessment within this section.
• Containment and Recovery • Shoreline Protection and Clean-up • Oiled Wildlife Response	Physical Interaction with Fauna and Flora (Onshore)	Detailed assessment within this section.
• In Situ Burning	Emissions to Air (Smoke)	Detailed assessment within this section.

2.3 Capabilities of Oil Spill Response Options

There are many components to consider when mobilising an oil spill response option. Each response option will require specialist resources, large numbers of personnel and global agreements to supply equipment and ongoing capabilities. Esso has considered the resources available to mobilise each response option and assessed the volume of resources available against the worst case credible scenario for the Gippsland Basin to ensure they are adequate and acceptable.

A review capabilities has been undertaken and environmental performance outcomes and standards identified to ensure resources remain current and available to respond to an oil spill event. The Environmental Performance Outcomes, Standards and Measurement Criteria are detailed in Volume 4 of the EP and will be monitored and reported as per the implementation strategy.

3. Source Control

3.1 Response Option Description

Source control activities are implemented to prevent or minimise the release of hydrocarbons into the marine environment. The response is reactive and depends on the source of the spill. The release of hydrocarbons may occur from one of the following scenarios:

- Operational spills (overfills, transfers and process equipment and drains system);
- Storage tank or piping leak/rupture;
- Pipeline leak/rupture;
- Well blowout (surface and subsea).

The origin and nature of hydrocarbon spill will determine the type of source control activities required and the duration of the response. Source control activities may include:

- Isolation of tanks / pipes;
- Remote Operated Vehicle (ROV) intervention;
- Well capping; and
- Relief well.

The source of the spill will be assessed and evaluated by the offshore Emergency Response Team (ERT) and onshore Incident Management Team (IMT) on a case by case basis. The origin and nature of the spill (wells, pipeline or vessel) and metocean conditions will prescribe the source control response options selected based on technical feasibility.

3.1.1 Isolation of Tanks /Pipes

Isolation provides a way for separating process systems and equipment from one another and may be used to prevent flow of hydrocarbons. Many types of isolations exist on subsea infrastructure, pipelines, wells and vessels.

3.1.2 Remote Operated Vehicle (ROV) Intervention

ROVs can be used subsea to inspect the condition of wellheads, pipelines and subsea equipment and have arms which may be used to manipulate valves and manually isolate equipment. Specialist ROVs can be fitted with a range of equipment including: debris clearing tools, specialist tooling, subsea dispersant spraying capabilities, cameras and cutting tools.

3.1.3 Well Capping Stack

A “capping stack” is a piece of equipment that is placed over the blown-out well as a “cap.” Its purpose is to stop or redirect the flow of hydrocarbons, establishing a barrier to the marine environment. Once subsea, the capping stack is installed on the well bore and interconnected to additional subsea equipment to begin the process of containing the well. The capping stack provides a safe barrier until the well can be permanently sealed. This option will require the use of a Construction Support Vessel (CSV) to install the capping stack.

3.1.4 Relief Well

A relief well is constructed like a standard well, and is directionally drilled to intersect the original well to allow specialised fluids to be pumped into the well to overcome reservoir pressure and stop the flow of the original well.

3.2 Environmental Impact Assessment of Source Control Response

Environmental aspects associated with implementing source control activities were identified and evaluated in Table 3-1. All associated environmental impacts have been described and assessed within Volume 2. Further assessment of the acceptability of these impacts in an oil spill response context and controls identified for minimising the environmental impact of mobilising a source control response are described below. The Environmental Performance Outcomes, Standards and Measurement Criteria for these controls are detailed in the OPEP for implementation in a response.

Table 3-1 Acceptability of Environmental Impact from Source Control

Factor	Demonstration Criteria	Criteria Met	Rationale
Principles of Ecologically Sustainable Development (ESD)	No potential to affect biological diversity and ecological integrity (i.e. Consequence Level is not I).	✓	All aspects related to source control activities are assessed in Volume 2 and have been evaluated as having the potential to result in a Level IV consequence.
	Activity does not have the potential to result	✓	All oil spill response activities are implemented with the aim of reducing the overall environmental

	in serious or irreversible environmental damage.		impact. Source control activities are necessary to stop the flow of oil and minimise safety risks and environmental damage. Impacts associated with source control are offset by the broader positive effects of reducing the impact of a spill incident on coastal and marine sensitivities and socio-economic receptors (e.g. fishing, tourism).
Legislative and Other Requirements	Legislative and other requirements have been identified and met.	✓	All source control activities will comply with:The Offshore Petroleum and Greenhouse Gas Storage (Resource Management and Administration) Regulations 2011 requirements for NOPSEMA approved Well Operations Management Plans (WOMP). • The Offshore Petroleum and Greenhouse Gas Storage (Safety) Regulations 2009 (OPGGS(S)) requirements for NOPSEMA approved facility Safety Case. • Protection of the Sea (Prevention of Pollution from Ships) Act 1983. • Navigation Act 2012. • Marine Order 96 (Marine pollution prevention – sewage) 2013. • Marine Order 95 (Marine pollution prevention - garbage) 2013.
Internal Context	Consistent with Esso's Environment Policy.	✓	Proposed control measures are consistent with Esso's Environment Policy, in particular, to "comply with all applicable environmental laws and regulations and apply responsible standards where laws and regulations do not exist".
	Meets ExxonMobil Environmental Standards.	✓	Proposed controls meet the requirements of the ExxonMobil Drilling Emergency Preparedness and Response Manual.
	Meets ExxonMobil Operations Integrity Management System (OIMS) Objectives.	✓	Proposed control measures meet: • OIMS System 6-5 objective to identify and assess environmental aspects; significant aspects are addressed and controlled consistent with policy and regulatory requirements; and • OIMS System 8-1 objective to clearly define and communicate OI requirements to contractors. • OIMS System 10-2 objective to ensure effective response to emergencies and business disruptions that threaten the safety, security and health of the public, contractors and employees, the environment, asset integrity, and critical business operations
External Context	Stakeholder concerns have been considered / addressed through the consultation process.	✓	No specific stakeholder concerns have been raised.

Table 3-2 ALARP Demonstration of Environmental Impacts from Source Control

ALARP Decision Context and Justification	Decision Context A. Source control equipment and resources (ROVs, capping stacks, vessels and rigs for relief well drilling) are standard practices that have been accepted for use in the Australian and International Offshore Petroleum Industry in the event of a hydrocarbon spill. Impacts associated with source control activities are well understood and source control response activities have iniciated and managed by industry previously Source control activities are aligned with company and partner values. Good Practice control(s) have been identified to ensure environmental impacts associated with implementing this response are reduced to ALARP, these controls will be implemented in a response scenario and have been included in the OPEP. Esso believes ALARP Decision Context A should apply.		
Good Practice	**Adopted**	**Control**	**Rationale**
Vessel compliant with MARPOL Annex I, IV, V and VI as appropriate to vessel class.	✓	Vessel Class Certification.	The vast majority of commercial ships are built to and surveyed for compliance with the standards (i.e. Rules) laid down by classification societies. The role of vessel classification and classification societies has been recognised by the International Maritime Organisation (IMO) across many critical areas including the International Convention for the Safety of Life at Sea, (SOLAS), the 1988 Protocol to the International Convention on Load Lines and the International Convention for the Prevention of Pollution from Ships (MARPOL).
AMSA JRCC notified before operations commence to enable AMSA to distribute an AUSCOAST warning.	✓	Pre-start Notification.	Under the Navigation Act 2012, the Australasian Hydrographic Society is responsible for maintaining and disseminating hydrographic and other nautical information. Details for AUSCOAST warning will be provided to the JRCC (24<48 hours) prior to commencing operations.
All planned drilling discharges are evaluated in accordance with the Chemical Discharge Assessment Process.	✓	Chemical Discharge Assessment Process.	All cements, drill fluids, additives and/or their components planned for discharge are evaluated as acceptable.
Cuttings are treated to reduce Residual Oil on Cuttings (ROC).	✓	Solids Control Equipment.	It is industry standard practice to remove Non Aqueous Fluid (NAF) muds from cuttings using a combination of shale shakers, cuttings driers and/or centrifuges to minimise the residual oil on cuttings.

3.3 Capability Assessment of Source Control

A detailed capability assessment has been undertaken to ensure that Esso has access to sufficient resources to complete source control activities in a timely manner. The assessment concluded sufficient resources are available within acceptable timeframes to conduct this response.
This section summarises outcomes of the capability assessment.

Table 3-3 Source Control Resource Availability

Activity	Resource Required	Resource Availability	Expected Timeframes
Specialist ROV	1 ROV for subsea / well / pipelines intervention / SFRT and surveillance.	Resource Agreements in place with ROV specialists.	Estimated 5 days from call out request to arrival in Victoria.
Construction Support Vessel (CSV)	1 CSV to assist in source control activities: Lifting capping stack; Specialist ROV subsea/ well /pipelines interventions; and Vessel salvage.	Resource A construction support vessel sourced from the Australasia.	Estimated 32 days from spill occurring to arrival in field.
Capping Stack	1 capping stack per well.	Resource Agreements with Capping Stack suppliers.	Estimated 79 days from mobilisation to installation of capping stack System.
Relief Well	1 rig per relief well.	Resource A rig will be mobilised from the Australasian region.	Estimated 98 days to drill the relief well.

Table 3-4 Source Control Capabilities

Good Practice	Adopted	Control	Rationale
Established Incident Management Team.	✓	Esso Incident Management Team (IMT).	Esso's IMT includes trained personnel able fulfil Incident Commander, Operations Section Chief, Planning Section Chief, Logistics Section Chief, Safety Officer, Source Control Branch Director and Environmental Unit Lead roles.
Pre-arranged agreement with ROV provider.	✓	Agreements with ROV providers.	ExxonMobil's global agreements provides Esso with access to ROVs.
For Rig Activities: Identification of suitable support vessels and their location prior to the commencement of rig activities.	✓	Support vessel identification process.	Support vessel identification process enables understanding of the availability of suitable vessels which may reduce response time.

Pre-arranged access to Subsea First Response Toolkit (SFRT).	✓	Agreement with AMOSC for SFRT.	The agreements with AMOSC provide access to SFRT designed with the following capabilities: Survey and provide a detailed image of condition of subsea infrastructure Ability for subsea intervention Ability to prepare subsea well / BOP for the running of a capping stack Application of subsea dispersant.
Pre-arranged access to Capping Stack equipment.	✓	Agreements with Capping Stack suppliers.	The agreements with capping stack suppliers provide options of sourcing a capping stack from overseas to implement the response option.
Ability to access drilling rigs in an emergency event.	✓	MoU with APPEA.	APPEA Memorandum of Understanding (MoU) states that signatories will make best endeavours to make drilling units available for transfer between operators when requested for emergency response.

Table 3-5 Engineering Risk Assessment – Additional Capabilities

Engineering Risk Assessment – Additional Capabilities			
Additional, Alternative, Improved Controls	**Benefit**	**Cost / Feasibility**	**Adopted**
Standby rig	A rig on standby may reduce the time required to drill a relief well.	A standby rig would effectively double the cost of the drilling campaign. Given the high potential costs to the program, implementing this control measure is considered grossly disproportionate, given that the source control event has an extremely low likelihood of occurrence.	Not adopted.
Standby construction vessel	A standby vessel may reduce the time required to drill a relief well.	Significant costs are associated with leasing a suitable vessel. Given the high potential costs to the program, implementing this control measure is considered grossly disproportionate, given that the source control event has an extremely low likelihood of occurrence.	Not adopted.
Capping stack available in Australia	A locally available capping stack may reduce the number of days of an uncontrolled well blow out.	Significant costs associated with leasing an additional capping stack.	Not adopted.

		The equipment is available for each operator globally and is strategically located to ensure quick deployment anywhere in the world. Given the high potential costs to the program, implementing this control measure is considered grossly disproportionate, given that the source control event has an extremely low likelihood of occurrence.	
Capping Stack shipped to Melbourne	Potential to reduce the number of days until the well can be controlled (vs. relief well drilling)	A capping stack is available in Singapore and can be fitted on to a skid and shipped. Note: this control measure depends on local availability of a suitable Construction Support Vessel near Singapore.	Adopted.
Capping Stack flown to Melbourne.	Potential to reduce the number of days until the well can be controlled (vs shipping capping stack or drilling relief well).	Capping stacks are available internationally and could be flown to Melbourne. The capping stack may have to be dissembled for transport and reassembled prior to loading onto a vessel. This may result in similar timing as shipping option. Note: This control measure depends on a suitable Construction Support Vessel to be available locally.	Adopted.

4. Surveillance and Monitoring

4.1 Response Option Description

Surveillance and monitoring activities are essential in an oil spill response strategy to characterise and quantify volumes and determine the movement of the slick. This information is fundamental to mobilising an effective oil spill response strategy and critical in determining the scale and nature of the oil spill incident.

To understand the scale and fate of the oil, the spill should be observed as soon as possible and monitored throughout the response until the decision has been made to stand down.

A variety of surveillance and monitoring techniques can be used to gather information required to support the ongoing response. These may include:

4.1.1 Aerial and/or vessel observation

Aerial and vessel observation provides the IMT with real time data of magnitude, direction of travel, and visual characteristics of surface oil. This information can be used in response planning and forming the incident specific NEBA.

4.1.2 Computer-based modelling software

Computer software can generate maps that show predictions for the path of the oil spill. It can also forecast the effects that currents, winds, and other physical processes have on the movement of oil in the ocean. This information can be used in response planning and the incident specific NEBA.

4.1.3 Utilisation of satellite tracking buoys

Satellite tracking buoys provide real time current data to use to predict forecasts of surface behaviour of the oil and direction of travel.

4.1.4 Remote sensing from aircraft and/or satellites

Airborne remote sensing equipment supplements visual observations by using sensors which detect radiation outside of the visible spectrum.

Satellite imagery can provide real time imagery over large areas and assist with determining the movement of the slick and determining response activities

4.1.5 Water quality and oil sampling

Water sampling will confirm the properties of oil. These details can be inputted into computer based modelling for increased accuracy and assist with determining response activities.

When oil enters the marine environment, a proportion of it will float and spread out on the sea surface where it will be influenced by the wind and ocean currents. In some situations, where natural dispersion and weathering processes are considered the most appropriate response, surveillance and monitoring may be the primary response strategy.

In this case, the response will monitor the oil as it undergoes the natural weathering processes of evaporation and dispersion, in which wind and wave action breaks the oil into small droplets in the water column increasing bioavailability and allowing the oil to be naturally degraded. Higher levels of surveillance such as vessel/aircraft surveillance, oil spill trajectory modelling and deployment of satellite tracking drifter buoys are options to be considered for Level 2/3 spills given the nature and scale of the spill risk.

4.2 Environmental Impact Assessment of Surveillance and Monitoring Response

Environmental aspects associated with surveillance and monitoring were identified and evaluated in Table 4-1. All associated environmental impacts have been described and assessed within Volume 2. Further assessment of the acceptability of these impacts in an oil spill response context and controls identified for minimising the environmental impact of surveillance and monitoring activities are described below. The Environmental Outcomes, Performance Standards and Measurement Criteria for these controls are detailed in the OPEP for implementation in a response.

Table 4-1 Acceptability of Environmental Impacts from Surveillance and Monitoring

Factor	Demonstration Criteria	Criteria Met	Rationale
Principles of Ecologically Sustainable Development (ESD)	No potential to affect biological diversity and ecological integrity (i.e. Consequence Level is not I).	✓	All aspects related to surveillance and monitoring activities are assessed in Volume 2 and have been evaluated as having the potential to result in a Level IV consequence.
	Activity does not have the potential to result in serious or irreversible environmental damage.	✓	All oil spill response activities are implemented with the aim of reducing the overall environmental impact. Surveillance and monitoring response activities are critical in determining the scale and nature of the oil spill incident. This information is fundamental to mobilising an effective oil spill response strategy to minimise potential

			environmental damage from a spill incident.
Legislative and Other Requirements	Legislative and other requirements have been identified and met.	✓	The proposed control measures align with the requirements of: • OPGGS Act 2006; • Protection of the Sea (Prevention of Pollution from Ships) Act 1983; • Navigation Act 2012 – Chapter 4 (Prevention of Pollution); • Marine Order 96 (Marine pollution prevention – sewage) 2013; and • Marine Order 95 (Marine pollution prevention - garbage) 2013.
Internal Context	Consistent with Esso's Environment Policy.	✓	Proposed control measures are consistent with Esso's Environment Policy, in particular, to "comply with all applicable environmental laws and regulations and apply responsible standards where laws and regulations do not exist".
	Meets ExxonMobil Environmental Standards.	✓	There is no standard related to the Surveillance and Monitoring however the controls proposed meet the strategic objectives of the Upstream Environmental Standards.
	Meets ExxonMobil Operations Integrity Management System (OIMS) Objectives.	✓	Proposed control measures meet: • OIMS System 6-5 objective to identify and assess environmental aspects; significant aspects are addressed and controlled consistent with policy and regulatory requirements; and • OIMS System 8-1 objective to clearly define and communicate OI requirements to contractors. • OIMS System 10-2 objective to ensure effective response to emergencies and business disruptions that threaten the safety, security and health of the public, contractors and employees, the environment, asset integrity, and critical business operations.
External Context	Stakeholder concerns have been considered / addressed through the consultation process.	✓	No specific stakeholder concerns have been raised.

Table 4-2 ALARP Demonstration of Environmental Impacts from Surveillance and Monitoring

ALARP Decision Context and Justification	Decision Context A. The potential environmental aspects associated with mobilising a Surveillance and Monitoring response have been evaluated and no new impacts have been identified. Surveillance and monitoring response activities are standard practices that are routinely used in the Australian and International Offshore Petroleum Industry as well as many other industries. Impacts associated with surveillance and monitoring are well understood and well implemented by the industry. Good Practice control(s) have been identified to ensure environmental impacts associated with mobilising this response are reduced to ALARP, these controls will be implemented in a response scenario and have been included in the OPEP. Esso believes ALARP Decision Context A should apply.		
Good Practice	**Adopted**	**Control**	**Rationale**
Vessel compliant with MARPOL Annex I, IV, V and VI as appropriate to vessel class.	✓	Vessel Class Certification	The vast majority of commercial ships are built to and surveyed for compliance with the standards (i.e. Rules) laid down by classification societies. The role of vessel classification and classification societies has been recognised by the International Maritime Organisation (IMO) across many critical areas including the International Convention for the Safety of Life at Sea, (SOLAS), the 1988 Protocol to the International Convention on Load Lines and the International Convention for the Prevention of Pollution from Ships (MARPOL).

Table 4-3 Engineering Risk Assessment

Additional, Alternative, Improved Controls	Benefit	Cost / Feasibility	Adopted
None Identified			

4.3 Capability Assessment of Surveillance and Monitoring

A detailed capability assessment has been undertaken to ensure that Esso has access to sufficient resources to complete surveillance and monitoring activities in a timely manner. The assessment concluded sufficient resources are available within acceptable timeframes to conduct this response.

This section summarises outcomes of the capability assessment.

Table 4-4 Surveillance and Monitoring Resource Availability

Activity	Resource Required	Resource Availability	Expected Timeframe
Visual Observation - Aerial Surveillance	1x observer per aircraft. Aircraft to have 100nm range and 3 hour duration.	Resource Esso helicopters can assist in aerial surveillance. Agreement with third party to provide fixed wing aircraft. AMSA Search and Rescue Aircraft. Personnel 4x Trained spill observers provided by Esso. Supplemented by AMOSC staff, AMOSC core group and OSRL.	Initial overflight <4 hours service requested. Trained observer <12 hours of spill occurring. Twice daily aerial surveillance. (*Note: Assumes good visibility, daylight hours and suitable flying conditions).*
Visual Observation – Vessel or Asset	An observer to conduct 2 hour watch from staffed assets.	Resource Platform /Drilling Rig /Vessel Personnel 1x Observer and /or available crew.	<2 hours, from time of spill.
Manual Oil Spill Trajectory Modelling	1x trained person.	Resource Trajectory vectoring. Relevant set of marine charts for Bass Strait. GIS mapping. Personnel IMT member trained trajectory vectoring. Internal Esso GIS mapping specialists.	<4 hours of service requested.
Oil Spill Trajectory Modelling	1x contract with specialist.	Resource AMOSC - Access to RPS modelling services. OSRL – Access to modelling services. ExxonMobil EMBSI (USA) – Access to modelling (available 24/7).	<4 hours of service requested.
ADIOS - Weathering Modelling	1x trained person.	Resource Automated Data Inquiry for Oil Spills 2 (ADIOS2) installed on IMT computers. Personnel IMT personnel trained in ADIOS.	<4 hours of the service requested.
Satellite Tracking Drifter Buoys	1x buoy available.	Resource 2x tracking buoys within 12 hours. 2x Tracking buoy available 24-48 hours.	Deployed <12 hrs of spill occurring (dependent on weather conditions) (Level 2 & 3 spill).
Remote Observation Using Satellite Imagery	1x contract with specialist.	Resource AMOSC agreement with KSAT. OSRL Agreement with Radiant Solutions. ExxonMobil Geospatial Emergency Response Service (available 24/7).	Initiated <24 hours of Level 3 spill occurring.

Initial Oil in Water Sampling	1x vessel. 1x initial sampling kit. 1x contract with laboratory.	Resource Vessel and crew (Esso). Initial Sampling kits available at various Esso locations. Personnel Field Service technician. Laboratory services and experienced analyst provided by NATA accredited lab as per OSMP.	Samples obtained <24 hrs of spill occurring. Analysis initiated <24 hours of receipt in laboratory. Results <5 days.
Ongoing Oil in Water Monitoring	1x vessel. 1x sampling services contract.	Resource Vessel contractor/ crew (Esso). Sampling services via environmental consultancy. Personnel Sampling services via environmental consultancy. Laboratory services and experienced analyst provided by NATA accredited lab as per OSMP.	Samples obtained 48 hours hrs of spill occurring. Analysis initiated <24 hours of receipt in laboratory Results within 5 days.

Table 4-5 Surveillance and Monitoring Capabilities

Good Practice	Adopted	Control	Rationale
• Pre-arranged access to helicopters for aerial surveillance.	✓	Esso helicopter fleet.	Esso owns and operates its own helicopter fleet that can be used for surveillance and monitoring.
• Pre-arranged access to fixed wing aircrafts for aerial surveillance.	✓	Arrangement with third party for provision of fixed wing aircraft.	Arrangement with third party enables provision of fixed wing aircraft.
• Pre-arranged access to vessels for Surveillance and Monitoring activities.	✓	Support vessel.	The support vessel that is used for ongoing Esso operations can be used for surveillance and monitoring.
	✓	Agreement with third party suppliers for provision of additional vessels.	Agreement with supplier of vessel services has provision for supply of additional vessels
• Pre-arranged access to trajectory modelling capabilities.	✓	Agreement with AMOSC for trajectory modelling.	Agreement with AMOSC, and the associated service level statement, includes provision for trajectory modelling.
• Pre-arranged access to satellite tracking buoys.	✓	Esso owned tracking buoys.	Esso owns satellite tracking buoys to enable quick deployment.
• Pre-arranged access to satellite imagery	✓	Agreements in place to access satellite imagery.	Agreements in place with satellite imagery provider enables access to satellite imagery services.
• Pre-arranged access to water testing services.	✓	Agreement with service provider for monitoring and sampling.	Agreement with third party service provider enables access to monitoring and sampling services.

Table 4-6 Engineering Risk Assessment

Additional, Alternative, Improved Controls	Benefit	Cost / Feasibility	Adopted
Night-time monitoring - infrared.	Enable night time monitoring of the location of oil on the water's surface.	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. Safety considerations may also restrict night time operations.	Not Adopted.
Initial sampling kits available on supply vessels and rigs.	Enable rapid sampling from supply vessels and rigs	• Sampling kits on-board vessels and rigs will enable rapid sampling of the oil. • The results from the testing will provide details of the oil properties and confirm the properties of oil, assist with source identification. • Results can be used in the modelling for increased accuracy and assist with determining response activities.	Adopted.

5. Dispersant Application

5.1 Response Option Description

Dispersants enhance the rate and extent of natural dispersion in an oil spill event. The surfactants in dispersant allow wave energy to rapidly breakdown the oil into small oil droplets. These droplets are pushed into the upper water column by wave action and maintained there by turbulence. The dispersed oil droplets are much more available to naturally-occurring, hydrocarbon-degrading microorganisms.

For maximum effectiveness, dispersants should be applied as close to the source and as soon as possible. Dispersant can be applied either subsea at the source of the spill or directly on the surface from aircraft or vessels.

5.1.1 Aircrafts

Aerial application of dispersant requires aircrafts to be fitted dispersant spraying equipment. For best effectiveness, aerial dispersant should be administered at steady airspeeds in low altitudes, generally 50 – 100ft above the sea level.

5.1.2 Vessels

Vessels can be fitted with dispersant spraying equipment for surface application. For best effectiveness the dispersant should applied to the thickest concentrations of oil.

5.1.3 ROVs

Vessels can be fitted with specialist ROVs that have Subsea Dispersant Injection (SSDI) capabilities for subsea dispersant application. SSDI treats oil released at the point of release which reduces the volume of dispersant required and can be applied continuously in all-weather scenarios.

Dispersants may be applied in a broad range of weather conditions including high winds and rough seas. Dispersants are only amenable to certain oil types and are generally not considered to be suitable for Type I and lighter Type II oils, including diesel. The oil type and the metocean conditions (e.g. temperature, wave height, swell) will dictate the effectiveness of dispersant application.

The main objectives of dispersant application are:

- Reduce environmental impacts;
- Rapidly reduce oil toxicity through dilution;
- Enhance the natural dispersion processes;
- Enhance natural microbial biodegradation;
- Minimise impacts to shoreline habitats;
- Reduce the requirement for shoreline clean up; and
- Reduce concentrations of Volatile Organic Compounds (VOCs) at the sea surface.

The decision whether or not to use dispersants will be made after considering the potential effects of dispersed oil versus undispersed oil. Dispersants will only be considered for use at specific locations/times where testing shows oil to be amenable and decision is supported by the site specific NEBA.

5.2 Approval of Use of Dispersant

In Commonwealth waters, Esso does not require additional approval for using dispersant, provided its been pre-approved by AMSA. Dispersant application within state waters must be approved by the state control agency prior to use.

5.2.1 Impact Assessment

Environmental aspects associated with implementing dispersant application were identified and evaluated in Table 5-1. An impact assessment has been undertaken and additional controls identified to minimise the environmental impacts associated with the Environmental Outcomes, Performance Standards and Measurement Criteria for these controls are detailed in the OPEP for implementation in a response.

Table 5-1 Aspect: Planned Discharge – Toxicity of Dispersant and Dispersed Oil

Affected Receptor	Impact Assessment	Consequence Level
Plankton	Plankton, specifically zooplankton, are vulnerable to hydrocarbons (Hook et al., 2016). Water column organisms that come into contact with oil and chemicals risk exposure through ingestion, inhalation and dermal contact (NRDA, 2012), which can cause immediate mortality or declines in egg production and hatching rates along with a decline in swimming speeds (Hook et al., 2016). Plankton are typically abundant in the upper layers of the water column and decline with depth. Once background water quality is re-established, plankton takes weeks to months to recover (ITOPF, 2011).	III
Benthic Habitats and Communities	Benthic invertebrates are potentially at risk of toxic impacts of exposure to in-water hydrocarbons. While exposure can lead to impacts including mortality, recovery of benthic invertebrates exposed to entrained hydrocarbons would be expected to return to background water quality conditions within weeks to months of contact. Several studies have indicated that rapid recovery rates may occur even in cases of heavy oiling (Burns et al., 1993; Dean et al., 1998). Acute or chronic exposure, through both surface contact, and/or ingestion can result in toxicological risks. However, the presence of an exoskeleton (e.g., crustaceans) will reduce the impact of hydrocarbon absorption through the surface membrane. Other invertebrates with no	IV

	exoskeleton and larval forms may be more prone to impacts from pelagic hydrocarbons. It is possible that injury or mortality associated with acute or chronic exposure could result in a slight alteration of the local habitat and community structure, however no long-term changes to ecosystem are expected.	
Fish	Exposure to dissolved / entrained hydrocarbons and chemicals in the water column can be toxic to fishes. 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 hydrocarbons, which reduces the risk of bioaccumulation (NRDA, 2012). Pelagic free-swimming fish and sharks are unlikely to suffer long-term damage from exposure because dissolved/entrained hydrocarbons in water are not expected to be sufficient to cause harm (ITOPF, 2010). Pelagic species are also generally highly mobile and as such are not likely to suffer extended exposure (e.g. >96 hours) at concentrations that would lead to chronic effects due to their patterns of movement.	III
Marine Reptiles	Marine turtles are vulnerable to the effects of oil at all life stages; eggs, hatchlings, juveniles, and adults. Marine turtles can be exposed to oil externally (e.g. swimming through oil slicks) or internally (e.g. swallowing the oil, consuming oil affected prey, or inhaling of volatile oil related compounds). While marine turtles, including threatened species, are known to occur in the area potentially exposed to dispersed and dissolved hydrocarbons they are not noted to reside or aggregate in significant numbers, and there are no recognised BIAs in the region. It should be noted that the threat and relative impacts of an oil / pollution on some marine reptile species are considered less damaging than other stressors. Report cards produced on protected marine reptiles in Australia generally ranked oil pollution as either 'not of concern' or 'of less concern' depending on the marine region (DSEWPAC 2012).	IV
Birds	No impacts are expected from entrained oil unless species are diving during feeding (e.g. terns, boobies).	IV
Mammals	Impacts to marine mammals are expected to be limited to diving species, and affect individuals only. Any injury or mortality from hydrocarbon exposure on an individual level will not impact the long term survival and recovery of threatened marine mammals	IV

Table 5-2 Acceptability of Environmental Impacts from Dispersant Application

Factor	Demonstration Criteria	Criteria Met	Rationale
Principles of Ecologically Sustainable Development (ESD)	No potential to affect biological diversity and ecological integrity (i.e. Consequence Level is not I).	✓	The activities were evaluated as having the potential to result in a Level III to IV consequence.
	Activity does not have the potential to result in serious or irreversible environmental damage.	✓	The application of dispersants will decrease the volume of oil on the surface which may reduce exposure to coastal sensitives and seabird and marine mammal populations to floating oil. Dispersant application will only be a selected following a site specific NEBA, which must demonstrate potential environment impacts from dispersant outweigh the potential for shoreline, fauna and marine sensitivity impacts.
Legislative and Other Requirements	Legislative and other requirements have been identified and met.	✓	The proposed control measures align with the requirements of the: • OPGGS Act 2006 • Protection of the Sea (Prevention of Pollution from Ships) Act 1983. • Navigation Act 2012 – Chapter 4 (Prevention of Pollution). • Marine Order 96 (Marine pollution prevention – sewage) 2013 • Marine Order 95 (Marine pollution prevention - garbage) 2013.
Internal Context	Consistent with Esso's Environment Policy.	✓	Proposed control measures are consistent with Esso's Environment Policy, in particular, to "comply with all applicable environmental laws and regulations and apply responsible standards where laws and regulations do not exist".
	Meets ExxonMobil Environmental Standards.	✓	Proposed controls meet the requirements of the ExxonMobil Dispersant Guidelines 2008.
	Meets ExxonMobil Operations Integrity Management System (OIMS) Objectives.	✓	Proposed control measures meet: • OIMS System 6-5 objective to identify and assess environmental aspects; significant aspects are addressed and controlled consistent with policy and regulatory requirements; and • OIMS System 8-1 objective to clearly define and communicate OI requirements to contractors. • OIMS System 10-2 objective to ensure effective response to emergencies and business disruptions that threaten the safety, security and health of the public,

			contractors and employees, the environment, asset integrity, and critical business operations
External Context	Stakeholder concerns have been considered / addressed through the consultation process.	✓	No specific stakeholder concerns have been raised.

Table 5-3 ALARP Demonstration of Environmental Impacts from Dispersant Application

ALARP Decision Context and Justification	Decision Context B Dispersant application is a standard response strategy that has been accepted for use in the Australian and International Offshore Petroleum Industry. Impacts associated with dispersant application are well understood and have been implemented by industry. The application of dispersants must be supported by a site specific NEBA in commonwealth waters or have approval from state control agency within state waters. Dispersant application activities are aligned with company and partner values. Good Practice control(s) have been identified to ensure environmental impacts associated with mobilising this response are reduced to ALARP, these controls will be implemented in a response scenario and have been included in the OPEP. Esso believes ALARP Decision Context B should apply.		
Good Practice	**Adopted**	**Control**	**Rationale**
Vessel compliant with MARPOL Annex I, IV, V and VI as appropriate to vessel class.	✓	Vessel Class Certification.	The vast majority of commercial ships are built to and surveyed for compliance with the standards (i.e. Rules) laid down by classification societies. The role of vessel classification and classification societies has been recognised by the International Maritime Organisation (IMO) across many critical areas including the International Convention for the Safety of Life at Sea, (SOLAS), the 1988 Protocol to the International Convention on Load Lines and the International Convention for the Prevention of Pollution from Ships (MARPOL).
NEBA completed prior to conducting dispersant application operations.	✓	NEBA process.	The NEBA takes into account the circumstances of spill, fate of the oil, potential environmental and social impacts and relative oil spill response options.
Dispersants are selected from the Oil Spill Control Agents (OSCA) Register, including grandfathered stocks, unless otherwise	✓	Dispersant selection process.	Dispersants which have been pre-approved for use in Australia by AMSA are placed on the Oil Spill Control Agent (OSCA) Register. The AMSA Efficacy Test Protocol for the Register (AMSA 2012) lists the toxicity testing requirements that ensure products meet the requirements of

endorsed by the Statutory Authority.			acceptable practice for the National Plan, and products with a high acute toxicity (LC50 < 10 ppm, 96 hrs) or containing prohibited substances are not permitted.
Effectiveness of dispersant confirmed prior to application.	✓	Basic field dispersant effectiveness test.	Testing effectiveness of the dispersant on the oil spill will inform the response option strategy and assist IMT determining response activities.

Table 5-4 Engineering Risk Assessment

Additional, Alternative, Improved Controls	Benefit	Cost / Feasibility	Adopted
None Identified			

5.3 Capability Assessment of Dispersant Application

A detailed capability assessment has been undertaken to ensure that Esso has access to sufficient resources to complete dispersant application activities in a timely manner. The assessment concluded sufficient resources are available within acceptable timeframes to conduct this response.
This section summarises outcomes of the capability assessment.

Table 5-5 Dispersant Application Resource Availability

Activity	Resource Required	Resource Availability	Expected Timeframe
Dispersant Stocks Available	810m^3 of dispersant for the WCDS.	Dispersant stockpiles available in Australia between Esso, AMOSC, mutual aid and AMSA. Additional dispersant available from OSRL.	Victoria stockpiles <24hours. National stockpiles <48 hours.
Dispersant Application from Subsea Equipment	Subsea Dispersant Injection Equipment.	SFRT Contract with Oceaneering (install/operate). SFRT agreement with AMOSC (equipment and stockpile). Additional dispersant available from OSRL.	Dispatched from Western Australia <24 hrs. SFRT deployed to field <7 days of service request. SSDI deployed and operating <14 days.

Dispersant Application from Aircraft	Ability to spray 8.2m^3 of dispersant per day.	AMOSC (AMSA Fixed Wing Aerial Dispersant Contract (FWADC)) NatPlan. Air Attack Supervisor to be sourced under NatPlan arrangements to direct overhead spraying operations. Additional dispersant aircraft via OSRL.	Mobilisation of FWAD aircraft <4 hours of request for service. Dispersant application ability <24 hours. (*Note: Assumes good visibility, daylight hours and suitable flying conditions).*
Dispersant Application from Vessels	Ability to spray 4-6 m^3 of dispersant per day per strike team.	Esso Production support vessels loaded with dispersant and spraying equipment from BBMT. Agreements third party vessel operators. Vessels of opportunity available at Barry Beach Marine Terminal, Lakes Entrance, Port Albert, Port Welshpool, Port Franklin and Mallacoota and Hobart.	1st team dispersant application ability <48 hours of request for service. 2nd team dispersant application ability <72 hours of request for service.
Testing Dispersant	Dispersant effectiveness test kit.	Esso have 3 x test kits available.	Available locally and within less than 48 hours of request.

Table 5-6 Dispersant Application Capabilities

Good Practice	Adopted	Control	Rationale
Access to dispersant and dispersant application equipment for initial response.	✓	Esso owned dispersant stocks.	Esso owns stock of dispersant with greater than 50% effectiveness is available for the first 48 hours of a response (65m^3).
		Esso owned dispersant application equipment.	Esso have dispersant application equipment in Victoria and available to mobilise when required.
Pre-arranged access to additional dispersant stockpiles and equipment for applying dispersant.	✓	Agreement with AMOSC for dispersant capabilities.	Response capabilities maintained per service level statement including access to mutual aid and the National Plan (which provides dispersant stockpiles).
		Agreement with OSRL for dispersant capabilities.	Response capabilities maintained and available per OSRL service level statement.
Pre-arranged access to SFRT and subsea dispersant stockpile.	✓	SFRT agreement with AMOSC.	Agreement with AMOSC in place to mobilise the dispersant application response equipment when required.

Pre-arranged access to personnel to install and operate SFRT equipment.	✓	Contract with third party provider to install/operate SFRT.	Agreement in place to mobilise the dispersant application response when required.
• Pre-arranged access to vessels for dispersant application.	✓	Support vessel.	The support vessel that is used for ongoing Esso operations can be used for dispersant application.
	✓	Agreement with third party suppliers for provision of additional vessels.	Agreement with supplier of vessel services has provision for supply of additional vessels

Table 5-7 Engineering Risk Assessment– Additional Capabilities

Additional, Alternative, Improved Controls	Benefit	Cost / Feasibility	Adopted
Quarterly AMOSC equipment availability review.	Provides status update on available equipment.	No cost associated with this control.	Adopted.
Dispersant and application equipment stored on vessel.	Reduce time to apply dispersant.	No cost associated with control.	Adopted.

6. Containment & Recovery

6.1 Response Option Description

Containment and recovery involves controlled collection and recovery of oil from the water's surface. The response typically involves the deployment of booms and oil skimmers from suitable vessels, as well as the collection, transfer and disposal of oil and oily water recovered during the response. Floating barriers or booms are used to enclose the spilled oil on the sea surface into a suitable surface thickness, to allow its mechanical removal using a recovery device such as a skimmer, which pumps the oil from the water surface into temporary storage. The oil and water mix are stored temporarily in vessel tanks on the deck or in internal tanks. Recovered sea water may need to be decanted and returned to the sea to free up storage capacity and enable greater volumes of oil to be recovered without making the potentially long voyage back to port, increasing the effectiveness of the Containment and Recovery. The decanted water will contain traces of hydrocarbons and cannot be discharged unless approval has been provided by AMSA.

Effective containment and recovery can reduce the potential risks and impacts associated with:

- Marine fauna;
- Sensitive shoreline environments;
- Shoreline response; and
- Waste generation.

Containment and recovery is often considered the primary or preferred response option due to the minor impact of its operation on the environment. However, the overall effectiveness of containment and recovery can be limited by a combination of operational constraints and the fate of the oil on the surface (e.g. thickness and patchiness) which may include but not limited to:

- Weather: suitable weather and sea state conditions;
- Logistics: availability of suitably equipped vessels, aerial surveillance support and adequate facilities for the storage and disposal of oil and water;
- Personnel: Competence and availability of responders;
- Location: Accessibility and transit time;
- Health and Safety: health effects from exposure to the oil and ability to safety deploy and use equipment; and

- Environment: increased environmental risks and impacts from increased vessels/ aircraft use and treatment/disposal of oily waste.

Experience has shown that the efficiency of at-sea containment and recovery operations can vary widely depending on the above constraints, and recovery is usually limited to between 5% and 20% of the initial spilled volume (IPECA /IOGP – At Sea Recovery - Good Practice Guidance).

6.2 Environmental Impact Assessment of Containment and Recovery

Resources for offshore containment and recovery activities will include offshore vessels that will be mobilised from established ports. Nearshore containment and recovery activities are likely to be undertaken from smaller crafts that may be launched from a number of different locations along the coastline. Access to the crafts, equipment and transit to the affected areas may disturb local port operations, recreational activities, fauna and sensitive habitats.

The collection, handling and disposal of hydrocarbons introduces potential environmental impacts from the oily waste generated. The oily waste must be handled and disposed of correctly to prevent secondary contamination from contaminated equipment and decanting activities.

Environmental aspects associated with implementing containment and recovery were identified and evaluated in Table 6-1. Implementing this response option introduces new environmental aspects which are not assessed within Volume 2:

- Physical presence - Nearshore and Shoreline Users
- Physical presence - Interaction with Fauna and Flora

6.2.1 Impact Assessment

An impact assessment for each environmental aspect has been undertaken and additional controls have been identified to minimise the environmental impacts associated with containment and recovery which are detailed within the ALARP assessment. Further assessment of the acceptability of these impacts in an oil spill response context and controls identified for minimising the environmental impact of containment and recovery activities are described below. The Environmental Outcomes, Performance Standards and Measurement Criteria for these controls are detailed in the OPEP for implementation in a response.

Change to the function, interests or activities of other users could occur through disruption to recreational and commercial activities, which may include:

- Socioeconomic
- Cultural
- Tourism

Table 6-1 Environmental Aspect: Physical Presence - Nearshore and Shoreline Users

Affected Receptor	Consequence Evaluation	Consequence Level
Socioeconomic	Recreational fishing is generally concentrated inside the Gippsland Lakes or along the Ninety Mile Beach coastline. As Bass Strait is relatively shallow, the water currents can create unpredictable seas reducing the number of recreational boats venturing into Bass Strait from the shore. Additional vessels and personnel will only be present for the response period. Once the response has been stood down nearshore socioeconomic activities can resume without disruptions.	IV
Cultural	The movement of personnel, vehicles and equipment may disturb or damage cultural heritage artefacts or sites. Adverse effects are expected	IV

	to be localised to the area of disturbance and for important sites and artifacts can be protected by exclusion zones.	
Tourism	Response activities may necessitate temporary beach closures/ exclusions. The exclusion of residents and tourists from beaches has the potential to result in impacts to local tourism. Exclusions and closures will only be in place for the duration of the response.	IV

Shoreline activities may potentially disturb or damage habitat or cause injury or stress to wildlife, the impact assessment is provided in Table 6-2.

Table 6-2 Environmental Aspect: Physical Presence - Interaction with Fauna and Flora

Affected Receptor	Consequence Evaluation	Consequence Level
Sandy Beaches	Sandy beaches provide potential foraging and breeding habitat for numerous bird, marine turtle and pinniped species. Response activities primarily occur above the high tide line, with exception of haul outs. Generally oil on a sandy shore will be concentrated at or below the high tide mark.	IV
Mangroves and salt marshes	Mangroves grow in intertidal mud and sand, with specially adapted aerial roots (pneumatophores). Saltmarshes are a coastal ecosystem in the upper coastal intertidal zone between land and open saltwater or brackish water that is regularly flooded by the tides. It is dominated by dense stands of salt-tolerant plants such as herbs, grasses, or low shrubs. Damage to intertidal shoreline habitats and communities may have indirect effects on the food chains; affecting the macrofauna communities which they support. In addition, the removal of habitat (such as sand from beaches) may also make them more vulnerable to ongoing erosion. Affected sites are predicted to recover through beach replenishment due to natural sediment transport processes and recolonisation by beach biota. Response activities should avoid these areas unless they have been selected specifically for clean-up or OWR activities. Exclusion zones can be set up to protect these areas.	IV
Sensitive and protected areas and parks	Potential impacts to sensitive and protected areas may be impacted from shoreline response activities. Human activity in sensitive areas may adversely affect important natural behaviours of biota, e.g. nesting of shorebirds and seabirds, or pinnipeds. Human presence may also cause ground disturbance due to manual raking and turnover of sandy beaches or intertidal flats to remove accumulations of weathered oil, which could affect sediment infauna, cultural heritage sites, temporary exclusion of residents and tourists from amenity beaches. The consequence to protected marine areas is	IV

	assessed as localised and short term, it will recover quickly once activities cease. Response activities should avoid these areas unless they have been selected specifically for clean-up or OWR activities. Exclusion zones can be set up to protect these areas and minimise impact.	
Wildlife	Physical presence may adversely affect important natural behaviours of biota, e.g. nesting of shorebirds and seabirds, reptiles or pinnipeds. Disturbance to wildlife will only be for the duration of the response. Once the stood down, it is expected that the ecosystems will quickly recover.	IV

Table 6-3 Acceptability of Environmental Impacts from Containment and Recovery

Factor	Demonstration Criteria	Criteria Met	Rationale
Principles of Ecologically Sustainable Development (ESD)	No potential to affect biological diversity and ecological integrity (i.e. Consequence Level is not I)	✓	All the aspects related to containment and recovery have been evaluated as having the potential to result in a Level IV consequence.
	Activity does not have the potential to result in serious or irreversible environmental damage.	✓	All oil spill response activities are implemented with the aim of reducing the overall environmental impact. Containment and recovery activities may limit the volume of oil that could impact the shoreline and marine sensitivities.
Legislative and Other Requirements	Legislative and other requirements have been identified and met.	✓	Activities will comply: • OPGGS Act 2006. • Protection of the Sea (Prevention of Pollution from Ships) Act 1983. • Marine Order 96 (Marine pollution prevention – sewage) 2013. • Marine Order 95 (Marine pollution prevention - garbage) 2013.
Internal Context	Consistent with Esso's Environment Policy.	✓	Proposed control measures are consistent with Esso's Environment Policy, in particular, to "comply with all applicable environmental laws and regulations and apply responsible standards where laws and regulations do not exist".
	Meets ExxonMobil Environmental Standards.	✓	There is no standard related to the containment and recovery however the controls proposed meet the strategic objectives of the Upstream Environmental Standards.
	Meets ExxonMobil Operations Integrity Management System (OIMS) Objectives.	✓	Proposed control measures meet: • OIMS System 6-5 objective to identify and assess environmental aspects; significant aspects are addressed and controlled

			consistent with policy and regulatory requirements; and • OIMS System 8-1 objective to clearly define and communicate OI requirements to contractors. • OIMS System 10-2 objective to ensure effective response to emergencies and business disruptions that threaten the safety, security and health of the public, contractors and employees, the environment, asset integrity, and critical business operations
External Context	Stakeholder concerns have been considered / addressed through the consultation process.	✓	No specific stakeholder concerns have been raised.

Table 6-4 ALARP Demonstration of Environmental Impacts from Containment and Recovery

ALARP Decision Context and Justification	Decision Context A. Containment and recovery activities are standard practice for hydrocarbon spills to reduce hydrocarbons in the marine environment and minimise impacts to shorelines and marine sensitivities. There is a good understanding of potential impacts from containment and recovery. This response option would be supported by an incident specific NEBA. All activities undertaken in state waters will be led by the state control agency. Good Practice controls have been identified to ensure environmental impacts associated with mobilising this response are reduced to ALARP, these controls will be implemented in a response scenario and have been included in the OPEP. Esso believes ALARP Decision Context A should apply.		
Good Practice	**Adopted**	**Control**	**Rationale**
Vessel compliant with MARPOL Annex I, IV, V and VI as appropriate to vessel class.	✓	Vessel Class Certification.	The vast majority of commercial ships are built to and surveyed for compliance with the standards (i.e. Rules) laid down by classification societies. The role of vessel classification and classification societies has been recognised by the International Maritime Organisation (IMO) across many critical areas including the International Convention for the Safety of Life at Sea, (SOLAS), the 1988 Protocol to the International Convention on Load Lines and the International Convention for the Prevention of Pollution from Ships (MARPOL).
NEBA completed prior to conducting containment and recovery activities.	✓	NEBA process.	The NEBA takes into account the circumstances of spill, fate of the oil, potential environmental and social impacts and relative oil spill response options.

Discharge of de-oiled water (decanting) must meet MARPOL requirements.	✓	AMSA approval for discharge.	MARPOL sets out requirements for discharge of de-oiled water (decanting) to avoid undue environmental impact. Decanting performed in commonwealth waters in accordance Prevention of Pollution from Ships) Act 1983, Section 9, subsection (2) (e)

Table 6-5 Engineering Risk Assessment– Additional Capabilities

Additional, Alternative, Improved Controls	Benefit	Cost / Feasibility	Adopted
None Identified			

6.3 Capability Assessment of Containment and Recovery

A detailed capability assessment has been undertaken to ensure that Esso has access to sufficient resources to complete containment and recovery activities in a timely manner. The assessment concluded sufficient resources are available within acceptable timeframes to conduct this response.

This section summarises outcomes of the capability assessment.

Table 6-6 Containment and Recovery Resource Availability

Task	Resource Required	Resource Availability	Expected Timeframe
Containment & Recovery -Vessels	6x vessels available for 3x strike teams.	Esso Support vessel. Agreement with third party vessel operators to supply additional vessels. Vessels of opportunity available at Barry Beach Marine Terminal, Lakes Entrance, Port Albert, Port Welshpool, Port Franklin and Mallacoota and Hobart.	1x Vessel C&R strike team will be on site <48 hours of service request. 2x Vessel C&R strike teams will be on site <72 hours of service request.
Containment & Recovery Equipment	Equipment for 3x vessel strike teams.	AMOSC Geelong stockpile 3x C&R systems. Fremantle stockpile 3 x C&R strike systems. OSRL Additional equipment available through OSRL. AMSA Additional equipment available through AMSA.	Load out from Geelong <4 hours service request.
Containment & Recovery Personnel	2 trained and 4x personnel per strike team.	Esso Core Group (10) AMOSC Staff (6) Core Group (50) OSRL Response Technicians (18)	Esso <24 hours from request AMOSC <24 hours from request of service OSRL.

Task	Resource Required	Resource Availability	Expected Timeframe
Waste Management	Onshore waste management arrangements.	Esso have a contract with a third party waste management service to provide transport and disposal of solid and liquid wastes. 4,500m^3 bulk hard waste (soil/sand). 3,000,000L of liquid waste (oil in water).	<24 hours of service request.

Table 6-7 Containment and Recovery Resource Availability

Good Practice	Adopted	Control	Rationale
Pre-arranged access to vessels for containment and recovery activities.	✓	Support vessel.	The support vessel that is used for ongoing Esso operations can be used for containment and recovery.
	✓	Agreement with third party suppliers for provision of additional vessels.	Agreement with supplier of vessel services has provision for the supply of additional vessels.
Pre-arranged access to containment & recovery equipment.	✓	Esso owned containment and recovery equipment.	Esso owns its own equipment that can be utilised for containment and recovery activities.
Pre-arranged access to additional equipment for containment and recovery.	✓	AMOSC agreement.	Agreement with AMOSC provides access to additional containment and recovery equipment.
Pre-arranged access to additional labour.	✓	Personnel hiring agreements.	Esso have personnel hiring agreements in place which can be utilised to provide personnel for containment and recovery activities.
Pre-arranged Waste facilities.	✓	Agreement with waste management contractor.	Waste arrangements for removal of waste to approved disposal or treatment facilities in accordance with EPA requirements.

Table 6-8 Engineering Risk Assessment – Additional Capabilities

Additional, Alternative, Improved Controls	Benefit	Cost / Feasibility	Adopted
Standby dedicated emergency response vessel.	A dedicated standby emergency response vessel may reduce time required to implement containment and recovery activities and increase recovery capacity.	Significant costs are associated with leasing a suitable vessel. Given the high potential costs to the program, implementing this control measure is considered grossly disproportionate, given that the event has an extremely low likelihood of occurrence.	Not adopted.

7. In-Situ Burning

7.1 Response Option Description

In-situ burning is the controlled burning of hydrocarbons. It will rapidly reduce the volume of spilled oil, and thus greatly reduce the volume of oil in the marine environment. It is a non-mechanical response option that removes oil from the marine environment by the combustion of hydrocarbons.

Incomplete combustion results in material being left behind after a fire is extinguished; this is known as burn residue. Residue may come in different forms, and ranges from being brittle or a stiff toffee-like material to a liquid similar to the original oil. The residue may need to be contained and recovered.

In-situ burning is only possible in relatively calm conditions (<20 knot wind and 1m wave height) and so the ability to implement this strategy in the Bass Strait is likely to be limited but maybe viable in suitable conditions.

The advantages of in-situ burning:

- Rapid removal of oil;
- Minimal equipment requirement;
- Reduced volume of oily waste for disposal; and
- Can be used in a variety of habitats and oil types.

The disadvantages of in-situ burning:

- Black smoke plume (aesthetics and increased air emissions);
- Residue may need to be recovered; and
- Safety risks to response personnel.

Currently in-situ burning is not detailed within the Australian National Plan, and local guidelines for approval and practical implementation of this strategy are not available.

7.2 Environmental Impact Assessment of In Situ Burning

In-situ burning will introduce additional atmospheric emissions which may contribute to global warming and a reduction in air quality.
The emissions generated from in-situ burning have been studied and shown to be consistent (Ferek 1996):

- 85-95% of the burned oil becomes carbon dioxide and water;
- 5-15% of the oil is not burned efficiently and is converted to particulates, mostly soot; and
- 1-3% of the oil may become nitrogen dioxide, sulfur dioxide, carbon monoxide, PAHs, ketones, aldehydes, and other combustion by-products.

The collection, handling and disposal of hydrocarbons introduces potential environmental impacts from the oily waste generated. The oily waste must be handled and disposed of correctly to prevent secondary contamination from contaminated equipment and decanting activities.

7.2.1 Impact Assessment

Environmental aspects associated with implementing in-situ burning were identified and evaluated in Table 7-1. Implementing this response option introduces new environmental aspects which are not assessed within Volume 2:

- Emissions to Air (Smoke)

The release of combusted and un-combusted hydrocarbons into the atmosphere can lead to a decline in air quality, cause atmospheric pollution and contribute to greenhouse gases.

Table 7-1 Environmental Aspect: Air Emissions - Smoke

Affected Receptor	Consequence Evaluation	Consequence Level
Birds	If in-situ burning was undertaken it would be offshore in Commonwealth waters, close to the operational area. The Operational Area is within foraging BIAs for black browed albatross, Campbell albatross, Indian Yellow nosed albatross and Wandering albatross, Antipodean albatross, Buller's albatross, shy albatross, common diving petrel, white-faced storm petrel, and short-tailed shearwater. In-situ burning would be an activity of short duration. Atmospheric emissions or reduction in air quality are not identified as a threat the conservation advice or recovery plans for any of these species.	IV

Table 7-2 Environmental Aspect: Air Emissions - Smoke

Factor	Demonstration Criteria	Criteria	Rationale
Principles of Ecologically Sustainable Development (ESD)	No potential to affect biological diversity and ecological integrity (i.e. Consequence Level is not I).	✓	The activities were evaluated as having the potential to result in a Level IV consequence.
	Activity does not have the potential to result in serious or irreversible environmental damage.	✓	All oil spill response activities are implemented with the aim of reducing the overall environmental impact. In-situ burning would only be selected following an incident specific NEBA, which must demonstrate potential environmental impacts from in-situ burning outweigh the potential for shoreline and marine sensitivity impacts.
Legislative and other requirements have been identified and met.	Legislative and other requirements have been identified and met.	✓	The proposed control measures align with the requirements of:

			• OPGGS Act 2006;Protection of the Sea (Prevention of Pollution from Ships) Act 1983; • Navigation Act 2012 – Chapter 4 (Prevention of Pollution); • Marine Order 96 (Marine pollution prevention – sewage) 2013; and • Marine Order 95 (Marine pollution prevention - garbage) 2013.
Internal Context	Consistent with Esso's Environment Policy.	✓	Proposed control measures are consistent with Esso's Environment Policy, in particular, to "comply with all applicable environmental laws and regulations and apply responsible standards where laws and regulations do not exist".
	Meets ExxonMobil Environmental Standards.	✓	There is no standard related to in-situ burning however the controls proposed meet the strategic objectives of the Upstream Environmental Standards.
	Meets ExxonMobil Operations Integrity Management System (OIMS) Objectives.	✓	Proposed control measures meet: • OIMS System 6-5 objective to identify and assess environmental aspects; significant aspects are addressed and controlled consistent with policy and regulatory requirements; and • OIMS System 8-1 objective to clearly define and communicate OI requirements to contractors. • OIMS System 10-2 objective to ensure effective response to emergencies and business disruptions that threaten the safety, security and health of the public, contractors and employees, the environment, asset integrity, and critical business operations
External Context	Stakeholder concerns have been considered / addressed through the consultation process.	X	Although no specific stakeholder concerns have been raised we expect the community may have concerns implementing this response strategy. *NOTE: this response will not be implemented without further consultation.*

Table 7-3 ALARP Demonstration of Environmental Impacts from In Situ Burning

ALARP Decision Context and Justification	ALARP Decision Context B In-situ burning has been accepted as a response within the International Offshore Petroleum Industry but it has not been practiced within Australia. There is a good understanding of potential impacts from response activities and this response would be supported by an incident specific NEBA. Good Practice controls have been identified to ensure environmental impacts associated with mobilising this response are reduced to ALARP, these controls will be implemented in a response scenario and have been included in the OPEP. Esso believes ALARP Decision Context B should apply.		
Good Practice	**Adopted**	**Control**	**Rationale**
Apply control identified in Volume 2 for vessels.	✓	Vessel Class Certification.	The vast majority of commercial ships are built to and surveyed for compliance with the standards (i.e. Rules) laid down by classification societies. The role of vessel classification and classification societies has been recognised by the International Maritime Organisation (IMO) across many critical areas including the International Convention for the Safety of Life at Sea, (SOLAS), the 1988 Protocol to the International Convention on Load Lines and the International Convention for the Prevention of Pollution from Ships (MARPOL).
NEBA completed prior to conducting any in situ burning.	✓	NEBA process	The NEBA takes into account the circumstances of spill, fate of the oil, potential environmental and social impacts and relative oil spill response options.

Table 7-4 Engineering Risk Assessment

Additional, Alternative, Improved Controls	**Benefit**	**Cost / Feasibility**	**Adopted**
Develop in situ burning response plan for the Bass Strait.	Reduced time to implement strategy.	Development of a plan will take considerable time and unlikely to be utilised as not currently within national plan.	Not Adopted.

7.3 Capability Assessment of In-Situ Burning

A detailed capability assessment has been undertaken to ensure that Esso has access to sufficient resources to complete in-situ burning activities in a timely manner. The assessment concluded sufficient resources are available within acceptable timeframes to conduct this response.

This section summarises outcomes of the capability assessment.

Table 7-5 In-Situ Burning Resource Availability

Task	Resource Requirement	Resource Availability	Expected Timeframe
Vessels	2x vessels.	Esso Support vessel. Agreement with third party vessel operators to supply additional vessels. Agreements third party vessel operators to supply additional vessels. Vessels of opportunity available at Barry Beach Marine Terminal, Lakes Entrance, Port Albert, Port Welshpool, Port Franklin and Mallacoota and Hobart.	2x vessels will be on site <96 hours of service request.
In-Situ burning Equipment	Fire booms and ancillaries.	Fire boom available from OSRL Singapore and Southampton.	Mobilise equipment to Melbourne in <96hrs.
Personnel	2x trained and 4x personnel per strike team.	OSRL Response Technicians (18).	Mobilise personnel to Gippsland <96hrs
Waste Management	Onshore waste management arrangements.	Esso has a contract with a third party waste management service to provide transport and disposal of solid and liquid wastes. 4,500m^3 bulk hard waste (soil/sand). 3,000,000L of liquid waste (oil in water).	<24 hours of service request.

Table 7-6 In Situ Burning Capabilities

Good Practice	Adopted	Control	Rationale
Pre-arranged access to vessels for in situ burning.	✓	Support vessel.	The support vessel that is used for ongoing Esso operations can be used for in situ burning activities.
	✓	Agreement with third party suppliers for provision of additional vessels.	Agreement with supplier of vessel services has provision for supply of additional vessels.
Pre-arranged access to additional equipment and personnel for in situ burning.	✓	OSRL agreement.	Agreement with OSRL provides access to trained personnel equipment for in situ burning activities.
Pre-arranged Waste facilities.	✓	Agreement with waste management contractor.	Waste arrangements for removal of waste to approved disposal or treatment facilities in accordance with EPA requirements.

Table 7-7 Engineering Risk Assessment – Additional Capabilities

Additional, Alternative, Improved Controls	Benefit	Cost / Feasibility	Adopted
None Identified			

8. Shoreline Protection and Clean-up

8.1 Response Option Description

Shoreline protection and clean-up consists of different techniques to prevent or reduce exposure of shoreline sensitives.

This shoreline response strategy is based on:

- Protection and deflection; and
- Shoreline response operations.

8.1.1 Protection and Deflection

Protection - Booms may be used to exclude slicks from targeted sensitive shorelines and/or amenities where it is safe and conditions permit access and effective deployment.

Deflection - Booms may be deployed at an angle to a drifting slick to divert oil away from targeted sensitive areas or to a collection point where it is safe to contain and recover.

Containment and Recovery – Near shore containment and recovery (refer to Section 4.6) may be deployed when there is little or no current and the sea-state permits.

This response is restricted by specific weather and metocean conditions and site accessibility. In strong winds, currents and/or waves this option may not be effective.

8.1.2 Shoreline Clean-up

If a spill has reached or is predicted to reach the shoreline, an assessment of the area will be undertaken using the Shoreline Clean-up Assessment Technique (SCAT). This consists of a series of consistent and repeatable shoreline assessments that prioritise clean-up response based upon shoreline type. The assigned team will identify the appropriate shoreline clean-up technique, report the potential for, or any incidents of, oiled wildlife and undertake routine assessments throughout the response in terms of rehabilitation progress.

Shoreline clean-up consists of different manual and mechanical recovery techniques to remove oil and contaminated debris from the shoreline to reduce ongoing environmental contamination and impact.

Esso Australia and Cooper Energy have developed a Shoreline Protection and Clean-Up Plan and site specific Tactical Response Plans for Gippsland Basin oil and gas activities.

The plans outline the strategies that may be adopted and actions required to undertake safe and effective shoreline protection and clean-up response. The area assessed ranges from Port of Eden to Wilsons Promontory to Flinders Island in the Bass Strait (Figure 8-1).

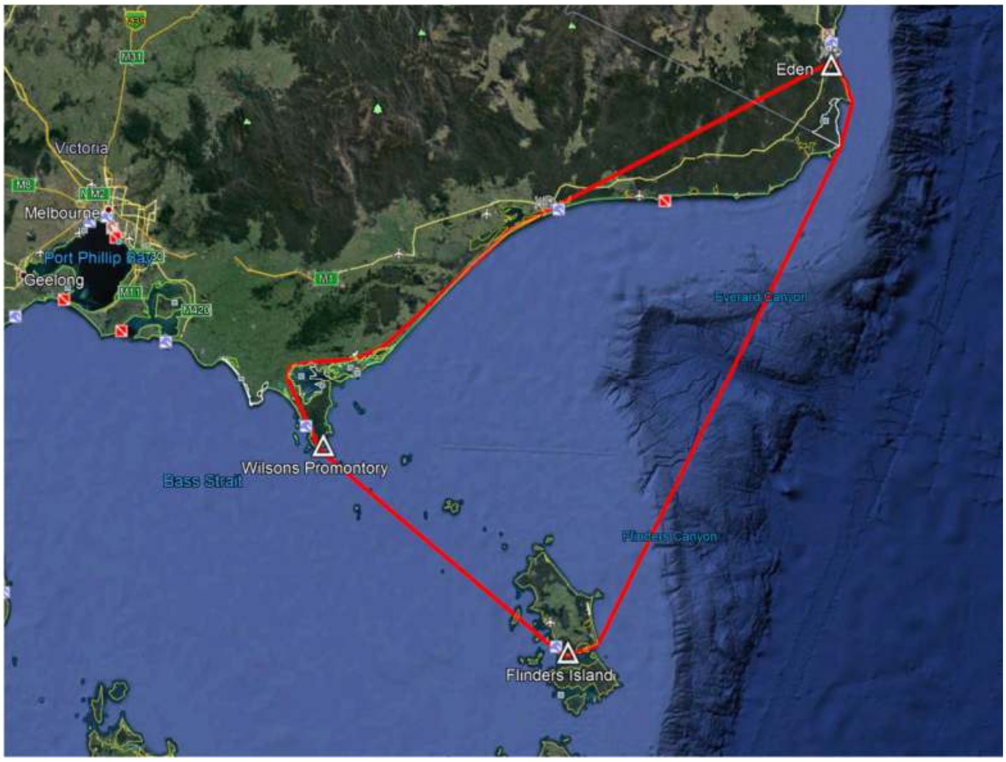

Figure 8-1 Overview of Gippsland Basin field locations

Tactical Response Plans (TRPs) are available for primary and secondary sites that have been assessed and chosen based on appropriate access for shoreline response, shoreline type and key sensitive receptors. The application of Global Information Systems (GIS), cross referenced with the Oil Spill Response Atlas sensitivity mapping was carried out prior to site visits to validate both the identification of specific sites as 'high priority', and the strategies proposed for shoreline response.

8.1.3 State Governments

In response to a spill, a shoreline protection and clean-up response will be led by the respective state response agency.
The State Governments of Victoria, Tasmania and New South Wales will ultimately decide, through their control agencies, how oil spill response operations will occur on these shorelines, however, Esso will make the Shoreline Protection Plan and Tactical Response Plans and resources to support the response available.

8.2 Environmental Impact Assessment of Shoreline Protection and Clean-up

Nearshore shoreline protection activities are likely to be undertaken from smaller crafts that may be launched from a number of different locations along the coastline. Access to the crafts, equipment and transit to the affected areas may disturb local fauna, sensitive habitats, cultural heritage areas and disrupt local recreational activities.

Shore clean-up activities may disturb a number of nearshore habitats as identified in the prepared Shoreline Protection Plans. The collection, handling and disposal of hydrocarbons introduces potential environmental impacts from the oily waste generated.

8.2.1 Impact Assessment

Environmental aspects associated with implementing shoreline protection and clean-up activities were identified and evaluated in Table 8-1. Implementing this response option introduces new environmental aspects which are not assessed within Volume 2:

- Physical Presence - Nearshore and Shoreline Users (refer to assessment in Table 6.1)
- Physical presence - Interaction with Fauna and Flora (refer to assessment in Table 6.2)

An impact assessment for each environmental aspect has been undertaken and additional controls have been identified to minimise the environmental impacts associated with the shoreline protection and clean-up activities which are detailed within the ALARP assessment.

Table 8-1 Acceptability of Environmental Impacts from Shoreline Protection and Clean-up

Factor	Demonstration Criteria	Criteria Met	Rationale
Principles of Ecologically Sustainable Development (ESD)	No potential to affect biological diversity and ecological integrity (i.e. Consequence Level is not I).	✓	All aspects related to shoreline protection and clean-up activities have been evaluated as having the potential to result in a Level IV consequence.
	Activity does not have the potential to result in serious or irreversible environmental damage.	✓	All oil spill response activities are implemented with the aim of reducing the overall environmental impact. The purpose of shoreline protection and clean-up activities is to minimise the environmental impacts resulting from an oil spill.
Legislative and Other Requirements	Legislative and other requirements have been identified and met.	✓	The proposed control measures align with the requirements of: • OPGGS Act 2006. • Emergency Management Act 2013 (Vic). • Emergency Management Act 1989 (NSW). • Emergency Management Act 2006 (Tas). • Wildlife Act 1975 (Vic). • EPBC Act. • Wildlife Act 1975 (Vic). • Nature Conservation Act 2002 (Tas). • National Parks and Wildlife Act 1974 (NSW).
Internal Context	Consistent with Esso's Environment Policy.	✓	Proposed control measures are consistent with Esso's Environment Policy, in particular, to "comply with all applicable environmental laws and regulations and apply responsible standards where laws and regulations do not exist".
	Meets ExxonMobil Environmental Standards.	✓	There is no standard related to the shoreline protection and clean-up however the controls proposed meet the strategic objectives of the Upstream Environmental Standards.
	Meets ExxonMobil Operations Integrity Management System (OIMS) Objectives.	✓	Proposed control measures meet: • OIMS System 6-5 objective to identify and assess environmental aspects; significant aspects are addressed and controlled consistent with policy and regulatory requirements; and • OIMS System 8-1 objective to clearly define and communicate OI requirements to contractors.

			• OIMS System 10-2 objective to ensure effective response to emergencies and business disruptions that threaten the safety, security and health of the public, contractors and employees, the environment, asset integrity, and critical business operations
External Context	Stakeholder concerns have been considered / addressed through the consultation process.	✓	No specific stakeholder concerns have been raised.

Table 8-2 ALARP Demonstration of Environmental Impacts from Shoreline Protection and Clean-up Activities

ALARP Decision Context and Justification	Decision Context A Shoreline protection and clean-up activities are standard practice for hydrocarbon spills to reduce hydrocarbons in the marine environment and minimise impacts to shoreline sensitivities. There is a good understanding of potential impacts from shoreline protection and clean-up activities. This response option would be supported by an incident specific NEBA. All activities undertaken in state waters will be led by the State Control Agency. Good Practice controls have been identified to ensure environmental impacts associated with mobilising this response are reduced to ALARP. These controls will be implemented by the state led control agency in a response scenario and have been included in the OPEP. Note that the response must be led by State Control Agencies, with Esso providing support and resources when requested. Esso believes ALARP Decision Context A should apply.		
Good Practice	**Adopted**	**Control**	**Rationale**
NEBA completed prior to conducting shoreline protection and clean-up activities application operations.	✓	NEBA process.	The NEBA takes into account the circumstances of spill, fate of the oil, potential environmental and social impacts and relative oil spill response options.
Environmental consideration of Gippsland basin local shorelines.	✓	Shoreline Protection and Clean Up Plan and TRPs.	Shoreline Protection Plan & Tactical Response Plans (TRPs) describe the shoreline types and have categorised primary and secondary sites which have been assessed and chosen based on appropriate shoreline response options, shoreline type and key sensitive receptors. These plans will be made available to the control agency.

Table 8-3 Engineering Risk Assessment

Additional, Alternative, Improved Controls	Benefit	Cost / Feasibility	Adopted
None Identified			

8.3 Capability Assessment of Shoreline Protection and Clean-up

A detailed capability assessment has been undertaken to ensure that Esso has access to sufficient resources to support the State Control Agency to complete shoreline protection and clean-up activities in a timely manner. The assessment concluded sufficient resources are available within acceptable timeframes to conduct this response.

This section summarises outcomes of the capability assessment.

Table 8-4 Shoreline Protection and Clean-up Resource Availability

Task	Resource requirement	Resource Availability	Expected Timeframe
Vessels for Shoreline Protection	7 vessels* (based on Lakes Entrance TRP which has the highest resource requirements.	Gippsland Ports have suitable vessels for nearshore response activities. Agreements with third party vessel operators to supply additional vessels. Vessels of opportunity available at Barry Beach Marine Terminal, Lakes Entrance, Port Albert, Port Welshpool, Port Franklin and Mallacoota and Hobart.	<24 hours of request for service.
Shoreline Protection Response Equipment	5x booming systems (based on Lakes Entrance TRP which has the highest resource requirements).	AMOSC/Esso/State equipment includes: • Booms • Anchor kit • Skimming systems • Temporary waste storage • Decontamination kit	<24 hours of request for service.
Shoreline Protection Response Personnel	Approx. 100 personnel (based on Lakes Entrance TRP which has the highest resource requirements).	<u>State Response Team</u> >200 trained personnel. <u>AMOSC</u> Core group <120 trained personnel (inc Esso). <u>Esso</u> Agreements in place with labour hire companies.	<u>State Response Team</u> Notify <2 hours of incident. Initiate request to call out core group <3 hours.
Shoreline Clean-up Personnel	15m3 recovery per team per day based on 33 teams of 15 people.	<u>Esso</u> Agreements in place with labour hire companies. <u>AMOSC</u> Core group >140 trained personnel (including Esso). <u>State Response Team</u> >200 trained personnel.	<24 hours of request for service.

Task	Resource requirement	Resource Availability	Expected Timeframe
Waste Management	Onshore waste management arrangements.	Esso have a contract with a third party waste management service to provide transport and disposal of solid and liquid wastes. • 4,500m^3 bulk hard waste (soil/sand). • 3,000,000L of liquid waste (oil in water). S	<24 hours of service request.

Table 8-5 Shoreline Protection and Clean-up Capabilities

Good Practice	Adopted	Control	Rationale
Shoreline protection and deflection equipment available.	✓	Esso owned shoreline protection and deflection equipment.	Esso owns its own equipment that can be utilised for shoreline protection and clean up
Pre-arranged access to additional equipment for shoreline protection and deflection.	✓	AMOSC agreement.	Agreement with AMOSC provides access to additional for shoreline protection and clean up equipment
Pre-arranged access to additional labour.	✓	Personnel hiring agreements.	Esso has personnel hiring agreements in place which can be utilised to provide personnel for containment and recovery activities.
Pre-arranged Waste facilities.	✓	Agreement with waste management contractor.	Waste arrangements for removal of waste to approved disposal or treatment facilities in accordance with EPA requirements.

Table 8-6 Engineering Risk Assessment – Additional Capabilities

Additional, Alternative, Improved Controls	Benefit	Cost / Feasibility	Adopted
None Identified			

9. Oiled Wildlife Response

9.1 Response Option Description

Coastal areas are most likely to have the largest number of affected wildlife from an oil spill given that coastal areas provide habitat for breeding and foraging as well as protection from the elements.
The scale of the impacts to wildlife does not correlate with the amount of oil spilled but is dependent on factors such as the timing and location of an incident, the product type, oceanographic and weather patterns, and the corresponding movements of species that feed, nest or generally inhabit a particular area.

Oiled wildlife response (OWR) is a combination of activities with the objective to minimise the impacts of an oil spill on wildlife (such as birds, mammals and reptiles) by both prevention of oiling where possible and mitigating the effects on individuals following an oil spill incident.

Oiled wildlife response consists of a three-tiered approach involving:

- Primary: Situational understanding of the species/populations potentially affected (NEBA, SCAT, aerial surveillance);
- Secondary: Deterrence or displacement strategies (e.g., hazing, visual flags/balloons, barricade fences; or pre-emptive capture); and
- Tertiary: Recovery, construction of operating unit, transport, waste management, veterinary examination, triage, stabilisation, cleaning/washing, rehabilitation, release.

The oiled wildlife response may lead to the survival of vulnerable wildlife populations. The level of oiled wildlife response required can be scaled up or down based on the predicted number of wildlife affected.

Site-specific wildlife reconnaissance would be undertaken on foot, by vehicle, by vessel or by aircraft, and should be conducted across areas potentially at risk. This activity is key to gather baseline information on the numbers of wildlife present and/or individuals oiled.
Information from the reconnaissance is then used to inform the NEBA and assist the IMT to select suitable response options.

Ongoing surveillance and monitoring may utilise surveillance and monitoring aircraft and vessel resources.

9.1.1.1 Protection of nesting/haul-out sites

Sensitive areas may be protected from the spill using protection and deflection (Section 5.2) and containment and recovery (Section 5.1) response options.

9.1.1.2 Hazing and deterrence

Hazing and deterrence are terms used for activities that are undertaken to prevent or discourage wildlife from entering contaminated sites or move them away from areas that are likely to be affected by the spill.

9.1.1.3 Pre-emptive capture

Pre-emptive capture is the capture of healthy, unoiled wildlife and transporting them to an area that is unlikely to be affected by the spill.

9.1.1.4 Triage assessments

Depending on the numbers and species of animals affected from the spill, a triage assessment may be required to ensure the best chance of long term survival. The assessment process is typically undertaken by a veterinarian under direction of the state agency.

9.1.1.5 Rehabilitation of oiled wildlife

Rehabilitation methods have been developed that aim to effectively reverse the effect of oiling, and return the health of an oiled animal back to an assumed pre-oiling state. The key stages associated with rehabilitation are:

- Stabilisation;
- Decontamination;
- Conditioning; and
- Release.

9.1.2 Waste management

OWR generates large volumes of waste contaminated with hydrocarbon attributed to large volumes of water associated with cleaning, washing and rehabilitating the oiled wildlife. Estimated volumes are provided in

Table 9-1.

Table 9-1 Estimated Waste Types and Volumes

Waste Type	Waste Volume	No. of Units	Estimated Volume
Waste Water	1 m^3 per unit (1 unit per bird)	50[1]	50 m^3
PPE	5 kg per unit	50[1]	250 m^3

1 Number of units based upon a Level 3 incident as described in DPAW (2014). This was considered to provide a suitable indication as to the number of units potentially exposed in lieu of any other appropriate estimation tool.

9.1.3 State Government Agencies

In response to a spill, an Oiled Wildlife Response will be led by the respective state response agency. The State Governments of Victoria, Tasmania and New South Wales will ultimately decide, through their control agencies, how oiled wildlife spill response operations will occur on these shorelines, however, Esso will make the Shoreline Protection Plan and Tactical Response Plans and resources to support the response available.

9.1.3.1 Victoria

The DELWP (Department of Environment, Land, Water and Planning) has primary responsibility for wildlife impacted by marine pollution in Victorian state waters, which will be defined in the Victorian Emergency Wildlife Plan for Marine Pollution (under development) and the Victorian State Maritime Emergencies (non-search and rescue) Plan (SMEP).

9.1.3.2 Tasmania

The control agencies within Tasmania are Tasmanian Ports Corporation (Tasports) within port waters and the Tasmanian EPA outside of port waters. The state Tasmanian Marine Oil Spill Contingency Plan (TasPlan) is administered by the EPA and is integrated with the National Plan, the Tasports Oil Spill Contingency Plan, the Tasmanian Emergency Management Plan and the Tasmanian Oiled Wildlife Response Plan (WildPlan).

9.1.3.3 New South Wales

New South Wales Maritime is the control agency for marine pollution control incidents within state waters in accordance with the NSW State Emergency Management Plan (EMPLAN) and the NSW State Waters Marine Oil and Chemical Spill Contingency Plan which is a sub-plan of the EMPLAN.

If an incident occurs in Commonwealth waters and has the potential to enter state waters, State Agencies must be immediately notified and Esso will support and provide resources when requested. Esso personnel may also be deployed under the direction of State to undertake wildlife response activities, however only trained people can interact with oiled fauna species.

9.2 Environmental Impact Assessment of Oiled Wildlife Response

Nearshore OWR activities are likely to be undertaken on foot or by smaller crafts that may be launched from a number of different locations along the coastline. Access to the crafts, equipment and transit to the affected areas may disturb local fauna and sensitive habitats.

A number of activities associated with this response involve direct contact with wildlife e.g. pre-emptive capture, rehabilitation and cleaning animals, and their release. These activities will only be undertaken by trained personnel and vets.

Wildlife rehabilitation centres will be constructed where required and should include reliable systems for the supply of potable water, electricity, heating or cooling, and ventilation that meet the specific wildlife requirements as well as amenities for personnel including food and lodging, waste disposal and communications. The construction of rehabilitation centres for OWR activities will be controlled by the state agency.

Wildlife response activities, specifically running a rehabilitation centre, generates large volumes of waste. There is a potential for secondary contamination through the handling of oiled wildlife and waste generation.

9.2.1 Impact Assessment

Environmental aspects associated with implementing oiled wildlife response activities were identified and evaluated in Table 9-2. Implementing this response option introduces new environmental aspects which are not assessed within Volume 2:

- Physical Presence - Nearshore and Shoreline Users (refer to assessment in section 6.1)
- Physical presence - Interaction with Fauna and Flora (refer to assessment in section 6.2)

An impact assessment for each environmental aspect has been undertaken and additional controls have been identified to minimise the environmental impacts associated with the oiled wildlife response activities which are detailed within the ALARP assessment.

Table 9-2 Acceptability of Environmental Impacts from Oiled Wildlife Response

Factor	Demonstration Criteria	Criteria	Rationale
Principles of Ecologically Sustainable Development (ESD)	No potential to affect biological diversity and ecological integrity (i.e. Consequence Level is not I).	✓	All the aspects related to oiled wildlife response have been evaluated as having the potential to result in a Level IV consequence.
	Activity does not have the potential to result in serious or irreversible environmental damage.	✓	All oil spill response activities are implemented with the aim of reducing the overall environmental impact. Mobilising an OWR is an inherent part of minimising the impacts from an oil spill incident on wildlife.
Legislative and other Requirements	Legislative and other requirements have been identified and met.	✓	Legislation and other requirements have been considered as relevant and include: • OPGGS Act 2006. • Protection of the Sea (Prevention of • EPBC Act. • Wildlife Act 1975 (Vic). • Nature Conservation Act 2002 (Tas) • National Parks and Wildlife Act 1974 (NSW)
Internal Context	Consistent with Esso's Environment Policy.	✓	Proposed control measures are consistent with Esso's Environment Policy, in particular, to "comply with all applicable environmental laws and regulations and apply responsible standards where laws and regulations do not exist".
	Meets ExxonMobil Environmental Standards.	✓	There is no standard related to oiled wildlife response, however the controls proposed meet the strategic objectives of the Upstream Environmental Standards.
	Meets ExxonMobil Operations Integrity Management System (OIMS) Objectives.	✓	Proposed control measures meet: • OIMS System 6-5 objective to identify and assess environmental aspects; significant aspects are addressed and controlled consistent with policy and regulatory requirements; and

			• OIMS System 8-1 objective to clearly define and communicate OI requirements to contractors. • OIMS System 10-2 objective to ensure effective response to emergencies and business disruptions that threaten the safety, security and health of the public, contractors and employees, the environment, asset integrity, and critical business operations
External Context	Stakeholder concerns have been considered / addressed through the consultation process.	✓	No specific stakeholder concerns have been raised.

Table 9-3 ALARP Demonstration of Potential Impacts of Oiled Wildlife Response

ALARP Decision Context and Justification	Decision Context A Oiled wildlife response activities are standard practice for hydrocarbon spills to minimise the impacts resulting from an oil spill on wildlife. There is a good understanding of potential impacts from oiled wildlife response activities. This response option would be supported by an incident specific NEBA. All activities undertaken in state waters will be led by the state control agency. Good Practice control(s) have been identified to ensure environmental impacts associated with mobilising this response are reduced to ALARP, these controls will be implemented by the State Control Agency in a response scenario and have been included in the OPEP. Esso believes ALARP Decision Context A should apply.		
Good Practice	**Adopted**	**Control**	**Rationale**
NEBA completed prior to conducting OWR operations.	✓	NEBA process.	The NEBA supports the implementation of the response strategies, and an operational NEBA is undertaken throughout the emergency response.
Minimise impacts to coastal environmental sensitivities.	✓	Shoreline Protection and Clean Up Plan and TRPs.	Shoreline Protection Plan & Tactical Response Plans (TRPs) that consider local environmental sensitivities and habitats are provided to the control agency.

Table 9-4 Engineering Risk Assessment

Additional, Alternative, Improved Controls	**Benefit**	**Cost / Feasibility**	**Adopted**
None Identified			

9.3 Capability Assessment of Oiled Wildlife Response

A detailed capability assessment has been undertaken to ensure that Esso has access to sufficient resources to complete oiled wildlife response activities in a timely manner. The assessment concluded sufficient resources are available within acceptable timeframes to conduct this response.

Oiled wildlife is led by the state government and a variety of organisations will provide resources to assist the response, therefore Table 9-5 details the resources available by organisation.

Table 9-5 Oiled Wildlife Resources Availability

Organisation	Resource Availability	Expected Timeframe
DELWP	Resources 1 x OWR Kit (Bairnsdale) 1 x OWR Kit (Colac) 1 x OWR Kit (Port Phillip) 1 x OWR Kit (Warrnambool) 1 x State-wide Trailer Agreement - Phillip Island Nature Park 6x staff - Wildlife emergency response. 17x Wildlife Team Leaders. 5x IMT Members. Approx. 45 volunteers – Collection/Facility Operations/Rehabilitation. Approx. 20 staff – Animal Feeding.	DELWP will make the decision to stand up resources which are based in Victoria. They are expected to be available <24 hours from request for services.
ExxonMobil	Personnel Regional Response Team - OWR Core Team 12x Trained Personnel	Remote support <12 hours from notification. In-country support <72 hours from notification.
AMOSC	Resources 2x OWR Containers (Geelong and Fremantle). 4x OWR Box Kits. Personnel OWR Coordinator 18x OWR Industry Team Contingency Agreements Memorandum of Understanding with Phillip Island Nature Park Call off Contract with DWYERtech NZ. A minimum of two personnel teams, to fulfil role of facilities manager and facilities coordinator.	Geelong container available onsite <24 hours of request for services. Kits would be available at site <24 hours of request for services. OWR Coordinator <24 hours OWR Industry Team <48 hours DWYERtech available <24 hours of AMOSC request for service.
OSRL	Resources 3x OWR Search and Rescue kits 1x OWR Intake and Triage kit 4x Cleaning and Rehabilitation kits 1x Wildlife Rehabilitation Unit 50% of the above inventory is available during an incident. Agreements Sea Alarm 1x Full time availability of one Sea Alarm expert for advice and potential mobilisation to the affected site. 1x Full time availability of one Sea Alarm expert for advice and response support. This expert will not be mobilised but provide advice and support from Sea Alarm office in Brussels or OSRL Premises.	Singapore based equipment can be mobilized to Melbourne airport <72 hours. Can be activated 24/7 as part of a wider OSRL mobilization.
AMSA	Resources 4x OWR Containers Personnel	Available through NATPLAN. Containers process approximately 100 units per day. Deployment of such resources to the Gippsland

	National Plan: State/NRT Personnel (>100 persons)	region would be expected to take 48-72 hours (road travel) from request for services.
NSW Maritime	Resources 1x OWR Container	Available through NATPLAN. Containers process approximately 100 units per day. Deployment to the Gippsland region would be expected to take 48-72 hours (road travel) from request for service.
WA Department of Biodiversity and Attractions	Resources 1x OWR Container	Deployment to the Gippsland region would be expected >72 hrs (road travel) from request for service.
Waste Management Contractor	Onshore waste management arrangements.	Esso have a contract with a third party waste management service to provide transport and disposal of solid and liquid wastes. • 4,500m³ bulk hard waste (soil/sand). 3,000,000L of liquid waste (oil in water).

Table 9-6 Oiled Wildlife Resources Availability

Good Practice	Adopted	Control	Rationale
Pre-arranged access to equipment and personnel to support OWR.	✓	Agreement in place with AMOSC.	Agreement with AMOSC provides resources and equipment required for OWR activities.
Pre-arranged access to equipment and personnel to support OWR.	✓	Agreement in place with OSRL.	Agreement with OSRL will provide equipment and personnel for OWR activities.
Pre-arranged access to personnel to support oiled wildlife response.	✓	ExxonMobil Regional Response Team (RRT).	ExxonMobil have a global team available for OWR activities.
Agreement with waste contractor in place.	✓	Agreement with waste management contractor.	Waste arrangements for removal of waste to approved disposal or treatment facilities in accordance with EPA requirements.

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Appendix A – Bass Strait Oil Pollution Emergency Plan

Esso Australia Resources Pty Ltd

Bass Strait
Oil Pollution Emergency Plan

Document Number: AUGO-EV-ELI-001

OIMS MANUAL - DOCUMENT CONTROL DETAILS

TITLE:	Bass Strait Oil Pollution Emergency Plan
REVISION:	0
REVISION STATUS:	Issued for NOPSEMA acceptance
DATE OF ISSUE:	21 August 2019
DOCUMENT ADMINISTRATOR:	Environment & Regulatory Advisor
OIMS DOCUMENT CATEGORY:	Special Controls Mandatory
MPI CLASSIFICATION:	None
RETENTION PERIOD:	IND, MIN ACT+10+LC (Indefinite, Retain while current + 10 years, then obtain Law Clearance prior to disposal)
MASTER STORAGE LOCATION:	Udocs (OIMS 10-2 Emergency Prep & Response)

APPROVALS:

Rev 0	Name	Position	Signature	Date
Prepared by:	Sean Hine	Regional EP&R Advisor		
Endorsed By:	Carolyn Thomas	Offshore Risk, Env. & Regulatory Supervisor	On file	
Document Owner:	Carolyn Thomas	Offshore Risk, Env. & Regulatory Supervisor		
Approved By	Simon Kemp	Offshore Asset Manager	On file	

Endorsed / approved by Esso Australia Pty Ltd, for and on behalf of Esso Australia Resources Pty Ltd.

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Rev	Revision / Status	Date	Prepared by	Approved By
A	Issued for Review (IFR)	July 2019	Sean Hine	Simon Kemp
0	Issued for acceptance	21 August 2019	Sean Hine	Simon Kemp

DOCUMENT REVIEW AND UPDATE:

The Document Owner is responsible for maintaining and controlling changes to this document in accordance with the Document Management Manual (AUGO-PO-DMM-001). In the course of using this document, users may identify opportunities to improve its content. They are requested to provide suggestions to the Document Owner.

This document should be reviewed for accuracy and currency on a 5 yearly basis commencing from the original formal issue date. Major revisions to this manual are to comply with the OIMS System Manual/Process Management of Change procedures.

DISTRIBUTION:

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Rev	Recipient/Role	Location	Distribution via
00	SSHE Group Administrator	Docklands	Email/electronic

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Definitions and Abbreviations

ADIOS2	Automated Data Inquiry for Oil Spills 2
ALARP	As low as reasonably practicable
AMOSC	Australian Marine Oil Spill Centre
AMOSPlan	Australian Marine Oil Spill Plan
AMSA	Australian Maritime Safety Authority
BBMT	Barry's Beach Marine Terminal
BIA	Biologically important area
CA	Control agency
CG	AMOSC core group
CMR	Commonwealth Marine Reserve
CoP	Common operating picture
DELWP	Department of Environment, Land, Water and Planning
DPIPWE	Department of Primary Industries, Parks, Water and Environment (Tasmania)
DODI	Diamond Offshore Drilling Inc
DoEE	Department of the Environment and Energy (Cth)
DOT	Department of Transport (Vic)
DRET	Department of Resources, Energy and Tourism (Cth)
EAPL	Esso Australia Pty Ltd
EMBA	Environment that may be affected (see also ZPI)
EMBSI	ExxonMobil Biomedical Sciences Inc
EMD	Emergency Management Division (part of DOT)
EMMV	Emergency Management Manual Victoria
EP	Environment plan
EPA	Environment Protection Authority
EP&R	Emergency preparedness and response
ERM	Emergency response manual
ERR	Earth Resource Regulation (part of the DJPR)
ERT	Emergency response team
ESG	Emergency support group
EUL	Environment unit lead
EWMS	Esso Work-Method Statement
FWADC	Fixed-wing aerial dispersant capability
GOR	Gas–oil ratio
IAP	Incident action plan
IC	Incident commander
ICP	Incident command post
ICS	Incident command system

IMT	Incident management team
IPIECA	International Petroleum Industry Environmental Conservation Association
JSA	Job safety analysis
JSCC	Joint Strategic Coordination Committee
KEF	Key ecological feature
LIP	Long Island Point
LSC	Logistics section chief
LCM	Lead country manager
LOWC	Loss of well control
MDO	Marine diesel oil
MENSRP	Maritime Emergency (Non-search and Rescue) Plan
MES	Monitoring, evaluation and surveillance
MOH	Medical and occupational health personnel
MNES	Matter of National Environmental Significance
NATIONAL PLAN	National Plan for Maritime Environmental Emergencies.
NEBA	Net environmental benefit analysis (Items of)
NES	National environmental significance
NM	Nautical mile (also M, nmi)
NOAA	National Oceanographic and Atmospheric Administration (USA)
NOPSEMA	National Offshore Petroleum Safety and Environmental Management Authority
OIM	Offshore installation manager
OSC	Operations section chief
OPEP	Oil Pollution Emergency Plan
OPGGSA	Offshore Petroleum and Greenhouse Gas Storage Act 2006 (Cth)
OSA	Oiled shoreline assessment
OSMP	Operational and Scientific Monitoring Program
OSR	Oil spill response
OSRA	Oil spill response atlas
OSRL	Oil Spill Response Limited
OSTM	Oil spill trajectory modelling
OWR	Oiled wildlife response
PCR	Production control room
PEAR	People, environment, assets, reputation
P&GA	Public & Government Affairs
PPE	Personnel protective equipment
PSC	Planning section chief
PSZ	Petroleum safety zone
POLREP	Pollution report form

POWBONS	Pollution of Waters by Oil and Noxious Substances Act 1987 (Cth)
RMS	NSW Roads and Maritime Services
RRT	Regional response team
SC	Section chief
SCAT	Shoreline clean-up assessment technique
SDS	Safety data sheet (formerly MSDS)
SERP	Victorian State Emergency Response Plan
SSH&E	Safety, security, health, and environment
SITREP	Situational report
SITU	Situation unit of the incident management team
SMPC	State Marine Pollution Controller
SOPEP	Shipboard Oil Pollution Emergency Plan
TASPLAN	Tasmanian Marine Oil Spill Contingency Plan
TRP	Tactical response plan
WOMP	Well operations management plan
WMP	Waste management plan
WMM	Waste management manual
WWV	ExxonMobil Drilling Worldwide Ventures
VM	Vessel Master
ZPI	Zone of potential impact (also see EMBA)

1 Spill Response Operations

This section of the plan details the actions that Esso will undertake in the event of a hydrocarbon spill resulting from an Esso activity.
All staff are to be guided by the following spill response incident flow chart:

Assesment & 1st Strike

- Inital actions upon detection of a spill
- **Section 3.1.1**

Initial Response 0-12 hours

- Call outs and internal stand up of Esso response teams
- Reactive actions - checklists for the first 0-12 hours
- **Section 3**

12-48 hours Reactive operations

- Reactive actions - checklists for the first 12-48 hours
- State waters or Shoreline impact - **Section 4.1**
- No shoreline impact. Commonwealth waters only - **Section 4.2**

48+ hours Ongoing Actions

- Proactive actions - initiate the ongoing tasks
- **Section 5**

Description of ongoing actions

- Menu of oil spill response activities
- **Section 5.5 - 5.10**

Figure 1-1 Spill Response Incident Flow Chart

Sustain spill response until termination end points (refer to Section 5.5-5.10) and environmental performance objectives (refer to relevant EP) are reached for each activity.

2 Quick Reference OPEP Information

2.1 Location

This OPEP applies to spills from petroleum activities linked to Seahorse, Kipper and Tarwhine production assets (including BTA-SHA65, BTA-TWA65, BTA-LFD450, BTA-LFD150, SHA-BTA150, TWA-BTA200 pipelines and secondary lines). It also includes drilling in the area known as West Barracouta (VIC/L1).

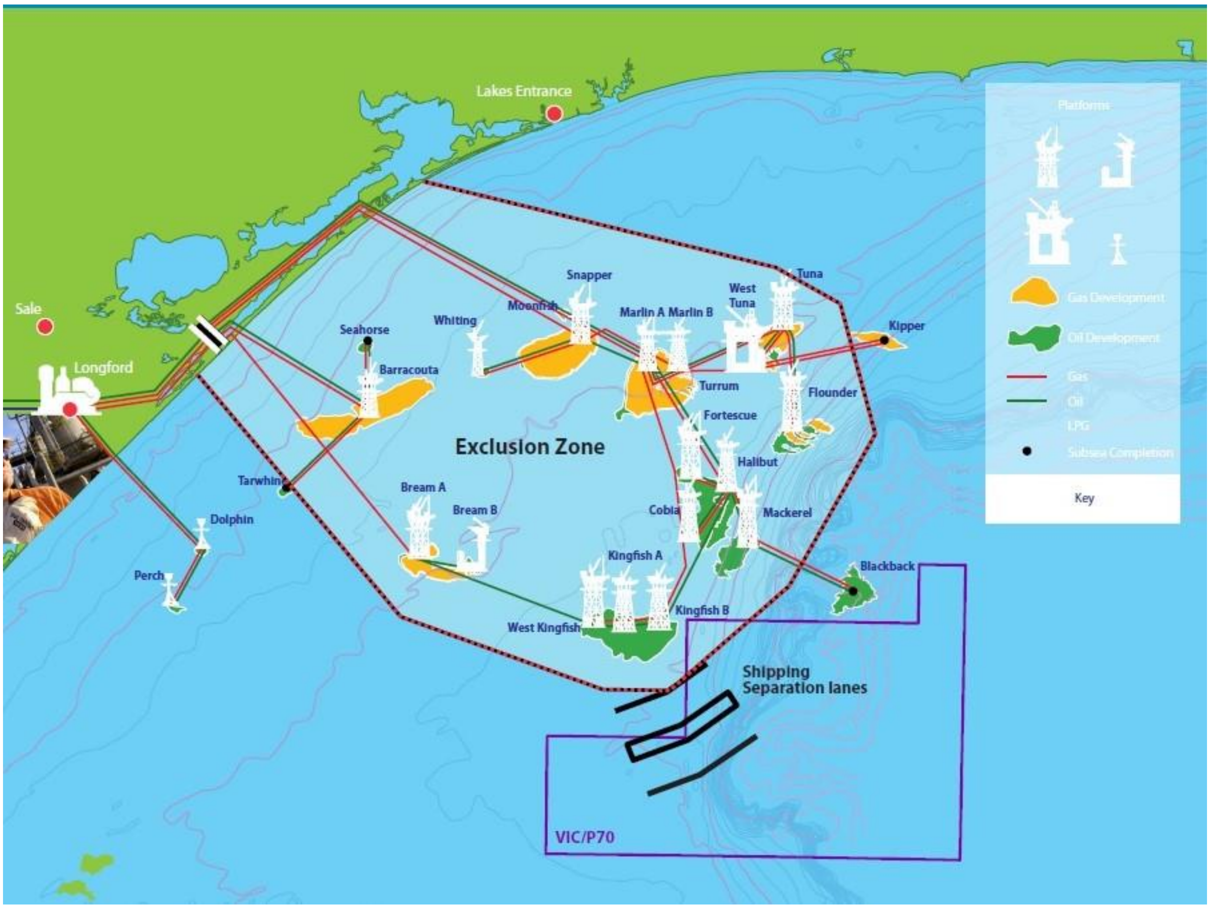


Figure 2-1 Asset Location

2.2 Potential Oil Types

- Marine diesel oil spills from support vessels may occur in connection with day-to-day work being carried out on any of the assets or in relation to drilling, or spill from a production or drilling asset.
- A group-one light crude oil is produced from Tarwhine and Seahorse.
- Gas and condensate are produced through Barracouta production wells, and are expected from the West Barracouta development.

2.3 Area That May Be Affected

Multiple spill trajectory 'runs' have been conducted to evaluate the effect of worse-case discharge spills from Tarwhine, Seahorse, Kipper and West Barracouta activities. These runs include the longest length of coastline oiled, largest volume of oil ashore, and greatest extent of actionable/visible floating oils.
In all cases, specific runs from the Seahorse facility produced an indication of the greatest geographic extent of a spill's effect.

This data is displayed below:

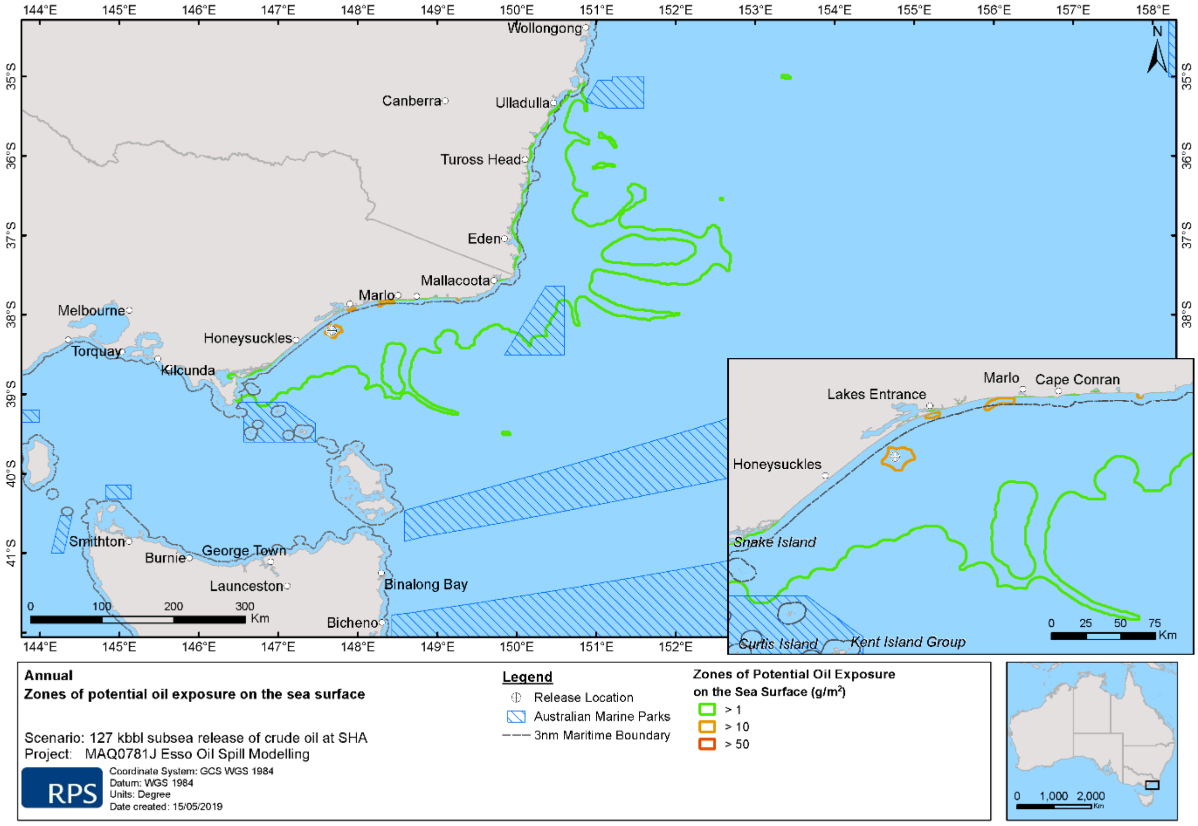


Figure 2-2 Area That May Be Affected – Seahorse Worst Case Credible Spill Scenario

The greatest shoreline extents of a Seahorse worse-case credible spill have also been generated. These are displayed below:

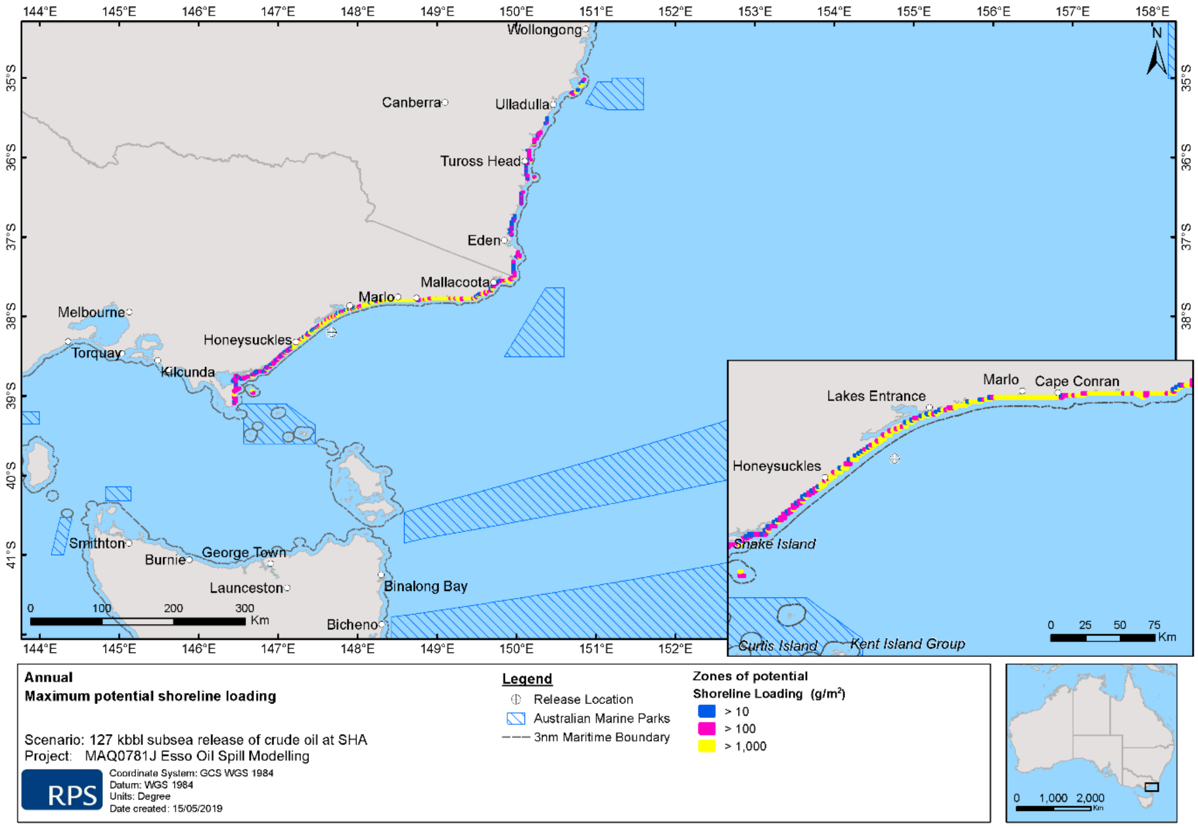


Figure 2-3 Greatest Shoreline Extents - Seahorse Worst Case Credible Spill Scenario

There are ranges of ecological, economic and social sensitives within these impact zones. These include:

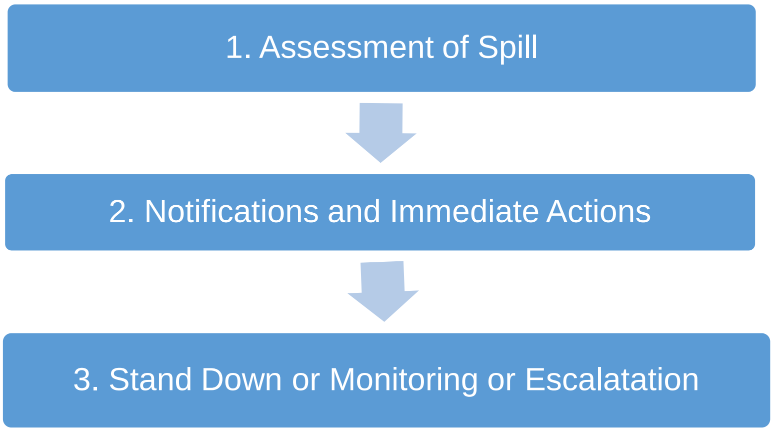
- The Victorian and NSW shorelines from Wilsons Promontory to Eurobodalla
- Coastal and blue-water ocean zones
- Flora and fauna that inhabit the pelagic and benthic marine environments.

An extensive description of the different types of sensitivities can be found in the Esso NEBA and in the Volume Two of the Environment Plan related to each activity.

3 Initial Oil Spill Response Actions – Assessment & Escalation 0–12 hours

3.1 Flowchart of Initial Processes

Upon detection of a spill, Esso will undertake a three-step process, as follows:



Each step is outlined in greater detail below.

3.1.1 Assessment of Spill – Emergency Response Incident Management Teams

Upon detection of a spill, Esso will form a field-based Emergency Response Team (ERT), which will undertake the following actions:

- Begin a risk assessment in order to determine (and then execute) safety mitigations,
- Determine the size, bearing/trajectory and fate (weathering) of the spill,
- Judge the potential environmental impacts and the appropriate actions necessary to reduce those impacts,
- Execute any available source control options/first-strike response actions, and
- Notify the shore-based Esso duty IC of the incident await further instructions as to the appropriate actions to take.

The ERT is to use the following checklist as a way to direct these immediate steps.

Table 3-1 ERT Immediate Actions

Who	What	Minimum time to implement	✓/✗
Observer of Spill	Report the spill to the Offshore Installation Manager (OIM) or Vessel Master (VM).	ASAP	☐
OIM/VM	Secure operations, assess and report damage. Isolate spill source if it is safe to do so – implement pipeline de-pressurisation or leak response procedures. Refer to ERM V2-052-008 for response to unknown source.	ASAP	☐
OIM/VM	Ensure that all personnel are accounted for.	ASAP	☐
OIM/VM	Conduct a hazard assessment to determine the potential for fire, explosion, and hazardous/toxic vapours as well as to define the personal protective equipment (PPE) needed by responders.	ASAP	☐

Who	What	Minimum time to implement	✓/✗
OIM/VM	Implement spill mitigation measures to prevent further oil from entering the water, providing it is safe to do so. Activate the ERT as required.	ASAP	☐
OIM/VM	Report the incident to the Field Superintendent. The Field Superintendent is then to initiate upward internal communications to the Duty Incident Commander. Observe and include the following information in the brief: • Number of injuries. • Note ongoing immediate hazards to life (such as risk of fire or explosion). • Description of incident. • Location of the incident. • Status of source. • Time of incident. • People and assets involved in the incident. • Current field objectives/actions. • Details of support required from the Esso IMT.	ASAP	☐
OIM/VM	Observe and report on weather and sea states, including: • Current/tide-stream speed, direction and period • Wind speed, direction and period • Wave height and direction • Swell height and direction.	ASAP	☐
OIM/VM	Observe and determine the spill trajectory (manual estimation), noting: • The speed and direction of the spill.	ASAP	☐
OIM/VM	Observe and determine the likely spill type and volume: • Is the source contained, ongoing, isolated or stopped? • Provide a visual description of the slick (e.g. is it breaking up, floating, sinking, etc.) • What type of spill is it (diesel, gas, condensate, slops, light crude or waxy crude oil)? • Calculate/estimate the spill volume (refer to OSMP O1 – Oil Spill Surveillance).	ASAP	☐
OIM/VM	Observe and note any immediate sensitivities in the area at risk from the spill: • Note the presence of people, environmental sensitives (e.g. fauna, reef, etc.), as well as any of Esso's or other organisations' assets.	ASAP	☐
OIM/VM	Request helicopter overflight and commence regular surveillance of the spill. Evaluate spill weathering.	ASAP	☐
OIM/VM	Remain available to update the Offshore Incident Management Team.	Ongoing	☐
OIM/VM	Evaluate the incident and determine the incident classification/level based on the below national plan levels (refer to *Table 3*). Confirm this level with the on-call/duty Incident Commander.	ASAP	☐

Who	What	Minimum time to implement	✓/✗
OIM/VM	Report the incident to NOPSEMA as per *Table 4*	ASAP and within 2hrs	☐

Once the Duty IC has been notified of the spill, go Table 3-2

Table 3-2 IMT Immediate Actions

Who	What	Minimum time to implement	✓/✗
Duty IC	Establish communications with the Platform/Vessel/ERT Leader, obtain situational awareness briefing and determine the next steps. Confirm the following details with the field-based team: • Incident details – what happened? • What are the current field operations? • What are the immediate incident objectives and priorities? • What support is required from the Esso IMT in order to execute the immediate objectives?	ASAP	☐
IC	Activate the Esso IMT – Deputy IC, OSC, PSC, LSC, SO and EUL, following which: • Provide an initial incident briefing to the Esso IMT • Commence the incident action-planning process • Commence the size-up of the incident • Establish incident response aim and objectives and offer support to the affected facility. • Begin working to meet incident and oil spill response objectives.	< 60 mins	☐
IC	Notify the ESG Leader of the incident and request ESG support as required.	ASAP	☐
IC	Notify SHE&S, P&GA and security of the incident.	ASAP	☐
IC	In conjunction with the PSC, EUL and the SHE&S team, determine and confirm the appropriate response level. Use the *Response Level Assessment Table 3* below to drive this process.	4 hours	☐
IC, PSC and OSC	Determine the response required of Esso: • Stand down – no spill/no oil left • Level One – monitoring of site-based response until completion • Level Two or Three – significant field and IMT escalation with significant additional resources required.	5 hours	☐
Once ERT- and IMT-based assessment tasks are completed, move on to Section 3.1.2.			

3.1.2 Notifications and Immediate Actions

Once a spill has occurred, the Esso IMT is required to complete several statutory notifications, which vary based on the spill level. Notifications and immediate actions are to be concurrently completed by different members and sections of the IMT.

As these tasks are completed, the Esso IMT should be aiming to mobilise resources in line with the following guide:

Table 3-3 Response Level Assessment & Resourcing Guide

Response Level Assessment

On the basis of information gathered by the ERT/IMT, and in conjunction with the PSC/SHE&S team, a spill level is to be determined using the following indicators:

Criteria	Level One Indicators	Level Two Indicators	Level Three Indicators
Type	Non-persistent oils (>50% loss after 24 hours)	Persistent oils (<50% loss after 24 hours)	Persistent oils (<25% loss after 24 hours)
Location	Located within a 3 NM radius of the spill location	Spreading/moving into adjacent waters, presenting a threat to state waters	Spreading/moving into state waters and shorelines
Direction/heading	Not moving/heading offshore	Heading onshore/towards state waters	
Spill status	Small single release	Ongoing/large single release	
Ecological impact	Isolated impacts/no impact; natural recovery expected within days/weeks	Significant impacts across a single area; natural recovery may take weeks/months	Significant impacts across a large area; recovery may take months/years
If any one of the above criteria are triggered, adopt the higher-level response until de-escalation can occur.			

Resourcing Guide by Level		
Level 1 Response	Level 2 Response	Level 3 Response
• Dealt with predominantly by the ERT, using existing Esso business-as-usual resources. • Supported by Victoria-based Esso resources; may involve the use of AMOSC technical advice or resources. • Of short duration. • Requires Tier One (local) resources.	• Requires assistance external to the site and a formal command and control structure. • IMT and ERT stood up; planning 'P' process implemented as soon as possible. • ERT resources supplemented by AMOSC resources, Victoria State and NatPlan resources. • Of short or medium-term duration. • Potential for significant state government engagement (shoreline and P&GA). • Requires both Tier One and Tier Two resources.	• Requires expanded IMT and full use of ICS processes with multiple planning periods. • Planning 'P' process used fully. • Extensive external national and (potentially) global resources (both in terms of personnel and technical and equipment-based resources). • Results in a lasting campaign/project duration. • Requires significant state and Australian government engagement. • Tiers One, Two and Three resources mobilised.

The required notifications are outlined below:

Table 3-4 Notifications

Who	What	Minimum time to implement	✓/✗
IC or Deputy IC EUL	A reportable incident is one that has caused, or has the potential to cause, moderate to significant environmental damage (interpreted as the following): • Unplanned release of hydrocarbon liquid or chemicals exceeding 80 litres into the marine environment caused by, or suspected to have been caused by, petroleum activities. • Unplanned injury or death of a cetacean or listed threatened/migratory/marine species caused by, or suspected to have been caused by, petroleum activities. Required for: all spills >80 litres. Notify the NOPSEMA Duty Officer: Tel: 08 6461 7090 Relay the known key facts of the spill – location, source, size and type – as well as incident factors causing the spill, and current assessed spill level. Follow up with a written record of the notification to NOPSEMA as soon as practicable (NOPSEMA N-03000-FM0831) but within three days[1].	<2 hours <3 days	☐ ☐
Vessel Master	Required for: all spills from vessels.	<2 hours	☐

[1] As per Schedule 3 of the *Offshore Petroleum and Greenhouse Gas Storage Act 2006* (Cth) and as outlined in the NOPSEMA Notification and Reporting of Environmental Incidents form N-03000-GL0926 Clause 82.

Who	What	Minimum time to implement	✓/✗
	Notify the Rescue Coordination Centre: Tel: 1800 641 792 Follow up with the completion and submission of a pollution report. https://www.amsa.gov.au/forms/harmful-substances-report-polrep-oil Relay the known key facts of the spill – location, source, size and type – as well as incident factors causing the spill, and current assessed spill level.	<24 hours	
EUL	Required for: all spills >80 litres: Notify the DJPR ERR and NOPTA via email: Email: DJPR: **operational.reporting@ecodev.vic.gov.au** Email: NOPTA: **reporting@nopta.gov.au** Relay the known key facts of the spill – location, source, size and type – as well as incident factors causing the spill, and current assessed spill level.	<6 hours	☐
IC or Deputy IC	Requirement: all spills that could impact Victorian state waters (>80 litres). Notify the DOT EMD Duty Watch Officer: Tel: [redacted] Email: semdincidentroom@ecodev.vic.gov.au Relay the known key facts of the spill – location, source, size and type – as well as incident factors causing the spill, and current assessed spill level. For Level Two and Level Three spills, exchange liaison officers between Esso and the DOT EMD.	<6 hours	☐ ☐
	Required for: all spills that could impact NSW waters. Notify the *Transport for NSW* Duty Officer of the need to stand-up state response arrangements. Transport for NSW Duty Officer: Tel: 02 9962 9074		☐
	Required for: all spills that could impact Tasmanian waters.		

Who	What	Minimum time to implement	✓/✗
	Notify the Tasmanian DPIPWE of the need to stand-up state response arrangements. Tasmanian DPIPWE Pollution Incidents and Complaints: Tel: 1800 005 171 The initial verbal notification must be followed up by an email containing a more detailed Pollution Incident Report to incidentresponse@epa.tas.gov.au		
EUL	Required for: all spills that are within a marine park, or could impact a marine park. Notify the Director of National Parks via the 24-hour Marine Compliance Duty Office: Tel: [redacted]	<12 hours	☐
	Required for: all spills that impact or have the potential to impact on matters of national environmental significance (NES)[2] including protected and migratory species, Commonwealth Marine Reserves and Ramsar Wetlands. Notify the Department of the Environment: Tel: 1800 803 772	< 12 hours	☐
Once all appropriate authorities have been notified, move onto the appropriate immediate actions tables, for levels **one, two** or **three** below, depending on severity.			

Following the notifications, immediate actions by spills level are as follows:

Table 3-5 Level One - 0-12 hour Actions

Who	What	Minimum time to implement	✓/✗
IC	In conjunction with the ESG leader, ensure all necessary regulatory notifications have been made.	12 hours	☐
IC	Commence the planning cycle (the 'stem' of the planning 'P'): • Establish incident aim • Establish incident response aim and objectives • Determine appropriate initial strategies and tactics to achieve objectives.	ASAP – <2 hours	☐
OSC	If the source is not controlled, establish a Source Control Branch to develop and implement the Source Control Plan.	ASAP	☐
OSC	Undertake aerial surveillance: • Deploy surveillance by crew change or contracted aircraft. • Initiate mobilisation of a trained aerial observer – Esso or AMOSC. • Obtain photographs or video footage. • Obtain completed aerial observer's report and pass to the PSC/SITL.	ASAP, then 2x daily	☐
OSC	Deploy a regular watch of the affected assets/vessel – confirm heading/changes to the situation.	ASAP then by reporting exception.	☐
LSC	Confirm the location of aerial and marine assets currently contracted to Esso.	4 hours	☐
PSC	Initiate specific elements of O1 of OSMP, including the tasks below.	ASAP	☐
PSC	Monitor and predict weather and sea states: • Consult meteorology services to determine water current and wind speed data, either from http://www.bom.gov.au, http://www.marineweather.net.au, or MetConnect (http://www.metconnect.co.nz): ○ Username: Esso ○ Password: basswx.	4 hours	☐
PSC	Conduct a manual forecast of the spill trajectory: • Determine the direction of the spill. • Determine if the spill is likely to cross into state waters or shorelines or if it might impact other sensitivities.	4 hours	☐
PSC	Should oil cross into state waters or impact shorelines, organise third-party trajectory modelling of the spill trajectory: • Organise urgent oil-spill trajectory modelling via AMOSC, OSRL, or EMBSI.	4 hours	☐
SITL	Establish a common operating picture – a graphical representation of the spill and its location. • Display overflight, OSTM/manual vectoring data on CoP.	4 hours	☐
PSC	Prepare and disseminate SITREPs as more information becomes available. The IC is responsible for determining the frequency of these updates.	Ongoing	☐
PSC	Consult the NEBA (Ref OPEP section 5.2)), identify potential exposed environmental sensitivities based on spill trajectory, and develop an incident action plan, including a spill-specific NEBA (ref OPEP 7.5).	12 hours	☐

Once these actions are complete, please move to **Section Four** of this plan

* Ability to deploy subject to available daylight and weather conditions

Table 3-6 Level Two - 0-12 hour Actions

Who	What	Minimum time to implement	✓/✗
IC	Seek alignment on incident objectives from the ESG.	ASAP	☐
IC	In conjunction with the ESG leader, confirm all necessary regulatory notifications have been made.	<2 hours	☐
IC	Commence the planning cycle (the 'stem' of the planning 'P'): • Establish the incident response aim. • Establish the incident objectives. • Determine appropriate strategies and tactics to achieve objectives.	ASAP – <6 hours	☐
IC	Establish a locally based Esso IMT, including representatives from the Deputy IC, Ops SC, Aviation Unit, Log SC, Planning SC, Environmental Unit and Situation Unit.	<2 hour	☐
IC	Establish a line of communications with DOT IMT and exchange Liaison Officers.	ASAP – <2 hours	☐
IC/OSC/PSC	Determine and agree on the need for a separate Source Control Branch	ASAP	☐
OSC	If the source is not controlled, establish a Source Control Branch to develop and implement the Source Control Plan.	ASAP	☐
OSC	Undertake aerial surveillance: • Initiate aerial surveillance using the crew change helicopter or contracted aircraft. • Initiate the mobilisation of a trained aerial observer – Esso or AMOSC • Obtain photographs or video footage of the incident • Obtain a completed aerial observer's report and pass to the PSC/SITL.	ASAP, then twice daily	☐
OSC	Mobilise a satellite tracking buoy to spill location (weather dependent).	ASAP – <12 hours	☐
LSC	Confirm the location of aerial and marine assets currently contracted to Esso. Confirm the location and availability of vessels of opportunity in Victoria, as follows: • Contact Atoll Offshore on 03 5116 1511 or [redacted] Contact Bhagwan Marine on +61 7 3907 3111 [redacted] Confirm the location and availability of aerial assets that may be used for aerial observation. • Contact Bairnsdale Air Charter on 03 5152 4617.	4 hours	☐

Who	What	Minimum time to implement	✓/✗
LSC	Notify the waste contractor of potential resource needs.	<12 hours	☐
LSC	Notify the marine and aviation FOBs of the need to conduct spill response operations and prepare area and hardstand. Marine bases BBMT Marine Supervisor [redacted] Lakes Entrances 03 5116 1511 (Atoll Offshore) Airfields Esso Longford Heliport [redacted] West Sale Airfield 1300 366 244 Tyabb Airfield 03 5977 4406.	<6 hours	☐
LSC	Identify and call-out Esso Core Group members – establish current location and timeframe to deploy to field-based ICP.	<6 hours	☐

LSC	Request that the AMOSC Technical Advisor come to the site (IMT) and that the AMOSC Operations Officer enters the field (ICP).
	
	Request that AMOSC undertake the call-out of CG resources (these should be mobilised in the Gippsland region).
	
	Request that AMOSC hire and mobilise x 6 satellite tracking buoys to Longford Heliport.
	
	Discuss potential equipment and service needs (spill-type specific) with AMOSC, consisting of:
	
	• Equipment for two x offshore containment & recovery strike teams, each comprising:
	  ○ 3 reels of Ro-boom (or high speed sweep system)
	  ○ Skimmer package comprising and LWS500 or similar
	  ○ Temporary vessel storage (deck bladders, intermediate bulk containers or towable barges)
	• Equipment to execute the shoreline TRPs
	  ○ Shore seal boom; fence boom; anchor kits and ancillaries.
	• Dispersant and National Plan aerial dispersant spraying capability.
		<3 hours	☐

Who	What	Minimum time to implement	✓/×
LSC	Stage BBMT-based dispersant and offshore containment and recovery equipment for deployment, consisting of: • 2 x AFEDO dispersant spray sets. • 10 x 1m³ IBCs of Corexit 9527. • 2 reels of offshore boom. • 1 x GT185 skimmer unit and power pack. • Waste liquid storage (vessel dependent). Move equipment package to wharf face, ready for load out.	<6 hours	☐
LSC	Prepare LIP-based nearshore/shoreline oil spill response equipment for deployment.	<24 hours	☐
LSC/PSC	Contact the waste management provider. Refer to PSC for advice on potential volumes and types of waste.	<24 hours	☐
PSC	Initiate specific elements of O1 of OSMP, including the tasks below.	ASAP	☐

PSC	Monitor and predict weather and sea states:
	
	• Consult meteorology services to determine water current and wind speed data, either from http://www.bom.gov.au, http://www.marineweather.net.au, or MetConnect (http://www.metconnect.co.nz):
	  ○ Username: Esso
	  ○ Password: basswx.
		4 hours	☐

PSC	Conduct ADIOS2 forecasting of oil weathering and conduct manual vectoring of the spill trajectory, as follows: • Determine the direction of the spill. • Determine if the spill is likely to cross into state waters or shorelines or if it might impact other sensitivities.	4 hours	☐
PSC	Conduct a third-party trajectory modelling of the spill trajectory: • Organise urgent oil spill-trajectory modelling using AMOSC, OSRL, or EMBSI.	4 hours	☐
SITL	Establish a common operating picture – a graphical representation of the spill and its location. Display overflight and OSTM/manual vectoring data on the CoP.	6 hours	☐
PSC	Prepare and disseminate SITREPs as more information becomes available. The IC is responsible for determining the frequency of these updates.	Ongoing	☐
EUL	Consult the NEBA (Ref OPEP section 5.2), identify potential exposed environmental sensitivities based on spill trajectory, and develop an incident action plan, including a spill-specific NEBA (ref OPEP 7.5).	ASAP	☐
EUL	Activate the OSMP 'O' modules 1.1, 1.2, 1.3 and 1.4	ASAP	☐
EUL	Review the OSMP to determine which other modules may need to be initiated.	ASAP	☐
EUL	Liaise with the state government Scientific Support Coordinator if it is anticipated that state waters or shorelines will be impacted.	6 hours	☐
EUL	Assess the need for and coordinate additional personnel to support the environmental unit.	12 hours	☐

Who	What	Minimum time to implement	✓/✗
EUL	Assess the need for and coordinate the development of specific plans, including the following: • Wildlife Management Plan • SCAT Plan • WMP • Sample Plan • Dispersant Plan • Remediation Plan. Monitor the environmental consequences of any actions. Participate in the development of plans for the next operational period.	12 hours	☐
Once these actions are complete, please move to **Section Four** of this plan.			

Table 3-7 Level Three - 0-12 hour Actions

Who	What	Minimum time to implement	✓/✗
IC	Seek alignment on incident objectives from the ESG.	ASAP	☐
IC	In conjunction with the ESG leader, confirm all necessary regulatory notifications have been made.	<2 hours	☐
IC	Commence the planning cycle (the 'stem' of the planning 'P'): • Establish the incident response aim. • Establish the incident objectives. • Determine appropriate strategies and tactics to achieve objectives.	ASAP – <6 hours	☐
IC	Establish full, locally-based Esso IMT including representatives from Deputy IC, Ops SC, Aviation Unit, Log SC, Planning SC, Environmental Unit and Situation Unit.	<2 hours	☐
IC	Establish a line of communications with the State IMT and exchange Liaison Officers.	<2 hours	☐
IC	Offer a line of communication with the AMSA and swap liaison officers.	<2 hours	☐
IC / ESG	Initiate the activation of the ExxonMobil Regional Response Team. Tel: [redacted]	<24 hours	☐
IC/OSC/PSC	Determine and agree on the need for a separate Source Control Branch.	<2 hours	☐
OSC	If the source is not controlled, establish a Source Control Branch to develop and implement the Source Control Plan (this should be made up of pipeline or well engineering teams).	ASAP	☐
OSC	Undertake aerial surveillance: • Initiate aerial surveillance using the crew change helicopter or contracted aircraft. • Initiate the mobilisation of a trained aerial observer – Esso or AMOSC. • Obtain photographs or video footage of the incident. • Obtain a completed aerial observer's report and pass to the PSC/SITL.	ASAP, then twice daily	☐
OSC	Deploy a twice-daily watch from assets/vessel – confirm heading/changes to the situation.	ASAP then by reporting exceptions.	☐
OSC/LSC	On the advice of the Drilling Engineer/Source Control Branch, mobilise the Subsea First Response Toolkit (SFRT) via the AMOSC.	4 hours	☐

Who	What	Minimum time to implement	✓/✗
LSC	Confirm the location of aerial and marine assets currently contracted to Esso. Confirm the location and availability of vessels of opportunity in Victoria, as follows: • Contact Atoll Offshore on 03 5116 1511 [redacted] • Contact Bhagwan Marine on +61 7 3907 3111 [redacted] Confirm the location and availability of aerial assets of opportunity that are suitable for aerial observation tasks. Contact Bairnsdale Air Charter on 03 5152 4617.	<3 hours	☐

LSC	Request that 3 x AMOSC Technical Advisors come to the site (IMT) and that 3 x AMOSC Operations Officers are deployed to enter the field (Marine or aviation ICPs).
	
	Request that AMOSC undertake the call-out of CG resources (these should be mobilised in the Gippsland region).
	
	Request that AMOSC hire and mobilise x 6 satellite tracking buoys to Longford Heliport.
	
	Discuss potential equipment and service needs (spill-type specific) with AMOSC, consisting of:
	
	• Equipment for two x offshore containment & recovery strike teams, each comprising:
	  ○ 3 reels of ro-boom (or high speed sweep system)
	  ○ Skimmer package comprising and LWS500 or similar
	  ○ Temporary vessel storage (deck bladders, intermediate bulk containers or towable barges)
	• Equipment to execute the shoreline TRPs
	  ○ shore seal boom; fence boom; anchor kits and ancillaries
	• Dispersant – 50m^3 of Corexit 9500A to be moved to West Sale Airport.
		<3 hours	☐

Who	What	Minimum time to implement	✓/✗
LSC	Notify the marine and aviation FOBs of the need to conduct spill response operations and prepare area and hardstand. Marine bases BBMT Marine Supervisor [redacted] Lakes Entrances 03 5116 1511 (Atoll Offshore) Airfields Esso Longford Heliport [redacted] West Sale Airfield 1300 366 244 Tyabb Airfield 03 5977 4406.	<6 hours	☐
LSC	Identify and call-out Esso Core Group members – establish current location and timeframe to deploy to field-based ICP	<6 hours	☐
LSC	• Request OSRL technical resources and notify the OSRL Duty Manager of the potential need for resources, as follows: • Contact the OSRL Duty Manager in Singapore +65 6266 1566. • Request 5 x Technical Advisors to mobilise and join the IMT.	<6 hours	☐
LSC	Stage BBMT-based dispersant and offshore containment and recovery equipment for deployment: • AFEDO dispersant spray set • 15 x 1m^3 IBCs of Corexit 9527 • 2 reels of offshore boom • 1 x GT185 skimmer unit and power pack • Waste liquid storage (vessel dependent). Move equipment package to wharf face, ready for load out.	<6 hours	☐
LSC	Notify waste contractors to prepare for potential liquid, and solid wastes – specific amounts and types to be determined.	<12 hours	☐
LSC	Prepare LIP-based nearshore/shoreline oil-spill response equipment for deployment.	<24 hours	☐
LSC/PSC	Contact the waste management provider PSC for advice on potential volumes and types of waste.	<24 hours	☐
PSC	Initiate specific elements of O1 of OSMP, including the tasks below.	ASAP	☐

PSC	Monitor and predict weather and sea states:
	
	• Consult meteorology services to determine water current and wind speed data, either from http://www.bom.gov.au, http://www.marineweather.net.au, or MetConnect (http://www.metconnect.co.nz):
	    o Username: Esso
	    o Password: basswx.
		4 hours	☐

Who	What	Minimum time to implement	✓/✗
PSC	Conduct ADIOS2 forecasting of oil weathering and conduct manual vectoring of the spill trajectory, as follows: • Determine the direction of the spill. • Determine if the spill is likely to cross into state waters or shorelines or if it might impact other sensitivities.	4 hours	☐
PSC	Conduct third-party trajectory modelling of spill trajectory: • Organise urgent oil-spill trajectory modelling via Esso/APASA/AMOSC. • Does the spill cross into state waters, shorelines or impact other sensitivities?	4 hours	☐
SITL	Establish a common operating picture – a graphical representation of the spill and its location. Display overflight and OSTM/manual vectoring data on the CoP.	4 hours	☐
PSC	Prepare and disseminate SITREPs as more information becomes available. The IC is responsible for determining the frequency of these updates.	Ongoing	☐
EUL	Consult the NEBA (Ref OPEP section 5.2), identify potential exposed environmental sensitivities based on spill trajectory, and develop an incident action plan, including a spill-specific NEBA (ref OPEP 7.5).	ASAP	☐
EUL	Activate the OSMP 'O' modules 1.1, 1.2, 1.3, 1.4 and 1.5.	ASAP	☐
EUL	• Review the OSMP to determine which other modules may need to be initiated.	ASAP	☐
EUL	Liaise with the state government Scientific Support Coordinator if it is anticipated that state waters or shorelines will be impacted.	6 hours	
EUL	Assess the need for and coordinate additional personnel to support the environmental unit.	12 hours	☐
EUL	Assess the need for and coordinate the development of specific plans, including the following: • Wildlife Management Plan • SCAT Plan • Waste Management Plan • Sample Plan • Dispersant Plan • Remediation Plan. Monitor the environmental consequences of any actions. Participate in the development of plans for the next operational period.	12 hours	☐
Once these actions are complete, please move to **Section Four** of this plan.			

4 Initial Oil Spill Response Actions: Reactive Operations 12–48 hours

Following the immediate action and assessment process, Esso will establish an IMT structure appropriate to mount actions as required for the response. Recommended minimum IMT structures are as below:

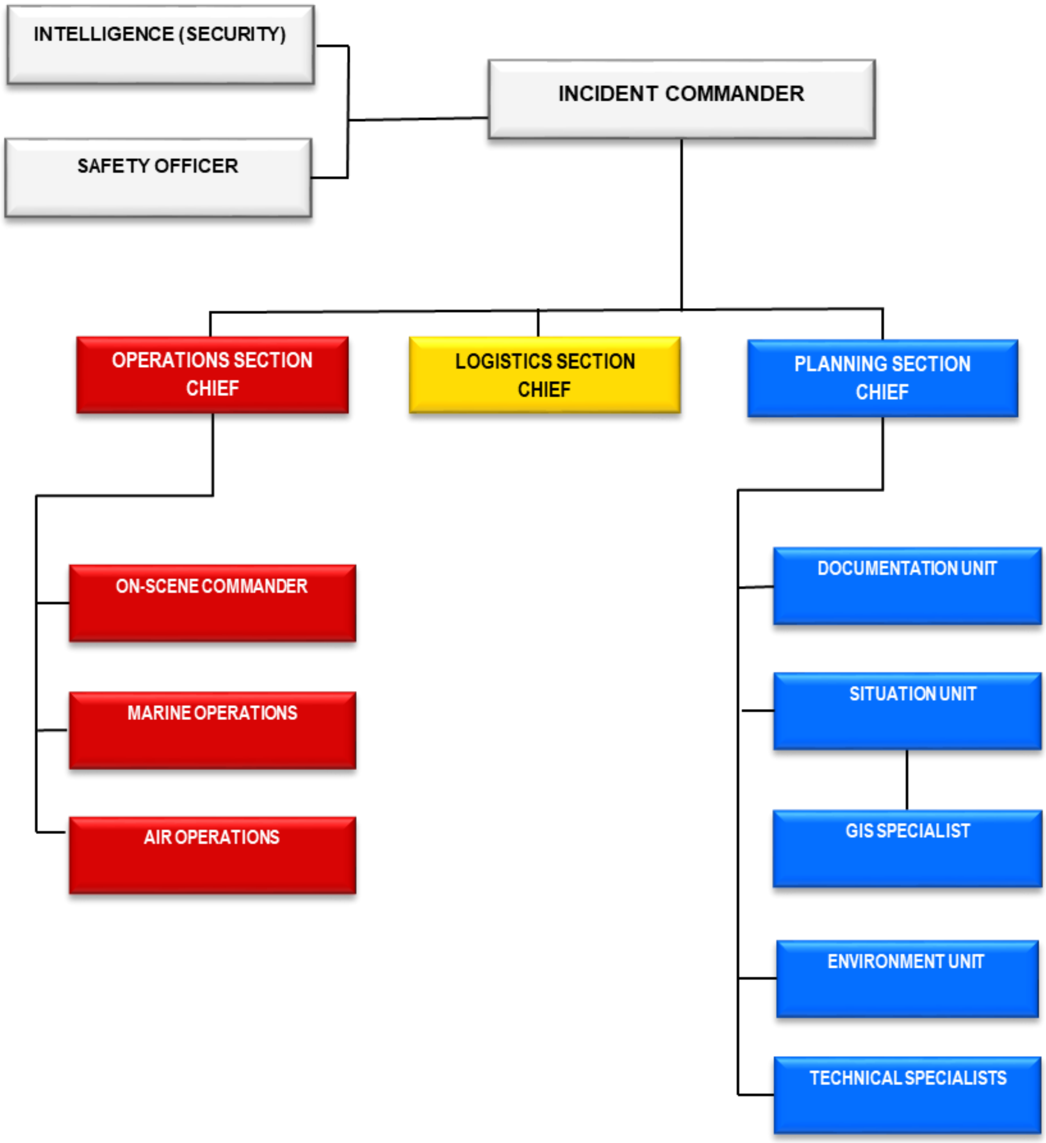
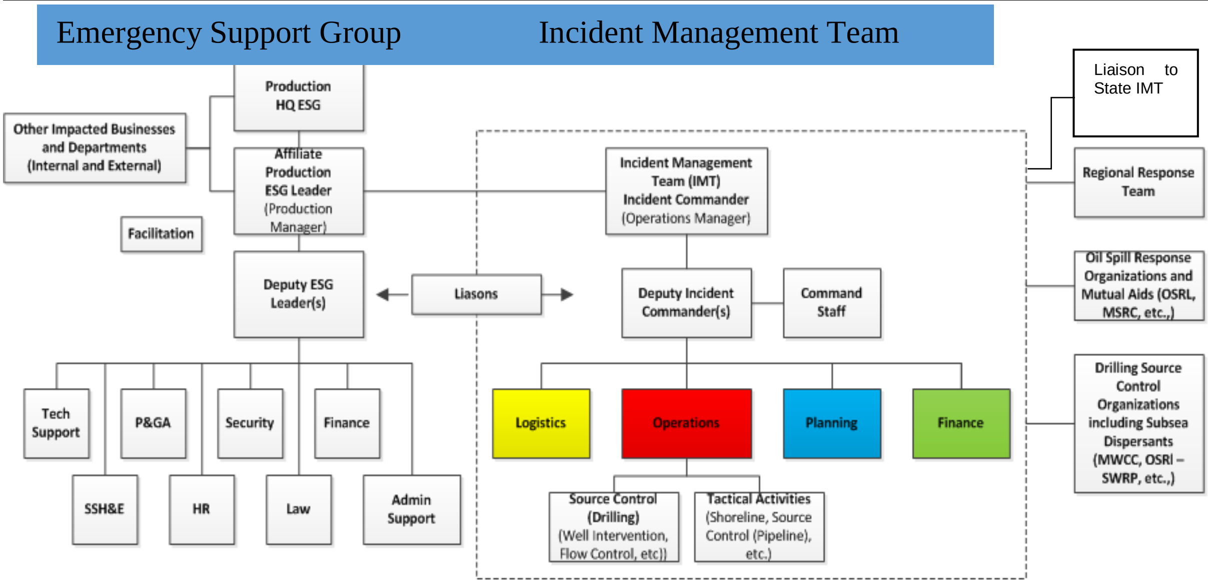


Figure 4-1 Level one – IMT for Localised Response Activities and Impacts (Offshore Incident Management Team)



(Note: Source control and operational divisions to be added/retired as required by incident objectives).

Figure 4-2 Level Two/Three – Esso IMT for Expanded Multi-Jurisdictional Impacts

Once the IMT is established, the following checklists are to be used by the functional areas of the IMT to assist each area to execute tasks in support of spill response strategies:

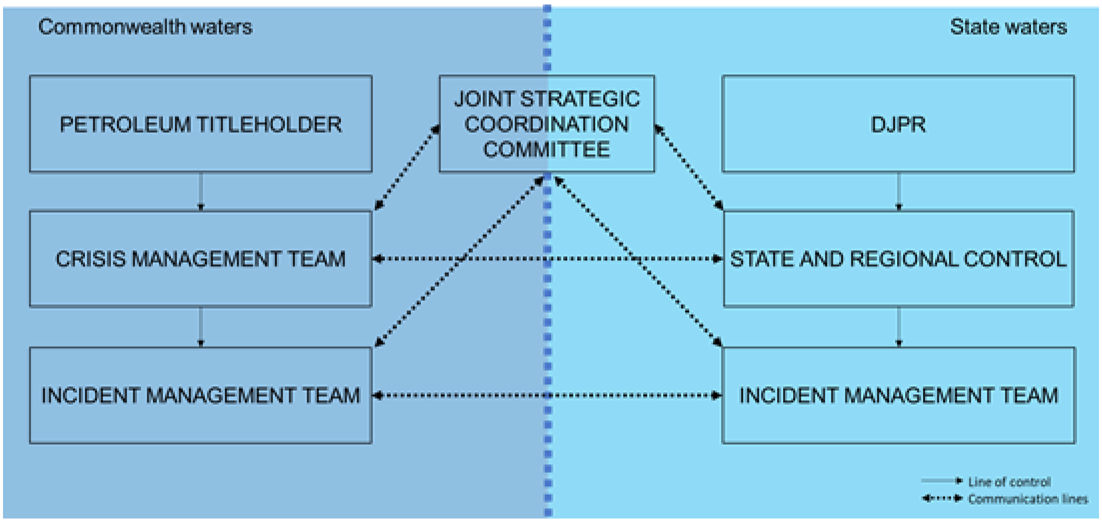
Spill Classification	Relevant Section
Level Two/Three Spills: State water & predicted shoreline impacts.	Section 4.1
Level Two/Three Spills: Commonwealth water impacts & no predicted State water or shoreline impacts.	Section 4.2
Level One Spills: localised	Section 4.3

4.1 Level Two and Three Spills – State Water and Shoreline Impacts.

In Victoria, DOT will assume responsibility for marine pollution incidents in coastal waters, up to 3 nautical miles from shore. Esso, as the petroleum titleholder, is the control agency for marine pollution incidents in Commonwealth waters resulting from an offshore petroleum activity. In the event of a marine pollution incident originating in Commonwealth waters that impacts or threatens State waters, DOT assumes jurisdictional control for such incidents within coastal waters from a State consequence management perspective. Esso will work with DOT to ensure an adequate response, including provision of personnel, equipment and other response resources.

DOT's role of control agency will not extend to response operations in Commonwealth waters including those directly associated with source control or relief well drilling; management of these operations will be performed by Esso. Emergency Management Liaison Officers (EMLOs) may be required between DOT's and Esso's Incident Management Team (IMT).

In the event of a cross-jurisdictional marine pollution incident, the Esso and DOT will work collaboratively, sharing response resources and providing qualified personnel to the DOT IMT. To facilitate effective coordination between the two control agencies and their respective IMTs, a Joint Strategic Coordination Committee (JSCC) will be established. The control and coordination arrangements for cross-jurisdictional maritime emergencies is outlined in the below figure.



The role of the JSCC is to ensure appropriate coordination between the respective IMTs established by multiple control agencies. The key functions of the JSCC include:

- Ensuring key objectives set by multiple IMTs in relation to the marine pollution incident are consistent and focused on achieving an effective coordinated response.
- Resolving competing priorities between multiple IMTs.
- Resolving competing requests for resources between the multiple IMTs, including those managed by Australian Maritime Safety Authority (AMSA), such as national stockpile equipment, dispersant aircraft and the National Response Team.
- Resolution of significant strategic issues as they arise during the incident response.
- Ensuring that there is a shared understanding of the incident situation and its meaning amongst all key stakeholders.
- Ensuring there is agreement on how information is communicated to the public, particularly those issues that have actual or perceived public health implications.
- Ensuring adequate coordination and consistency is achieved in relation to access and interpretation of intelligence, information and spill modelling to promote a common operating picture.

The JSCC is a committee, not a team operating from a specified location. The JSCC will be administered by DOT and the inaugural JSCC meeting will be convened by the State Controller

Maritime Emergencies (SCME) once both the titleholder and DOT formally assume the role of control agency in respective jurisdictions.

The JSCC will be jointly chaired by the SCME and Esso's nominated senior representative, who will determine whom will sit in the committee for a coordinated response. As the relevant jurisdictional authority in Commonwealth waters, NOPSEMA may opt to participate in the JSCC as they see fit. While the above arrangements described are specific to Victoria, Esso will work with other NSW or Tasmania State government IMT's in a similar manner should their State waters or shorelines be impacted.

For further information on Tasmanian cross jurisdiction arrangements, refer to [EPA Tasmania - Offshore Petroleum Industry Guidance Note]

Table 4-1 Incident Management Team Tasking

Establish an Incident Management Team that oversees the implementation of oil spill response measures – Unity of Command Model with DOT		
Tactic: Establish and staff a full Esso IMT		Completed?
IC / ESG Lead	Nominate Liaison Officers for State IMT Nominate senior company representative to participate in JSCC	☐ ☐
PSC Day One	Establish full Esso IMT – Call out IC/OSC/LSC/PSC/Situation & Enviro Units. – Staff each function with teams – actual and virtual.	☐
PSC Day two	– Review team make up for current, and future operational period. – Ensure that functional areas are aligned with the needs of the response.	☐
Tactic: Draft and execute an Incident Action Plan		Completed?
IC lead	Commence planning cycle ('stem of P')	☐

PSC
Day One
	– Complete the initial IAP (ICS 201s);
	    – Establish current operational period aim, objectives, strategy, tactics & resources.
	    – Draft 24, 48 & 72 incident potential worksheet (size up).
	    – Complete NEBA.
	    – Determine the potential shoreline impact.
	    – Assess weather and sea state for the next 48 hours for suitability to conduct marine response and/or aviation response activities.
	– NEBA outcomes to drive the selection of strategies from the Table Ten onwards.
	– Exchange Liaison Officers between State IMT and Esso IMT.
	– Use Liaison Officers to inform State IMT of Esso ICS201 outputs.
		☐

EUL Day One / Two	– Undertake an environmental risk assessment of each proposed tactical execution of strategy (below actions – shoreline/marine/aviation operations).	☐

PSC
Day Two
	– Review the ICS201 from the previous day
	    – Are the aim, objectives, strategies, tactics & resources still current given the current conditions for the operational period?
	    – Review response organisation and staffing needs.
	    – Continue execution of previous day's plan.
	    – Modify the plan.
	– In consultation with IC, assess readiness to move into the Proactive Planning Phase.
	– IMT commences proactive planning cycle (Planning 'P')
		☐

OSC
Day One
	– Plan and execute immediate/first strike operations (as per the list below), and include the following:
	– Shoreline operations
	    – Close off sensitive areas through the implementation of Tactical Response Plans (TRP).
	    – Provide materials and personnel to state response teams to undertake shoreline SCAT surveys.
	    – Provide materials and personnel to state response teams to undertake further shoreline protection.
	– Marine operations – vessel-based dispersant and containment & recovery operations,
	    – Vessels – direct vessel of opportunity fleets.
	    – Equipment – source from Esso, AMOSC, NatPlan and OSRL.
	    – Personnel – source from Esso, AMOSC, AMOSC Core Group, NatPlan CG, ExxonMobil Regional Response Team, OSRL.
	– Aviation operations – surveillance and dispersant operations.
	– Operations to follow the relevant section of ExxonMobil Field Response Manual and/or Shoreline Treatment Plans.
		☐

Safety Officer Day One	– Complete Safety Risk Assessment of all operational activities. – Incorporate Safety Risk Assessment into a Safety Plan.	☐

OSC / Source Control Branch Director
Day one
	– Execution of source control arrangements as required:
	    – Activate Australia Drill Team Tier II/III Emergency Response Plan.
	    – Pipeline response plan.
	– Activate source control resource contracts/assistance contracts:
	    – SFRT – AMOSC
	    – SWIS – OSRL
	    – Wild Well Control
	– Activate pipeline repair
	– Activate marine salvers
		☐

LSC
Day Two
	– Request and stage resources into Gippsland to enable long-term operations to occur:
	    – Integration of Level Two and Level Three resources into the response.
	– Execute the waste management plan:
	    – call out the third-party contractor (Cleanaway),
	    – Liaise with EPA for ongoing waste management requirements (temporary storage and transportation).
	– Equipment mobilisation for temporary storage and decontamination.
		☐

Table 4-2 Surveillance Monitoring & Visualisation Strategy

Tactic: Satellite tracking buoys will be deployed to monitor the leading edge of the slick and deployed in 24-hour intervals to indicate swept pathways.		Completed?
OSC Day one	– Deploy satellite tracking buoys (STBs) from Longford (via helicopter or vessel). Place on the leading edge of the spill	☐
	– Request AMOSC for all available STBs to be contracted to Esso – STBs moved to Longford ASAP	☐
Day two +	– Monitor location of deployed STBs – At last light, deploy STB close to the spill source	☐
Tactics: Twice daily manned overflights will be undertaken to monitor the spreading, location, and weathering of the slick.		Completed?
OSC Day One	– Commence twice daily aerial overflights to determine size/bearing – Obtain a completed aerial observer's report and pass to the PSC/SITL. – Use crew change helicopter where possible. – If Esso asset unavailable, contact and contract the use of third-party aircraft.	☐
OSC / PSC/LSC	– Activate Bairnsdale Air Charter for overflight duties – Request aircraft to fly over the Gippsland shoreline, noting the status (closed/open) of the following intermittently open estuaries: – Davis Creek - 37°34'43.46"S, 149°44'59.14"E, – Bunga Arm - 37°56'50.00"S, 147°48'18.98"E – Lake Tyers - 37°51'33.78"S, 148° 5'18.55"E – Merrimen Creek - 38°22'56.18"S, 147°11'4.26"E – Mueller River - 37°46'44.51"S, 149°19'41.29"E – Shipwreck Creek - 37°38'51.45"S, 149°41'58.05"E – Sydneham Inlet - 37°46'49.61"S, 149° 1'11.26"E – Tamboon Inlet - 37°46'39.31"S, 149° 9'11.11"E – Thurra River - 37°46'56.67"S 149°18'45.94"E – Yeerung River - 37°47'28.02"S, 148°46'26.67"E – Report this data back to the EUL/PSC	☐
OSC Day two	– Continue twice daily aerial overflight to determine size/bearing – Use crew change helicopter where possible). – If Esso asset unavailable, contact and contract the use of third-party aircraft. – Aircraft over slick 30 mins after first light – ▪ Use the location of deployed satellite tracking buoys as initial extents for aircraft bearing	☐

Tactics: Daily oil spill trajectory modelling will be used to predict the weathering and direction that the oil will spread.		Completed?

PSC
 	
Day One; then each day
	– Request OSTM runs to verify data gained through manual means via AMOSC twice daily. The request should include:
	  – 12/24/36/48/60/72 hour outlook deterministic trajectory modelling.
	  – Shoreline loadings (1, 10 and 100 gm p/sqm) – time frames, volumes and locations.
	  – Request via initial phone call and completion of Oil Spill Trajectory Modelling request form .
	  – Data to be relayed back to the Situation Unit.
	  – Via AMOSC, request the Technical Officer to be deployed to the Esso IMT to provide direct support to the Situation Unit.
	– For facility coordinates, refer to Gippsland platform location coordinates
		☐

Tactics: Set a twice-daily watch to confirm the extent and spreading of the spill from the assets.		Completed?
OSC Day One; then each day	– If there is a spill from a manned asset, set a two-hourly watch to confirm the bearing/size. – Have observers take photographs or video. Where possible, include vessels or other objects in photos to provide scale.	☐
Tactics: Establish the Esso Common Operating Picture in the Esso IMT.		Completed?

OSC / SITL
 	
Day one, then for the duration of the spill
	– Establish Esso's Common Operating Picture
	– Commence data capture and graphical display.
	– Key data to be displayed include:
	  – Spill location,
	  – Spill extent, direction and trajectory,
	  – Environmental sensitives ,
	  – Bass Strait oil & gas facilities,
	  – Location of the staging area and forward operating base ,
	  – Esso-controlled contracted resources – aircraft and vessels, and
	  – Third-party-controlled potential resources of opportunity – aircraft and vessels.
		☐

Tactics: OSMP as triggered.		Completed?
	Activate the various Operational Monitoring Programmes contained within the OSMP: – O1 – O5 as per triggers in OSMP	☐
For Level Three Spills only		
Tactics: Obtain satellite imagery of the spill location.		Completed?
PSC/ SITL	– Request satellite imaging of spill – Refer to ExxonMobil Production Geospatial Emergency Response Service) Alternative options: – Request satellite imagery via AMOSC. – Request satellite imagery via OSRL – Agreement in place with Radiant Solutions	☐

Table 4-3 Shoreline Protection and Clean up Strategy

Note: Implementation is dependent on NEBA and oil trajectory.		
Tactic: Inform and agree with State IMT tactical execution of shoreline planning.		Completed?

PSC/Esso LO
 	
Day one, then each day
	– Inform DOT/State IMT of Esso's intention to undertake planning for shoreline impacts.
	– Using data from SMV, establish shoreline planning:
	  – Shoreline extents.
	  – Nearest potential Incident Command Points.
	  – Shoreline incident control structure (sectors, segments & divisions).
	  – Draft a sector command structure.
	  – Shoreline access points - people and vehicles.
	– Share this data with DOT/State IMT for implementation.
		☐

Tactics: Commence pre-impact surveys and pre-impact shoreline cleaning.		Completed?

OSC
 	
Day 1
	– Commence pre-impact surveys
	  – Shoreline surveys by foot – AMOSC and Esso personnel.
	  – Shoreline surveys by air – UAV / contracted platforms.
		☐

OSC Day 2	– Implement operations – Commence shoreline pre-cleaning for areas at immediate risk (first light of day 2).	☐
Tactics: Implement Shoreline TRP's to reduce oil impact on sensitive receptors.		Completed?
PSC Day one	– Based on trajectory, agree with State IMT regarding the Primary & Secondary Shoreline TRPs to be implemented	☐

LSC
 	
Day One
	– Esso to tally equipment and personnel required for the selected TRPs
	  – Mobilise equipment from (i) Esso stockpiles, (ii) AMOSC Geelong stockpile & (iii) Gippsland Ports/State equipment cache.
	  – Request personnel from Esso CG and operational workforces; AMOSC Staff/Core Group & Gippsland Ports.
	– Decide upon ICP's and shoreline staging areas (east and west extents) for equipment.
	– Commence the mobilisation of equipment and personnel to the staging area (Lakes Entrance – Bullock Island or BBMT).
		☐

OSC Day One,	– Liaise with Gippsland Ports (on ground 1st strike agency) to commence execution of TRPs. – Commence primary and secondary site TRP implementation (based on the agreement with State IMT/Gippsland Ports).	☐
Tactics: Mass mobilisation of equipment, personnel and support for large-scale shoreline operations.		Completed?

LSC
Day 1
	– Activate supply and service contracts for ground support;
	– Establish equipment staging areas,
	– Use a third-party to identify accommodation providers (hotels, motels, caravan parks, and campsites),
	– Select ground transport providers (bus charter),
	– Use a third-party to identify remote camp options including:
	  – Locations
	  – Services
	  – Catering
	  – Laundry
	  – Water treatment options
		☐

LSC Day 1	– Activate specialised labour and OSR equipment support – Request AMOSC core group projections.	☐

		– Request AMOSC immediate deployment of availed CG to lead shoreline clean up teams (<24 hours). ○ Include PPE, shoreline consumables, and other shoreline kits. – Request OSRL shoreline team leaders (operations).	

Table 4-4 Marine Dispersant, and Containment & Recovery Operations

Note: Dependant on NEBA and oil trajectory.		
Tactic: Establish two strike teams able to undertake containment and recovery, and/or dispersant operations.		Completed?

LSC
 	
Day One
	- Establish BBMT as initial Marine FOB.
	- Secure four vessels for marine operations – if not engaged in other safety critical mission.
	- Direct vessels to BBMT to load out equipment.
	- Move BBMT C&R offshore boom to wharf edge and load out:
	    – 6 x offshore boom reels.
	    – 2 x offshore skimmer unit.
	    – If vessel tanks are <100m3 arrange the temporary storage units.
	- Move BBMT offshore vessel based dispersant systems to wharf edge:
	    – 2 x afedo dispersant spray systems.
	    – 30m3 dispersant (15 per vessel).
	- Request available Esso Core group recall for duty – vessel-based operations from day two.
	- Load out vessel for operations.
		☐

OSC Day One	- Prepare ICS204 for vessel-based C&R and dispersant operations: – Refer to Appendix B draft ICS204 for operations.	☐

OSC
 	
Day Two
	- Brief teams to the two separate ICS204.
	
	- Direct strike teams (each strike team comprises a pair of vessels) to area of operations:
	
	    – For dispersant operations, field test must be conducted prior to operational spraying, with results reported to the IMT.
	    – Report back of OSMP O2.2 to validate dispersant effectiveness.
	    – PSC to confirm based on the field dispersant testing move to large scale operational spraying.
		☐

Tactic: Establish Marine Forward Operating Base for ongoing large-scale marine operations.		Completed?

LSC
 	
Day Two
	- Based on shoreline impacts, plan for either/or BBMT and Lakes Entrance as marine FOB for ongoing C&R operations:
	    – Offshore C&R operations (large vessel operations – wharf considerations - under keel clearance, width, vessel availability).
	    – Nearshore/shoreline vessel support operations.
	- Demarcate in each location:
	    – OSR Equipment receipting and laydown areas.
	    – Office and briefing space.
	    – Temporary waste storage area (coming off vessel, after shift).
		☐

Tactics: Request and contract extended offshore response support – escalated resourcing.		Completed?

LSC
 	
Day two
	– Contract additional vessels for C&R:
	    – Nearshore/shoreline needs – marine surveyed vessels.
	    – Coastal/offshore needs – marine surveyed.
	– Shift all Esso OSR equipment to BBMT/Lakes Entrance:
	    – Boom reels.
	    – Skimmer units.
	    – Temp storage.
		☐

	– Dispersant spray sets. – Request and shift AMOSC nearshore and offshore C&R equipment, and all shoreline equipment to BBMT/Lakes Entrance: – Offshore booms reels. – Offshore skimmer packages. (in addition to TRP requirements) – Nearshore/shoreline booming equipment. – Nearshore/shoreline skimming packages. – Shoreline surveillance equipment – drone, unmanned aerial vehicle.	

Table 4-5 Aviation Dispersant Operations

Note: dependant on NEBA, oil type and oil trajectory.		
Tactic: Mobilise tier two aviation dispersant operations and dispersant resupply.		Completed?
LSC Day One	- Source domestic dispersant spraying aircraft Via AMOSC (AMSA Fixed Wing Aerial Dispersant) NatPlan link: – Activate FWADC Joint standard operating procedure through AMOSC: ▪ Victorian based aircraft move to Tyabb as nominated airfield for day one only. ▪ Subsequent aircraft to move to West Sale as nominated airfield. – Request of the DOT/State IMT an *Air Attack Supervisor* to direct overhead spraying operations. - Request from LIP 5000 litres Corexit 9527, to be moved to Tyabb Airfield. - Request re-location of dispersant stockpiles to West Sale from Esso LIP (60m3) and BBMT (60m3). - Request AMOSC Geelong to move all available Corexit 9500a and Slickgone NS to West Sale airfield.	☐
OSC/Aviation Branch Director Day One	- Complete JSOP operations template by Esso Aviation Specialist/AMOSC/AMSA: – 1st spraying operation – Victoria-based aircraft – to fly from Tyabb Airfield as nominated airfield, close to dispersant supply at LIP. – Secondary overhead coverage aircraft to be provided by third party contractor. – Ongoing spraying operations for Air Tractor Aircraft to be from West Sale as the nominated airfield. – 2nd and subsequent operations to be undertaken from West Sale Airport. – 2nd and 3rd aircraft arriving during day two of operation. - Establish communications links with AMSA air base manager and dispersant loading operator.	☐
OSC/Aviation Branch Director Day One	- Prepare and brief on ICS204 for aerial dispersant operations: – Refer to attached draft ICS204 for operations. – Field test spray to be conducted prior to operational spraying, with results reported to the IMT. – Field test spray to be reported via visual efficacy results from overhead aircraft and on-scene vessels.	☐
PSC /EUL	- Ensure ongoing OSMP deployment of O2.2	☐
OSC/Aviation Branch Director Day Two	- Relocate team overnight to West Sale airfield - Prepare and brief on ICS204 for aerial dispersant operations with additional aircraft. - Update JSOP with additional aircraft: – Refer to attached drafted ICS204 for operations – Field test spray to be conducted prior to operational spraying, with positive results reported to the IMT. - Field test spray to be reported via visual efficacy results from overhead aircraft and on-scene vessels. - Mount on-going operations of dispersant based	☐
For level three crude oil spills only		
Tactic: Consider tier three aviation dispersant resupply		Completed?
LSC Day Two	- If needed, request dispersant via OSRL: – Request OSRL activation of Global Dispersant Stockpiles:	☐

	– Develop mobilisation plan with OSRL to shift dispersant to Australia – freight aircraft operating from Singapore.	

Table 4-6 Oiled Wildlife Response Strategy

Note: Dependant on NEBA and oil trajectory		
Tactic: Through the DOT/State IMT, liaise with DELWP and aid their Concept of Operations for *Oiled Wildlife Response*.		Completed?
PSC/EUL Day 1	– Based on the NEBA, fates and trajectory modelling, ascertain likely wildlife impacts – provide this data to DOT/State IMT. – Send Liaison Officer to State IMT. – Propose tactics to State IMT that may reduce wildlife impacts.	☐
OSC Day 1	– Establish Industry OWR coordinator (from AMOSC) to oversee Esso OWR activity.	☐

LSC
 	
Day 1
	– As requested, or directed by DELWP and based on the advice of the OWR Coordinator, stand up AMOSC OWR resources:
	    – Facility support contract
	    – Equipment and clean-up resources from Geelong
	    – Equipment and clean-up resources from Perth
	    – AMOSC OWR support team
	– Establish availability of ExxonMobil RRT personnel trained in OWR.
	– Coordinate ground transport, accommodation, and other support needs for industry response personnel.
		☐

LSC Day 2	– Deploy requested OWR resources to the DELWP OWR ICP/field facility.	☐
OSC/Industry OWR coordinator Day 2	– Execute Esso OWR response operations as required or directed by State IMT.	☐

4.2 Level Two and Three Spills – Commonwealth Waters, No Predicted Shoreline Impacts

Table 4-7 Incident Management Team

Tactic: Establish and staff a full Esso IMT that oversees the implementation of oil spill response measures.		Completed?
IC Day One	– Establish Esso IMT: – Call out IC/OSC/LSC/PSC/Situation and Environmental Unit. – Staff each function with teams – actual and virtual.	☐
IC Day two	– Review team make up for current, and future operational period. – Assess if the functional areas aligned with the needs of the response.	☐
Tactic: Draft and execute an incident action plan		Completed?
IC lead	– Commence planning cycle ('stem of P').	☐
PSC Day One	– Complete the initial IAP (ICS 201's): – Establish current operational period aim, objectives, strategy, tactics and resources – Draft 24, 48 and 72 incident potential worksheet (size up) – Complete NEBA – Confirm the low potential for shoreline impact, or shoreline impact for monitoring only (>10gms/qm.) – Assess weather and sea state for the next 48 hour for suitability to conduct marine response and/or aviation response activities. – Exchange Liaison Officers between State IMT, AMSA and Esso. – Use Liaison Officers to inform State IMT of Esso ICS201 outputs and SitReps. – Undertake risk assessment of each proposed tactical execution of strategy (below actions – marine/aviation operations).	☐
PSC Day Two	– Review the ICS201 from the previous day. Assess : – The aim, objectives, strategies, tactics and resources suitability against the current conditions for the operational period. – Review response organization and staffing needs. – Continue execution of previous day's plan – If needed, modify the plan. – In consultation with IC, assess readiness to move into Proactive Planning Phase. – IMT commences planning cycle (planning 'p').	☐
OSC Day Two	– Plan and execute immediate/first strike operations (as per following checklist). Include: – Marine operations – dispersant, containment and recovery. – Vessels – Vessels of Opportunity. – Equipment – Esso, AMOSC, NatPlan and OSRL. – Personnel – Esso, AMOSC, AMOSC CG, NatPlan CG, Esso RRT, OSRL. – Aviation operations – surveillance, and dispersant operations – Aircraft.	☐
OSC/SC Branch Manager Day one	– As needed execution Source Control arrangements: – Activate Australia Drill Team Tier II/III Emergency Response Plan. – Pipeline Emergency Response Plan. – Containment contracts/assistance contracts: – Subsea first response toolkit– AMOSC, Oceaneering and AdEnergy	☐

	– Subsea well intervention service - OSRL – Wild Well Control. – Activate pipeline repair. – Activate marine salvers.	
LSC Day Two	– Request and stage resources into Gippsland to enable long term operations to occur: – Integration of tier two and tier three resources into the response. – Execute waste management plan: – Call out third party contractor (Cleanaway) – Estimate volumes of liquid waste consistent with large scale containment and recovery. – Equipment mobilization – temporary storage and decontamination. – Supporting resources for response personnel.	☐

Table 4-8 Surveillance Monitoring and Visualisation Strategy

Tactic: satellite tracking buoys will be deployed to monitor the leading edge of the slick; and deployed in 24-hour intervals to indicate swept pathways.		Completed?
OSC Day one	– Deploy STB from Longford (helicopter or vessel) – place on leading edge of spill.	☐

	– Request AMOSC all available STB's to be contracted to Esso:
	  – STBs move to Longford as soon as possible.
	  – At last light, deploy STB from the spill source.
		☐

Day two +	– Monitor location of deployed STBs: – At last light, deploy STB from the spill source.	☐
Tactics: twice daily manned overflights will be undertaken to monitor the spreading, location, and weathering of the slick.		Completed?

OSC
Day One
	– Commence twice daily aerial overflights to determine size/bearing:
	  – Divert aircraft to track spill (or use of scheduled crew change helicopter routing).
	  – If Esso asset unavailable, contact and contract the use of third-party aircraft.
		☐

OSC
Day two
	– Continue twice daily aerial overflight to determine size/bearing:
	  – Divert vessel/aircraft to track spill (or use of scheduled crew change helicopter routing).
	  – If Esso asset unavailable, contact and contract the use of third-party aircraft.
	  – Aircraft over slick 30 mins after first light –
	    ▪ Use location of deployed satellite tracking buoys as initial extents for aircraft bearing.
		☐

Tactics: daily oil spill trajectory modelling will be used to predict the weathering and direction that the oil will spread.		Completed?

PSC
 	
Day One; then each day
	– Request through AMOSC twice daily OSTM runs to verify data gained through manual means, request to include:
	  – 12/24/36/48/60/72-hour outlook deterministic trajectory modelling.
	  – Potential for shoreline or state water contact?
	  – Data to be relayed back to the SITU.
	– Request through AMOSC for OSTM third party be deployed into the Esso IMT to provide direct support to the SITU.
		☐

Tactics: Set a twice daily watch to confirm the extent and spreading of the spill from the assets.		
OSC Day One; then each day	– If spill from a manned asset, set two hourly watch to confirm bearing/size.	☐
Tactics: OSMP as triggered		Completed?
	Activate the various Operational Monitoring Programmes contained within the OSMP: – O1 – O5 as per triggers in OSMP	☐
Tactics: Establish the Esso Common Operating Picture in the Esso IMT		Completed?

OSC/SITL
 	
Day one, then for the duration of the spill
	– Establish Esso's CoP.
	– Commence data capture and graphical display.
	– Key data to be displayed includes:
	  – Spill location.
	  – Spill extent, direction and trajectory.
	  – Environmental sensitives.
	  – Bass Strait oil and gas facilities.
		☐

	– Passing ships. – Esso controlled contracted resources – aircraft and vessels. – Third party controlled potential resources of opportunity – aircraft and vessels.	
For Level Three Spills only		
Tactics: Request satellite imagery of the spill location.		Completed?
PSC/ SITL	– Request satellite imaging of spill – Refer ExxonMobil Production Geospatial Emergency Response Service Alternative options: – Request satellite imagery via AMOSC. – Request satellite imagery via OSRL – Agreement in place with Radiant Solutions.	☐

Table 4-9 Marine Dispersant, and Containment & Recovery Operations

Note: This strategy is dependent on NEBA outcomes and oil trajectory		
Tactic: Establish two strike teams able to undertake containment and recovery, and/or dispersant operations.		Completed?
LSC Day One	- Establish BBMT as initial Marine FOB. - Secure four vessel (s) for marine operations – if not engaged in other safety critical mission. - Direct vessels to BBMT to load out equipment. - Move BBMT C&R offshore boom to wharf edge and load out: – 6 x offshore boom reels (3 per vessel). – 4 x offshore skimmer unit (2 per vessel). – If vessel tanks are <100m3 arrange for temporary storage units. - Move BBMT offshore vessel based dispersant systems to wharf edge: – 2 x afedo spray systems. – 20m3 dispersant (10 per vessel). - Request available Esso Core group recall for duty – vessel-based operations from day two. - Load out vessel for operations.	☐
OSC Day One	- Prepare ICS204 for C&R and dispersant operations: – Refer to draft ICS204 for operations Appendix B.	☐
OSC Day Two	- Brief teams on the two separate ICS204. - Direct strike teams (each strike team comprises a pair of vessels) to area of operations: – For dispersant operations, field test must be conducted prior to operational spraying, with positive results reported to the IMT. – PSC to confirm based on the field dispersant testing move to large scale operational spraying.	☐
Tactic: Establish Marine FOBs for ongoing large-scale marine operations.		Completed?
LSC Day Two	- Based on shoreline impacts, plan for either/or BBMT and Lakes Entrance as marine FOB for ongoing C&R operations: – Offshore C&R operations (large vessel operations – wharf considerations - under keel clearance, width, tug availability). – Nearshore/shoreline vessel support operations. - Demarcate in each location: – OSR Equipment receipting and laydown areas.	☐

	– Office and briefing space. – Temporary storage of waste management (coming off of vessel after shift).	
Tactics: Request and contract level three offshore response support – escalated resourcing.		Completed?

LSC
 	
Day two
	– Contract additional vessels for C&R:
	    – Nearshore/shoreline need – marine surveyed vessels.
	    – Coastal/offshore need – marine surveyed.
	– Shift all Esso OSR equipment to BBMT/Lakes Entrance:
	    – Boom reels.
	    – Skimmer units.
	    – Temp storage.
	    – Dispersant spray sets.
	– Request and shift AMOSC nearshore and offshore C&R equipment, and all shoreline equipment to BBMT/Lakes Entrance:
	    – Offshore booms reels.
	    – Offshore skimmer packages.
	    – Shoreline surveillance equipment – drone, Unmanned aerial vehicles.
		☐

Table 4-10 Aviation Dispersant Operations

Note: This strategy is dependent on NEBA outcomes and oil trajectory.		
Tactic: Mobilise tier two aviation dispersant operations and dispersant resupply.		Completed?
LSC Day One	- Source domestic dispersant spraying aircraft Via AMOSC (AMSA Fixed Wing Aerial Dispersant) NatPlan link: – Activate FWADC Joint Standard Operating Procedure through AMOSC: ▪ Victorian based aircraft move to Tyabb as nominated airfield for day one only. ▪ Subsequent aircraft to move to West Sale as nominated airfield. – Request of AMSA and the DOT an *Air Attack Supervisor* to direct overhead spraying operations. - Request from LIP 5000 litres Corexit 9527, to be moved to Tyabb Airfield. - Request re-location of dispersant stockpiles to West Sale from Esso LIP (60m3) and BBMT (60m3). - Request AMOSC Geelong to move Corexit 9500a and Slickgone NS to West Sale airfield.	☐
OSC/Aviation Branch Director Day One	- Complete JSOP operations template by Esso Aviation Specialist/AMOSC/AMSA: – 1st spraying operation – Victoria-based aircraft – to fly from Tyabb Airfield as nominated airfield, close to dispersant supply at LIP. – Secondary overhead coverage aircraft to be provided by third party contractor. – Ongoing spraying operations for Air Tractor Aircraft to be from West Sale as the nominated airfield. – 2nd and subsequent operations to be undertaken from West Sale Airport. – 2nd aircraft arriving during day two of operation. - Establish communications links with AMSA air base manager and dispersant loading operator.	☐
OSC/Aviation Branch Director Day One	- Prepare and brief on ICS204 for aerial dispersant operations: – Refer to draft ICS204 for operations- Appendix B – Field test spray to be conducted prior to operational spraying, with positive results reported to the IMT. – Field test spray to be reported via visual efficacy results from overhead aircraft and on-scene vessels.	☐
PSC/EUL	- Ensure ongoing OSMP deployment of O2.2	
OSC/Aviation Branch Director Day Two	- Relocate team overnight to East Sale airfield. - Prepare and brief on ICS204 for aerial dispersant operations with additional aircraft. - Update JSOP with additional aircraft: – Refer to attached draft ICS204 for operations – Field test spray to be conducted prior to operational spraying, with positive results reported to the IMT. - Field test spray to be reported via visual efficacy results from overhead aircraft and on-scene vessels. - Mount ongoing operations.	☐
Tactic: Consider the mobilisation of tier three dispersant resupply		Completed?
LSC Day Two	- Calculate dispersant 'burn rate' and if it exceeds Australian national stockpiles: – Request OSRL activation of Global Dispersant Stockpiles:	☐

	– Develop mobilization plan with OSRL and Chapman Freeborn to shift dispersant to Australia – freight aircraft operating from Singapore.	

Table 4-11 Oiled Wildlife Response Strategy

Note: This strategy is dependent on NEBA outcomes and direction with the DELWP.		
Tactic: Through the DOT/State IMT, engage with DELWP and provide assistance to their Concept of Operations for *Oiled Wildlife Response*.		Completed?

PSC/EUL
 	
Day 1
	– Based on the NEBA, fates and trajectory modelling, ascertain likely wildlife impacts – provide this data to DELWP and DOT.
	– Send Liaison Officer to State IMT.
	– Advise ExxonMobil RRT Coordinator of potential resource needs.
	– Determine likely tactics to reduce wildlife impacts:
	    – Hazing
	    – Trans-location
	    – Other OSR tactics.
		☐

OSC Day 1	– Establish Industry OWR coordinator (from AMOSC) to oversee Esso OWR activity.	☐

LSC
 	
Day 1
	– As requested, or directed by DELWP and on the basis of advice of the OWR Coordinator, stand up AMOSC OWR resources:
	    – Facility support contract.
	    – Equipment and clean-up resources from Geelong.
	    – Equipment and clean-up resources from Perth.
	    – AMOSC OWR support team.
		☐

LSC Day 2	– Deploy requested OWR resources to the DELWP OWR ICP/field facility.	☐
OSC/Industry OWR coordinator Day 2	– Execute Esso OWR response operations as required or directed by DELWP.	☐

4.3 Level One Spills – Commonwealth Waters, Localised Impacts Only

Table 4-12 Incident Management Team

Tactic: Establish and staff the Esso IMT that oversees the implementation of oil spill response measures		Completed?
IC Day One	– Establish IMT: – Identify IC/OSC/ PSC and Environmental Units.	☐
IC Day two	– Review team make up for current, and future operational period. – Are the functional areas aligned with the needs of the response?	☐
Tactic: Draft and execute an Incident Action Plan		Completed?
IC lead	– Commence planning cycle ('stem of P').	☐

PSC
Day One
	– Complete the initial IAP (ICS 201 sheet):
	  – Establish current operational period aim, objectives, strategy, tactics and resources.
	  – Draft 24- and 48-hours incident potential worksheet (size up).
	  – Complete NEBA.
	  – Confirm the potential for sensitivity impacts.
	  – Confirm feasibility of 1st strike marine response for C&R or Dispersant operations.
	  – Confirm feasibility of 1st strike aviation response.
	– Inform DOT of Esso intent – provide ICS201 and SitRep.
	– Undertake risk assessment of any proposed tactical execution of strategy (below actions – marine/aviation operations).
		☐

PSC
Day Two
	– IMT continues planning cycle (stem of the planning 'p').
	– Review the ICS201 from the previous day:
	  – Confirm suitability of the aim, objectives, strategies, tactics and resources for the operational period?
	  – Review the appropriateness of the spill response level.
	  – Continue execution of previous day's plan and modify as needed.
		☐

OSC
Day Two
	– Plan and execute immediate/first strike operations (as per following checklist) as determined appropriate:
	– Marine operations – dispersant and containment and recovery,
	  – Vessels - Vessels of Opportunity,
	  – Equipment – Esso, AMOSC,
	  – Personnel – Esso/Esso CG, AMOSC.
	– Aviation operations – surveillance operations:
	  – Aircraft.
		☐

OSC/SC Branch Manager Day one	– As needed execution Source Control arrangements: – Activate Australia Drill Team Tier II/III Emergency Response Plan. – Containment contracts/assistance contracts. – Activate pipeline repair. – Activate marine salvers.	☐
LSC Day Two	– Monitor asset staging: – Confirm that business as usual locations and assets are adequate for the response.	☐

Table 4-13 Surveillance Monitoring and Visualisation Strategy

Tactics: twice daily manned overflights will be undertaken to monitor the spreading, location, and weathering of the slick.		Completed?
OSC Day One	– Commence twice daily aerial overflights to determine size/bearing: – Divert aircraft to track spill (or use of scheduled crew change helicopter routing). – If Esso asset unavailable, contact and contract the use of third-party aircraft.	☐
OSC Day two	– Continue twice daily aerial overflight to determine size/bearing: – Divert vessel/aircraft to track spill (or use of scheduled crew change helicopter routing). – If Esso asset unavailable, contact and contract the use of third-party aircraft.	☐
Tactics: daily oil spill vectoring and weathering analysis to predict the direction that the oil will spread, and its degradation.		Completed?
PSC Day One; then each day	– EUL to undertake vectoring (manual trajectory) and weathering: – 12/24-hour outlook. – Weathering based on the ADIOS2 computer programme. – Data to be relayed back to the SITU. – Should analysis show state water/shoreline impacts, request of AMOSC OSTM through third party.	☐
Tactics: Set a twice daily watch to confirm the extent and spreading of the spill from the assets.		Completed?
OSC Day One; then each day	– If spill from a manned asset, set two hourly watch to confirm bearing/size.	☐
Tactics: OSMP as triggered		Completed?
OSC / EuL Day One; then each day	Activate the various Operational Monitoring Programmes contained within the OSMP.	☐
Tactics: Establish the Esso Common Operating Picture in the Esso IMT		Completed?
OSC/SITL Day one, then for the duration of the spill	– Establish Esso's COP. – Commence data capture and graphical display. – Key data to be displayed includes: – Spill location. – Spill extent, direction and trajectory. – Environmental sensitives. – Bass Strait oil and gas facilities. – Passing ships. – Esso controlled contracted resources – aircraft and vessels. – Third party controlled potential resources of opportunity – aircraft and vessels.	☐

Table 4-14 Marine Dispersant, and Containment & Recovery Operations

Note: This strategy is dependent on NEBA outcomes and oil trajectory		
Tactic: Establish one x strike team to undertake containment and recovery, and/or dispersant operations.		Completed?
LSC Day One	- Establish BBMT/Lakes Entrance (Bullock Island) as initial Marine FOB. - Secure two vessels for marine operations – if not engaged in other safety critical mission. - Direct vessels to BBMT to load out equipment. - Move BBMT C&R offshore boom to wharf edge and load out: – 3 x offshore boom reels – 1 x offshore skimmer unit – If vessel tanks are <100m3 arrange for temporary storage units. - Move BBMT offshore vessel based dispersant systems to wharf edge: – 1 x afedo spray system. – 15m3 dispersant. - Mobilise satellite track buoy to platform and/or vessel - Request available Esso Core group recall for duty – vessel-based operations from day two. - Load out vessel for operations.	☐
OSC Day One	- Prepare ICS204 for C&R and dispersant operations: – Refer to draft ICS204 for operations - Appendix B	☐
OSC Day Two	- Brief teams to the two separate ICS204. - Direct strike teams to area of operations: – For dispersant operations, field test must be conducted prior to operational spraying, with positive results reported to the IMT. – PSC to confirm based on the field dispersant testing move to large scale operational spraying.	☐

Table 4-15 Oiled Wildlife Response

Note: This strategy is dependent on NEBA outcomes and oil trajectory.		
Tactic: Through the DOT, engage with DELWP and provide support to their Concept of Operations for *Oiled Wildlife Response*.		Completed?
PSC/EUL Day 1	– Based on the NEBA, fates and trajectory vectoring, ascertain likely wildlife impacts – provide this data to DELWP and DOT. – Determine likely tactics to reduce wildlife impacts: – Hazing – Trans-location – Other OSR tactics.	☐
LSC Day 1	– As requested, or directed by DELWP and based on advice of the OWR Coordinator, stand up AMOSC OWR resources: – Facility support contract. – Equipment and clean-up resources from Geelong. – Equipment and clean-up resources from Perth. – AMOSC OWR support team.	☐
OSC/Industry OWR coordinator Day 2	– Execute Esso OWR response operations as required or directed by DELWP.	☐

5 Ongoing Incident Management Activities 48 hours +

Note: From this point forward, IMT members are to utilise their Incident Management handbooks and IMT role descriptions to guide their daily activities, with this OPEP informing the subject matter expertise.

By following the checklists in section three and four, an appropriately sized and resourced IMT will have been set up, with operational resources deployed and pre-moved to execute confirmed and likely time-sensitive response strategies.

Sections of the OPEP continue to be colour coded to provide section-specific guidance to command, planning, operations, and logistics sections/areas.

Spill response operations are to continue during each operational period to put in place desired environmental outcomes until termination criteria can be applied to the tactical implementation of each spill response strategy.

Esso's Operational Monitoring Programme will inform the application of measures, and the Scientific Monitoring Programme will need to continue parallel to the response operations until such time as its own independent termination criteria have been met.

Once Esso has moved through the first 48 hours of response, laying the foundation for an ongoing response, the IMT and spill response operations will settle on a planning and operations implementation cycle, based on the ICS planning 'p'.

This section describes the (1) process used to evaluate oil spill response strategies by the Environmental Unit of the planning section and the (2) guidelines for the operations section to execute the chosen strategies.

The IMT is expected to go through the planning 'p' on a daily basis, even if the outcome of that process is to validate the current Incident Action Plan as appropriate for multiple operational periods.

5.1 Incident Action Planning Process

Once established, the task of the IMT is to establish situational awareness by gathering information, analysing this data, and applying the appropriate, defensible procedures and processes listed in the OPEP and EP to reduce harm to the environment.

The cornerstone document to guide the response to this end is the production and execution of the 'Incident Action Plan' – the business plan for the response.

In its basic form, an IAP is a simple document that tells responders what they need to do to resolve/mitigate an unplanned incident. It will include an aim, objectives, description of the situation, a worst case 'size up' consequence description, a NEBA, a description of what resources are at risk, and the activities that will be undertaken to resolve the situation/minimise environmental impacts.

For all oil spills, a level one IAP will comprise the completion of the following documents that comprise the Initial IAP:

- Weather report
- ICS201-1 Incident Briefing Map/Sketch
- ICS201-2 Summary of Current Actions
- ICS201-3 Organisation Chart
- ICS201-4 Resource Summary
- Notification Status Report

Additional forms may be used as required. Refer to Incident Management Handbook – IAP Preparation Guidance – Initial IAP Listing.

For level two and level three spills, a more comprehensive IAP is to be developed. This will require significant IMT resources to ensure that the plan is developed properly and that operations are simultaneously undertaken. The content of the IAP will be determined by the Incident Commander in consultation with the Planning Section Chief. Typically required components include

- Weather Report
- Incident Map
- ICS 202 Incident Objectives
- ICS 203 Organisation Assignment List
- ICS 204 Assignment List
- ICS 205 Communications Plan
- ICS 206 Medical Plan
- ICS 207 Organisation Chart

Note: Refer to Incident Management Handbook – IAP Preparation Guidance – Detailed IAP Listing for further guidance.

Note: The IAP must also include two additional pieces of analysis specific to the oil spill response
A description of the ICS 232 – Resources at Risk (derived from the execution of the SMV strategy)

An analysis of the benefits and dis-benefits of executing oil spill response strategies – the NEBA (derived from the execution of the SMV strategy).

The typical daily work pattern for the production of the IAP is as follows:

Time	Meeting [ICS 230]	Attendance
ASAP (<4hrs)	• Initial Incident Brief • Initial incident IC/UC meeting	• IC Command Staff reps; General Staff reps • Handover meeting/brief
0800	• Objectives Meeting • Review/ identify objectives for the next operational period.	• Esso IC; Command Staff reps; General Staff reps
1000	• Command & General Staff Meeting • IC/UC gives direction to Command & General staff including incident objectives and priorities.	• Incident Commander • Public Information Officer • Liaison Officer • Safety Officer • Legal • Security / Intelligence Officer • Operations Section Chief • Planning Section Chief • Logistics Section Chief • Finance Section Chief • Documentation Unit Lead • Situation Unit Lead
1100	• Strategic stakeholder briefing • Brief OPICC/NOPSEMA/States	• Esso ESG Leader • Esso Incident Commander • Liaison Officer • OPICC • NOPSEMA • DOT
1300	• Tactics Meeting • Develop/Review primary and alternate strategies to meet Incident Objectives for the next Operational Period.	• Operations Section Chief • Planning Section Chief • Logistics Section Chief • Finance Section Chief • Resource Unit Lead • Documentation Unit Lead • Situation Unit Lead • Env. Unit Lead • Safety Officer • Documentation Unit Lead

1500	• Planning Meeting • Review status and finalize strategies and assignments to meet Incident Objectives for the next Operational Period.	• Esso Incident Commander • Agency Representative • Public Information Officer • Liaison Officer • Security/Intelligence Officer • Legal Officer • Operations Section Chief • Planning Section Chief • Logistics Section Chief • Finance Section Chief • Resource Unit Lead • Documentation Unit Lead • Situation Unit Lead • Env. Unit Lead • Safety Officer • Documentation Unit Lead
1700	• Operations Brief • Present IAP and assignments to the Supervisors / Leaders for the next Operational Period.	• Esso Incident Commander • Operations Field leadership • Safety Officer • Public Information Officer • Liaison Officer • Security Officer • Legal Officer • Section Chiefs • Documentation Unit Lead • Resource Unit Lead • Situation Unit Lead • Environment Unit Lead

This cycle is represented in the planning ‘p’ below, with key written outputs noted by the arrows.

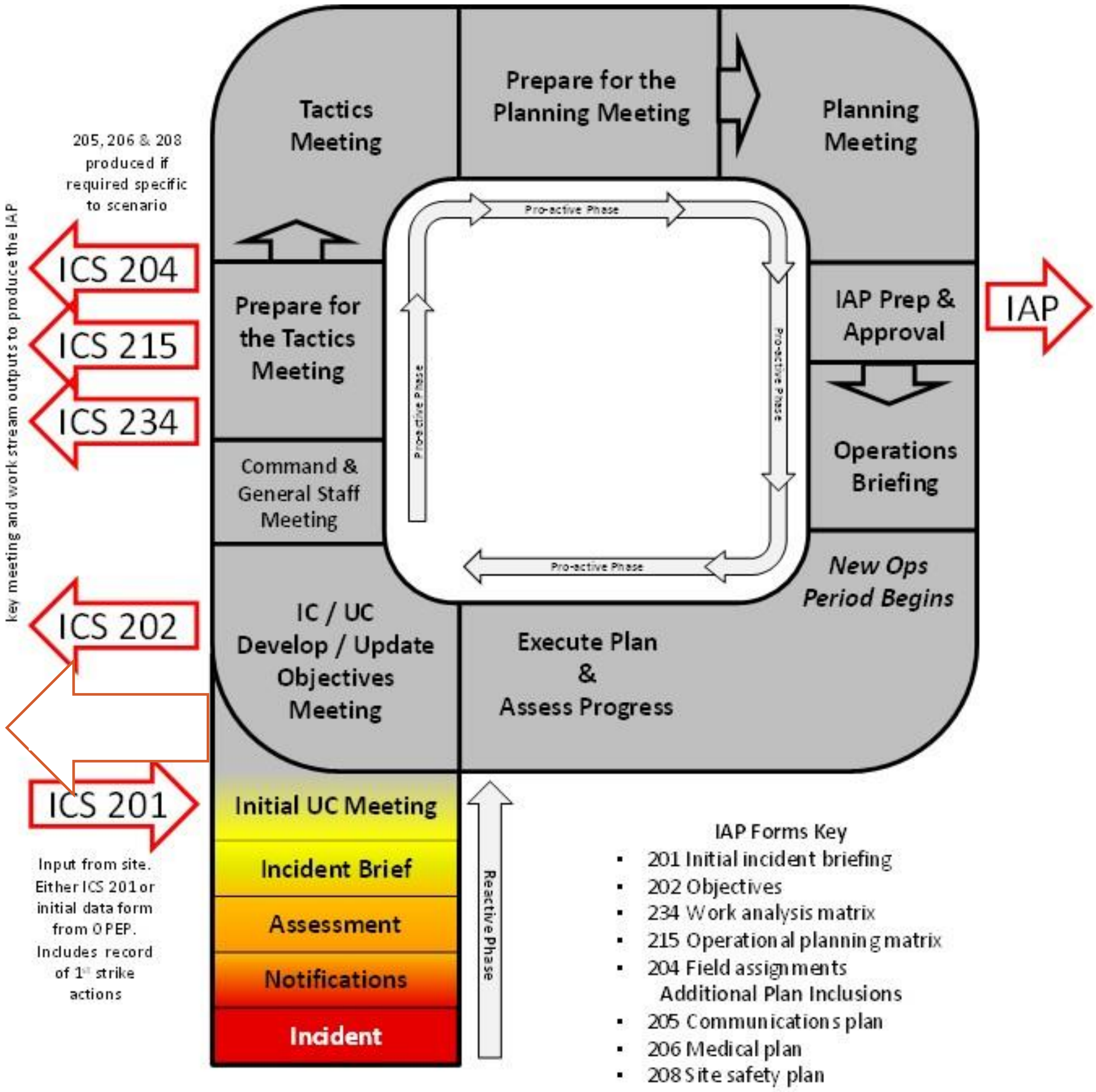


Table 5-1 Incident Planning

5.2 Selection of Response Strategies – Net Environmental Benefit Analysis

Based on the operational zone of response, Esso has undertaken a 'preparedness NEBA' to pre-plan which strategies would be appropriate for any given sensitivities within the ZPI (Refer Appendix A).
A summary of the outcomes of this NEBA are as follows:
Key:

P	Proposed	The tactic will be deployed where safe to do so and where the NEBA indicates the strategy will result in net environmental benefit, and if the response or the spill is likely to impact State waters, the response will be approved by the State Authority.
V	Viable	The tactic will be considered as a viable option, but deployment may not be warranted because of the size of spill, conditions, and other factors at the time of the spill.
NR	Not recommended	The tactic may be viable but is not recommended either due to safety considerations or impacts of the tactic itself.
NV	Not viable	The potential to deploy the tactic effectively is limited.
NP	Not practical	The tactic cannot be implemented for the resource type; e.g., resource type is inaccessible.
NA	Not applicable	The resource type does not warrant this response.

Diesel Spill

Offshore receptor	Exclusion zone	Hazing to deter wildlife	Monitoring and natural dispersion	Marine-based containment and recovery	Protection deflection	Chemical treatment, e.g., dispersant application	In situ burning
1. Open marine environment	P	V	P	NV	NR	NR	NR
2. Seabed	NA	NA	P	NV	NA	NR	NR
3. Subtidal rocky reefs	V	NA	P	NV	NA	NR	NR
4. Estuaries	V	V	P	NV	P	NR	NR
5. Shipwrecks	V	NA	P	NV	NA	NR	NR
6. Fisheries: Southern shark and scalefish	P	NA	P	NV	NR	NR	NR
7. Fisheries: Southeast fishery	P	NA	P	NV	NR	NR	NR
8. Fisheries: Southern scallop	P	NA	P	NV	NR	NR	NR
9. Fisheries: Southern rock lobster	P	NA	P	NV	NR	NR	NR
10. Fisheries: Abalone	NA	NA	P	NV	NR	NR	NR
11. Shoreline	P	P	P	NR	P	NR	NR

Light Crude Spill

Offshore resource type	Exclusion zone	Hazing to deter wildlife	Monitoring and natural dispersion	Marine-based containment and recovery	Protection deflection	Chemical treatment, e.g., dispersant application	In situ burning
1. Open marine environment	P	V	P	V	V	V	V
2. Seabed	NA	NA	P	NA	NA	NA	V
3. Subtidal rocky reefs	P	NA	P	V	NR	NR	NR
4. Estuaries	V	V	P	NA	P	NR	NR
5. Shipwrecks	P	NA	P	V	NR	NA	NR
6-10. Fisheries	P	NA	P	V	NA	**P** except in shallow water over sessile aquaculture.	V
11. Shoreline	P	P	P	V	V	NR	

Condensate Spill

Offshore resource type	Exclusion zone	Hazing to deter wildlife	Monitoring and natural dispersion	Marine-based containment and recovery	Protection deflection	Chemical treatment, e.g., dispersant application	In situ burning
1. Open marine environment.	P	V	P	NR	NR	NR	V
2. Seabed	NA	NA	P	NA	NA	NA	NA
3. Subtidal rocky reefs	P	NA	P	NR	NR	NR	V
4. Estuaries	P	V	P	NR	NR	NR	NV
5. Shipwrecks.	P	NA	P	NR	NR	NR	V
6-10. Fisheries	P	NA	P	V	NA	NR	V
Shoreline impacts	P	P	P	V	V	V	NR

Where shoreline impacts are predicted, a response-specific NEBA will be undertaken, in conjunction with DOT, to determine and agree on the appropriate response strategies.

A simple grouping of these tactics by location / hydrocarbon type:

<table>
<tr><th>Location</th><th>Loss of diesel, lubricating, condensate or mechanical oils</th><th>Crude oil releases</th></tr>
<tr><td>All locations</td><td colspan="2">• Surveillance, monitoring, and visualisation
• Exclusion zone (as driven by WHS risk assessment)
• Oiled wildlife response</td></tr>
<tr><td>Spill site</td><td colspan="2">• Source control (BOP intervention, capping stacks, relief well drilling, pipeline engineering efforts)</td></tr>
<tr><td>Offshore environment (Commonwealth waters)</td><td>• Mechanical dispersion</td><td>• Chemical dispersant
• Containment and recovery</td></tr>
<tr><td>Offshore and nearshore environments (Commonwealth and coastal waters)</td><td></td><td>• Containment and recovery</td></tr>
<tr><td>Coastlines and islands</td><td colspan="2">• Protection deflection
• Containment and recovery
• Shoreline response – assessment and clean-up
• Oiled wildlife response</td></tr>
</table>

Each tactic will be applied in a manner as determined by a dynamic planning process, adapted at the time to the current weather and sea conditions.

NEBA instructions:

For all spills, a spill-specific NEBA needs to be developed as outlined in Figure 8 and summarised as follows:

a. Select the appropriate NEBA worksheets from http://ishareteam1.na.xom.com/sites/EMPC0263/EPP/Environment%20Plans/6_NEBA.xlsx by oil type.
b. Refer to OSRA maps and cull non-relevant Resource Types according to the predicted ZPI.
c. Review the protection priority of the remaining resources (using EP Appendix X).
d. Review and expand on each of the benefits and disbenefits within the NEBA worksheet according to incident-specific details and further response considerations.
e. Assess the effectiveness of the response strategies in protecting the resources at risk.
f. Summarise the preferred strategy into the Incident Action Plan.

Detailed information on priorities for protection, potential impacts, and preferred response strategies will be used in conjunction with incident-specific trajectory modelling and real-time conditions to determine the most appropriate incident-specific response.

An editable copy of the NEBA worksheet is available on the SSHE TeamSite:
http://ishareteam1.na.xom.com/sites/EMPC0263/EPP/Environment%20Plans/6_NEBA.xlsx

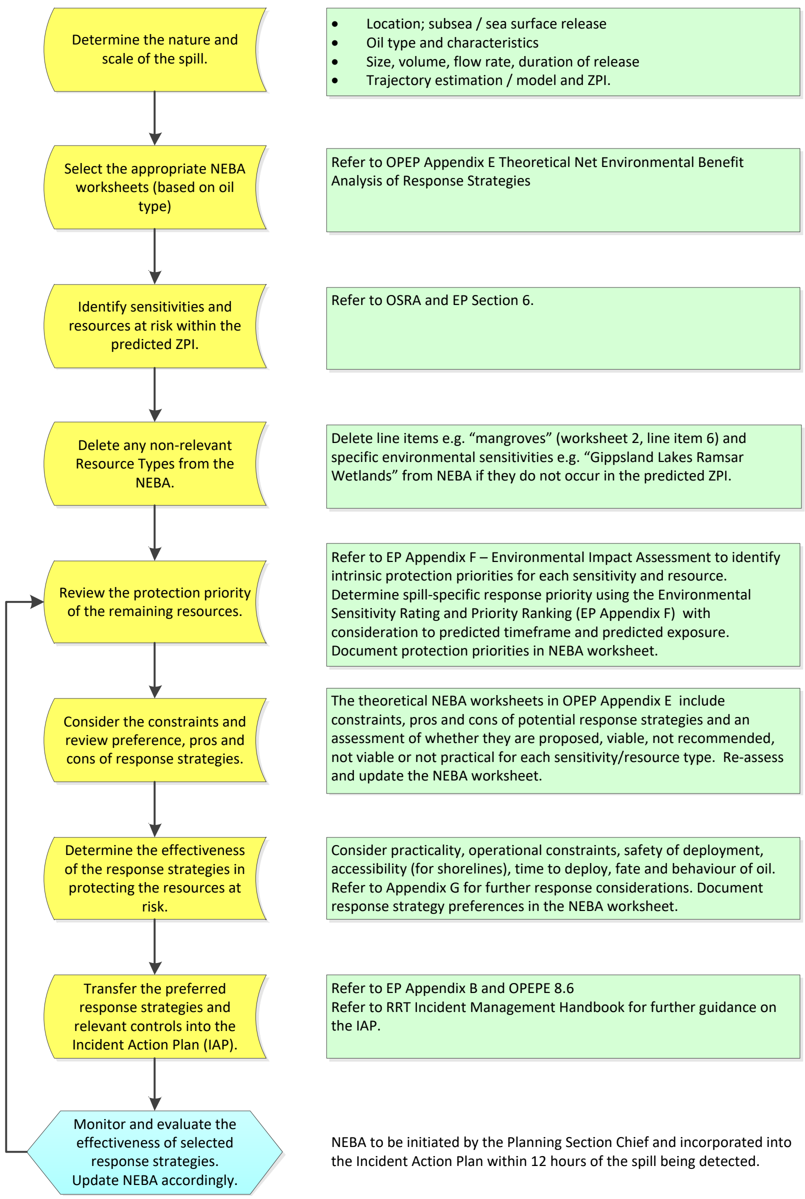


Table 5-2 NEBA Process Flowchart

Using the outputs of the NEBA as a feed into the planning ‘P’ process, the IMT will then draft/validate tactical plans for specific areas and execute those plans.

5.3 Cone of Response

For all offshore spills, Esso will utilise a ‘cone of response’ approach to spill response operations. This means proportioning resources to the spill response strategies that have a bulk removal/treatment affect closest to the source of the spill. The ‘cone’ is visually depicted below:

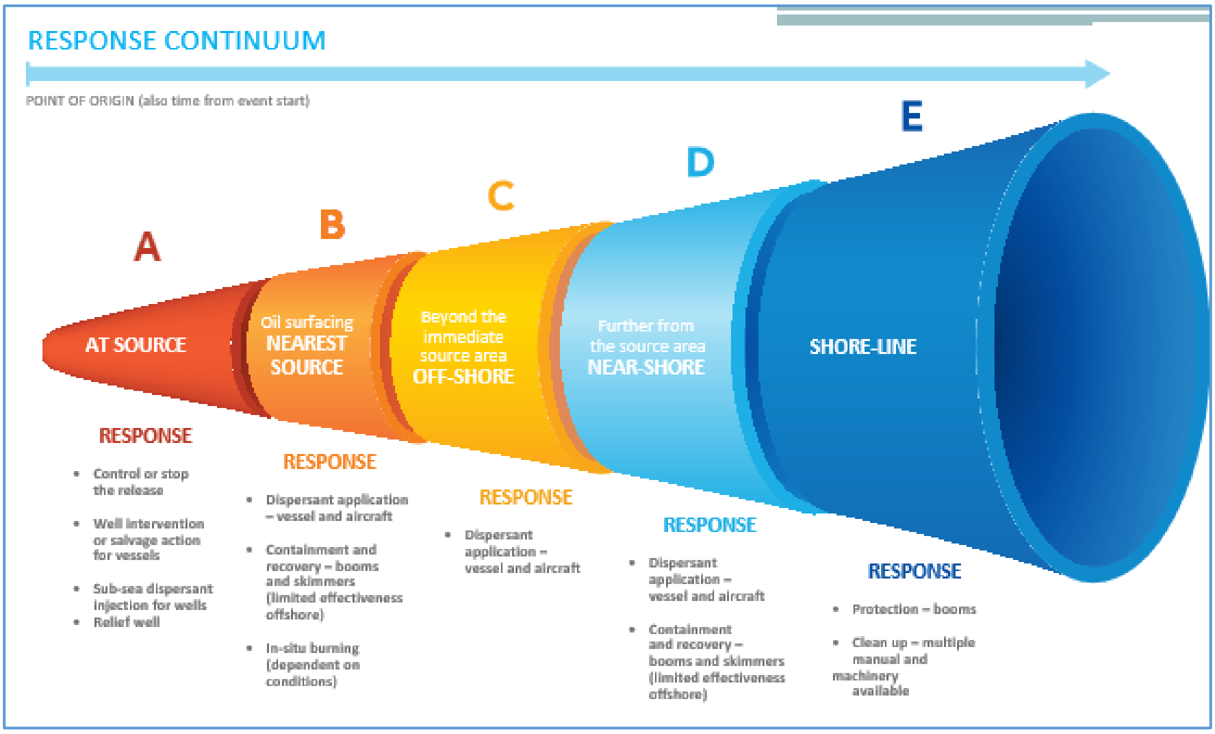


Figure 5-1 Cone of Response

For spills in near-shore waters or where shoreline impacts are imminent (<48 hours), the cone will be modified – Esso’s efforts will focus on minimising impacts to sensitives, particularly the shoreline, while also prioritising control of the source of the spill. Once shoreline protective/response measures are in place, efforts will revert back other areas of the ‘cone’.

The following is a description of each oil spill response strategy that Esso will put in place where applicable to the incident:

5.4 Source Control

Strategy Description:

Well intervention, subsea infrastructure repairs, and vessel salvage will be used as appropriate to the source of the spill to control and cease the uncontrolled flow of hydrocarbons into the environment.

Relevant environmental performance outcomes and standard:

Aspect	Performance Outcome	Control	Performance Standard	Measurement Criteria
Physical Interaction – Other Marine Users	Interference with other marine users is limited to those necessary for the exercise of right conferred by the titles granted.	Pre-start notifications	AMSA JRCC notified before operations commence to enable AMSA to distribute an AUSCOAST warning (24<48 hours).	Records confirm that information to distribute an AUSCOAST warning was provided to the JRCC before operations commenced. Issued AUSCOAST warning dated prior to, or on the date operations commenced.
Planned Discharges / emissions - sewage, food, bilge, deck drainage, air emissions	Change in water quality is limited to that allowed under MARPOL.	Vessel Class Certification	Vessel compliant with MARPOL Annex I, IV, V and VI as appropriate to vessel class.	Vessels with class certification are verified by International Association of Classification Societies (IACS) member.
Planned Discharge – Cement, drill fluids and additives	All cements, drill fluids, additives and/or their components planned for discharge are evaluated as acceptable.	Esso Chemical Discharge Assessment Process	All cement, drill fluids and additives planned for discharge are evaluated as acceptable in accordance with the Chemical Discharge Assessment Process.	Chemical assessment records confirm cements, drill fluids, additives, and/or their components are evaluated as acceptable prior to use / discharge. Contractor daily drilling reports show discharges.
		Solids Control Equipment	Solids control equipment (shale shakers and centrifuge/dryer) will treat cuttings to a level below 10% retained oil on dry weight basis; averaged over each well section, where Non Aqueous Fluid is used.	Retort test reports document residual oil on cuttings (ROC) measured. Daily drilling wellview report shows progressive average ROC for the section

Aspect	Performance Outcome	Control	Performance Standard	Measurement Criteria
				being drilled. Actual average ROC per section shows required standard achieved.

Response Objective	To prevent further uncontrolled release of hydrocarbons into the marine environment.
Critical Outputs	Wells/drilling: All source control operations will be done in accordance with the well operations management plan, relevant to that particular well and the source control options within that plan. Depending on the circumstances, the WOMP outlines the following options that will be followed: • Blowout preventer intervention • Seabed debris clearance • Well capping stack • Sub-sea dispersant injection • Rig for relief well drilling. Pipeline/subsea infrastructure: All pipeline/subsea infrastructure will be done in accordance with [Pipeline Management Plan]. Pipeline repairs include the use of ROVs with cutting or working tools, valve interventions, and pipeline de-pressurisation. Vessel salvage: Esso will provide support to AMSA or Marine Safety Victoria to ensure appropriate salvage operations.
Planning Section Instructions	As per individual source control plan/incident action plan.
Operations Section Instructions	
Logistics Section Instructions	

5.5 Surveillance, Monitoring, and Visualisation

Strategy Description:
Using field observations and modelling, the IMT will assess the incoming data to plan and tailor spill response operations to the scenario of the day. This process will continue for the duration of the response.

Relevant environmental performance outcomes and standards:

Aspect	Performance Outcome	Control	Performance Standard	Measurement Criteria
Planned Discharge / emissions from vessels - sewage, food, bilge, deck drainage, air emissions	Change in water quality is limited to that allowed under MARPOL	Vessel Class Certification	Vessel compliant with MARPOL Annex I, IV, V and VI as appropriate to vessel class.	Vessels with class certification are verified by International Association of Classification Societies (IACS) member.

Response Objective	To gather information and validate planning assumptions to adjust response plans as appropriate to the scenario. To quantitatively assess the extent, severity, persistence, and recovery of environmental values and sensitivities affected by the spill.

Critical Outputs	Level One Spills:
	- Aerial Surveillance
	- Oil Spill Trajectory Monitoring (Vectoring + ADIOS).
	Level Two Spills (in addition to the above)
	- Twice daily Oil Spill Trajectory Modelling.
	- Continuous monitoring from Oil Spill Tracking Buoys.
	- Surveillance from:
	    ○ Production assets – 4 hourly watch
	    ○ Aircraft – 2 x daily overflights
	    ○ Vessels – Opportunistically to sense check aerial observations.
	- Shoreline surveys (pre-emptive and post impact).
	- Operational and Scientific Monitoring programmes.
	
	Level Three Spills (in addition to the above)
	- Satellite photography runs as requested by the SITU.

Planning Section Instructions	The Planning Section – Environment and Situational units in particular – needs to receive and interpret field/modelling data to inform - The Net Environmental Benefit Assessment. - The list of Resources at Risk from the spill. - The development of the ICS 201 and IAP (for level two and three spills). Critical Daily Tasking: - Drive the planning process (refer to IMH schedules and timings). - Liaise with OSC to ensure field activities are in place to gather field data. - Liaise with LSC to activate and then receive the OSTM.

	- Establish and activate the OSMP with data reporting back to the SITU. - Gather data, establish, and keep up to date Status Boards and CoP GIS (refer to IMH Section 6). The Planning Section will ensure that the SMV strategy is scaled up or down to provide sufficient information for the IMT to plan and execute appropriate oil spill response activities. All data gathered through remote means are to be captured and displayed in the Common Operating Picture (Esso GIS) so that all members of the IMT have situational awareness. For level two or three spills, the Planning Section includes coordination of SCAT teams on shorelines, feeding data directly into the SITU.
Operations Section Instructions	The Operations Section is to task assets (marine and aviation divisions; shoreline) to gather data that can be used by the Planning Section to inform the development of the IAP and the operational response. This is done as a part of the execution of the IAP developed the previous day. Critical Daily Tasking: - Execute the IAP for the current Operational period. - Liaise with the PSC to ensure that field tasking (ICS 204) is drafted and used for SMV proposes. All Spills: - Direct aviation assets to complete aerial surveillance consistent with aerial observer guides and standard operating procedures. Spill Level Two and Above - Deploy satellite tracking buoys (Longford and third party). - Direct dedicated aviation assets to undertake surveillance with trained aerial observers. - Direct marine assets to undertake surveillance. - Set watch from manned platforms (4-hour report back). Deploy vessel for OSMP activities.

Logistics Section Instructions	The Logistics Section is to activate contracts and provide ongoing services and supply (from in-house resources or from third parties) in support of the execution of this strategy. Critical Daily Tasking: All Spills: - Business-As-Usual assets to be redeployed as per operational requirements – Dispersant spraying strike team. - Shift dispersant to BBMT as per 1st strike checklist. Activate contract with AMOSC and request dispersant. Spill Levels Two and Three - Maintain Air Operations base at West Sale. - Activate contracts with third-party aircraft providers. - Marine Operations Base at BBMT or Lakes Entrance. - Activate contract with AMOSC, request aerial observers for daily sorties, satellite tracking buoys to Longford, and twice-daily OSTM. Spill Level Three Only - Activate contract with AMOSC/internal for the provision of Satellite photography services.
Termination Criteria	Detectable oils are below the thresholds outlined in the OMSP at <0.3 g/m2; or Bonn appearance code 1;

5.6 Dispersant Operations

Strategy Description:

Dispersant will be applied to ongoing crude oil spills using sub-sea injection, aircraft and/or vessel.

Relevant environmental performance outcomes and standards:

	Performance Outcome	Control	Performance Standard	Measurement Criteria
Planned Discharge / emissions from vessels - sewage, food, bilge, deck drainage, air emissions	Change in water quality is limited to that allowed under MARPOL	Vessel Class Certification	Vessel compliant with MARPOL Annex I, IV, V and VI as appropriate to vessel class.	Vessels with class certification are verified by International Association of Classification Societies (IACS) member.
Toxicity effects of dispersed/dissolved hydrocarbons Entrainment of oil in the water column	Reduce overall impact of a spill	NEBA process	Develop incident specific NEBA.	Completed NEBA.
		Dispersant selection process	Dispersants are selected from the Oil Spill Control Agents (OSCA) Register, including grandfathered stocks, unless otherwise endorsed by the Statutory Authority.	Records confirm the registered dispersant.
		Basic field dispersant effectiveness test	Effectiveness of dispersant confirmed prior to application.	Incident records confirm testing was completed and dispersant was determined to be effective.

Response Objective	To reduce consequences to surface and shoreline values and sensitivities. To increase the bioavailability of oil for microbial breakdown.
Critical Outputs	Level One Spills: Based from BBMT; one vessel-based dispersant strike team.

	Daily dispersant spray capacity will be based on amount spilled. Levels Two and Three Spills (surface) Based from BBMT; two vessel-based dispersant strike teams Based from West Sale Airfield; up to two air tractor aircraft (AT502 & AT802) flying multiple daily sorties to spray oil located in Commonwealth waters. Surge Resources – Dependent on observations of dispersant effectiveness and additional need determined by the IMT at the time For dispersant operations that project beyond 60 days, global dispersant stockpiles from Singapore, may be air freighted to Australia and shifted to the operating airfields Based on the WCCS daily dispersant maximum spray requirements is calculated to be no greater than 10m^3 per day.
Planning Section Instructions	The Planning Section – Environment Unit in particular – needs to assess on a daily basis that dispersant use will demonstrably achieve net positive outcomes. Demonstrable positive outcomes include reduction in large-scale shoreline loadings, particularly on remote coastlines such as the Bass Strait Islands, the wilderness areas of far-east Gippsland, Corner Inlet, and surrounding estuaries, and sensitivity specific positive impacts as demonstrated by the daily NEBA. Dispersants are only to be used in Commonwealth waters, where water depths (>10M) and currents will encourage mixing and dispersion. Dispersants are <u>not</u> to be used in State waters without approval of the State IMT. The state must be notified if dispersants used offshore have the potential to enter state waters. Critical Daily Tasking: • Establish through a daily <u>Net Environmental Benefit Assessment</u> the ongoing benefit of dispersant spraying. • Ensure that operational and scientific monitoring programmes are in place, with data being collated and sent back to the EUL and SITU • Ensure daily dispersant operations are recorded (types, volumes, and locations).

	• Predict future dispersant 'consumption/burn rates' across all delivery means. • Assist operations to draft daily ICS 204 operations orders used by the aviation branch and complete the AMSA/AMOSC JSOP for the deployment of the FWADC. • The Planning Section needs to continuously monitor dispersant operations and scale them up or down to the number of daily sorties required to provide 100% spray coverage of slightly weathered (24 hours) crude oil. Dispersant selection will preference Dispersants listed on the AMSA Oil Spill Control Agents Register (grandfathered stockpiles and existing stockpiles) Those with highest efficacy testing against Esso Bass Strait crudes. All data gathered through the OSMP in relation to dispersant operations are to be captured and displayed in the Common Operating Picture (Esso GIS) so that all members of the IMT have situational awareness.
Operations Section Instructions	The Operations Section, Marine, Aviation, and Source Control Branch Directors will task assets under their command to undertake daily dispersant operations as a part of the execution of the IAP developed the previous day. • Aviation operations will be split between: • West Sale (AMSA/NatPlan-provided small air tractor aircraft and attack aircraft) • Longford Heliport. • Operational planning needs to assert control around the two distinct aircraft types. Safety planning to include separate, dedicated search and rescue (SAR) capability. Operational planning will be based on the ExxonMobil field operator's handbook at section 7.5 and the completion of the AMSA / AMOSC FWADC JSOP available at www.amosc.com.au. Vessel spraying operations will come out of BBMT/Lakes Entrance on 3-4 day swings, dependant on deck space for dispersant and waste. Resupply will occur at these locations. Critical Daily Tasking: • All Spills: • Execute the IAP for the current operational period. • Liaise with the PSC to ensure that field tasking (ICS 204) is drafted and used for dispersant operations. – Maintain records of dispersant application including quantities, types, and locations of spraying. Refer Appendix B for draft ICS 204.

	• Direct-vessel-based dispersant operations. • Spill Levels Two and Above (in addition to the above): • Operations are to be directed to the thickest part of the slick, to fresh oil. • De-confliction of aerial and vessel-based dispersant spraying – SimOps planning needs to be part of the daily tasking. • SSDI to be used where possible (well operations) with a subsequent reduction in aerial/vessel spraying operations. • Vessel assigned for the OSMP water sampling/monitoring activities.
Logistics Section Instructions	The Logistics Section is to activate contracts and provide ongoing services and supply (Esso resources and/or from third parties) in support of the execution of this strategy. This is focused on aerial operations from Essendon and West Sale and vessels from BBMT and Lakes Entrance, and in the event of SSDI field-based ongoing operations using a PSV. For level two and three spills, the key tasks are to Ensure correct activation with AMOSC of the AMSA fixed wing aerial dispersant spraying contract – aircraft is to move to West Sale airfield for ongoing operations Ensure internal (Esso-owned stockpiles) dispersants are moved to the aerial and marine operational points Ensure AMOSC and NatPlan stockpiles of dispersant are moved to aerial and marine operational points If needed, ensure activation of OSRL for large dispersant aircraft and transfer by air of additional dispersant to Australia. Critical Daily Tasking: • Monitoring dispersant burn rate. • Sustaining marine/aviation operations with contractors and third parties to ensure that operations can continue: • Operational bases, • Services and supply for operations. • Anticipate future needs of the operations
Termination Criteria	• Dispersant operations will cease based on any of the below triggers: • NEBA determines that dispersant operations no longer provide demonstrable environmental benefits. • OSMP triggers are met. • Oil is too weathered for affective operations.

5.8 At-Sea Containment and Recovery (Vessel Based)

Strategy Description:
Using containment boom and skimmers, strike teams will corral fresh oil and then mechanically recover it into vessel tanks and temporary storage.

Relevant environmental performance outcomes and standards:

Aspect	Performance Outcome	Control	Performance Standard	Measurement Criteria
Planned Discharge / emissions from vessels - sewage, food, bilge, deck drainage, air emissions	Change in water quality is limited to that allowed under MARPOL	Vessel Class Certification	Vessel compliant with MARPOL Annex I, IV, V and VI as appropriate to vessel class.	Vessels with class certification are verified by International Association of Classification Societies (IACS) member.
Contain surface oil and remove from environment	Reduce overall impact of a spill	NEBA process	Develop incident specific NEBA.	Completed NEBA.
Discharge of deoiled water (decanting).	Prevent secondary contamination	Decanting performed in commonwealth waters in accordance with MARPOL requirements	Decanting is performed in accordance with (Prevention of Pollution from Ships) Act 1983, Section 9, subsection (2) (e).	Written approval from AMSA prescribed officer.

Response Objective	To recover spilt oil before shoreline or other sensitivity contact. To remove bulk floating oil and improve water quality.
Critical Outputs	For Level One Spills (subject to NEBA): - Using a pair of large vessels, offshore booms will be towed in the optimal configuration to concentrate and collect floating oil. Alternatively, single vessel high speed booming systems may be used. - The optimal mechanical skimmer for the type and condition of oil will be used to recover as much oil as possible from the pocket of the boom. - Refer to the *ExxonMobil Oil Spill Response Handbook* s. 5 for more information on booming configurations. For level two and above spills (subject to NEBA): - Based from BBMT and Lakes Entrance, two strike teams (each comprising two pairs of vessels) will use the configurations noted above.

	○ In ideal conditions, 'advanced' booming techniques will be used to concentrate oil using two pairs of vessels per strike team. - Vessels of opportunity from fishing and offshore service fleets will be sourced from around Southern Australia. - Equipment and trained personnel will come from Esso, AMOSC, AMOSC Mutual Aid and Australian National Plan (government) stockpiles. These will be cascaded in from stockpiles across Australia. - Daily calculated volumes of oil to be contained and recovered through this method will be between 150m3 and 450m3 of oil in total.

Planning Section Instructions	The Planning Section to determine through the NEBA, and surveillance and monitoring inputs, that Containment and Recovery operations should be conducted. In particular, Containment and Recovery operations will be used to reduce shoreline loadings, particularly on remote coastlines such as the Bass Strait Islands, the wilderness areas of far-east Gippsland, Corner Inlet, and surrounding estuaries, and sensitivity-specific positive impacts as demonstrated by the daily NEBA. Weather conditions in Bass Strait are known to be volatile and challenging, so forward 24-48-hour forecasts (wave and swell height; wind speed) must be within operational limits for this tactic to proceed. Critical Daily Tasking: - Establish through a daily Net Environmental Benefit Assessment the ongoing benefit of Containment and Recovery - Ensure that weather conditions are amenable to safe and effective operations - Ensure that the operational and scientific monitoring programme is in place, with data being collated and sent back to the EUL and SITU - Ensure daily Containment and Recovery operations are recorded (location, estimated amount of oil recovered, estimated amount of water recovered) - Assist operations to draft daily ICS 204 operations orders used by the marine division for Containment and Recovery. Refer Appendix B for draft ICS 204 - Seek approval from AMSA to decant separated water to increase waste storage of recovered oil (refer to decanting IPEICA Good Practise Guide #17 http://www.oilspillresponseproject.org/wp-content/uploads/2016/02/JIP-17-Decanting.pdf) and National Plan Guidance NP-GUI016 for further details. - Working with the safety officer, ensure that WHS risks are appropriately identified and managed. - Plan temporary waste reception facilities at BBMT and Lakes Entrance. - Activate long-term waste treatment contracts from temporary waste storage sites. All data gathered through the OSMP in relation to Containment and Recovery operations are to be captured and displayed in the Common Operating Picture (Esso GIS) so that all members of the IMT have situational awareness. The Planning Section needs to continuously monitor Containment and Recovery operations and scale them up or down as needed when compared to the other spill response strategies. As the oil changes over time (weathering) Containment and Recovery will likely become favoured over dispersant operations.
Operations Section Instructions	The Operations Section and Marine Branch Directors will task assets under their command to undertake Containment and Recovery operations as part of the execution of the IAP developed the previous day. Vessels will operate in pairs, focusing on different sections of the thickest part of the slick within the Containment and Recovery zone. Utilise overhead aerial assets to provide real-time direction to the vessel strike teams. Where approved, regular de-canting by strike teams is to be done to maximise the volume of oil recovered from the vessel's waste tanks.

	Safety planning for this strategy must focus on de-confliction with aerial or vessel based dispersant operations. Operational planning will be based on *ExxonMobil Oil Spill Response Handbook* s. 5. Critical Daily Tasking: All Spills: - Execute the IAP for the current Operational period. - Liaise with the PSC to ensure that field tasking (ICS 204) is drafted and used for C&R operations. Refer Appendix B for draft ICS 204 - Ensure daily Containment and Recovery operations are recorded (location, estimated amount of oil recovered, estimated amount of water recovered. - Operations are to be directed to continuous parts of the slick to maximise effectiveness. - SimOps planning needs to be a part of the daily tasking. Vessels assigned for the OSMP water sampling/monitoring activities.
Logistics Section Instructions	The Logistics Section is to activate contracts and provide ongoing services and supply (from Esso resources and/or third parties) in support of the execution of this strategy. This is focused on supporting Containment and Recovery strike team operations from BBMT and Lakes Entrance. Vessels of opportunity are to be sourced and wet chartered through Esso's marine team. Oil spill response equipment is to be sourced from AMOSC, NatPlan sources, and OSRL if required. Logistics is to use the technical advice of AMOSC LO/OSRL LO as to the best equipment selection for the operation at the time. Factors to be considered include - Known and anticipated weather conditions. - Weathering of oil. - Anticipated volumes of oil. - Length of operation/swing. Only large/heavy offshore booms are to be ordered from providers (i.e. greater than 1.5 metres in height) with skimmer selection focusing on high capacity, high volume oil removal (i.e. greater than 30m3 per hour pumping capacity). For Level One Spills: Utilise the chartered Esso vessels to load out equipment from BBMT with Esso OSR trained personnel. - Contract AMOSC personnel and AMOSC CG personnel if needed. For Levels Two and Three: - Request additional skimming equipment, booms, and temporary storage from AMOSC to match the need, as directed by the planning section – quantities and types of equipment. - Request AMOSC personnel and AMOSC CG in numbers suitable for equipment deployment.

	- Contract offshore surveyed vessels suitable for strike team duties – deck size and bollard 'pull'.
	- Ensure that temporary storage facilities at BBMT and Lakes Entrance are in place to receive the volume of waste that will be offloaded from the strike teams.
	- Ensure that waste contractors are in place to remove the temporary waste from BBMT and Lakes Entrance to final waste storage/disposal sites or processing.
	
	Critical Daily Tasking:
	- Sustain the activities for the duration of the spill with contractors and third parties to ensure that operations can continue –
	    o Marine Bases.
	    o Services and supply for operations – vessel consumables, goods, and resupply.
	- Track vessels for compliance with Esso marine requirements.
	- Track volumes of oil recovered by strike teams and anticipate temporary storage requirements at marine bases.

Termination Criteria	Containment and Recovery operations will cease based on any of the below triggers: NEBA determines that Containment and Recovery operations no longer provide demonstrable environmental benefits. - OSMP triggers are met. - Oil is too thin for effective booming and containment to take place - Weather/sea conditions make Containment and Recovery operations unsafe or ineffective.

5.9 Protection of Sensitive Shoreline Resources

Strategy Description:
Booms will be used to protect shoreline resources and to corral oil for skimming.

Relevant environmental controls:

Aspect	Performance Outcome	Control	Performance Standard	Measurement Criteria
Planned Discharge / emissions from vessels (sewage, food, bilge, deck drainage, air emissions)	Change in water quality is limited to that allowed under MARPOL	Vessel Class Certification	Vessel compliant with MARPOL Annex I, IV, V and VI as appropriate to vessel class.	Vessels with class certification are verified by International Association of Classification Societies (IACS) member.
Destruction/damage to sensitive habitat due to trampling/4wd access Disturbance/damage/destruction of roosting/resting/nesting wildlife Disturbance to estuary and shoreline environments (vegetation and wildlife) Waste Generation Secondary Contamination Disposal of contaminated equipment	Reduce overall impact of a spill	NEBA process	Develop incident specific NEBA.	Completed NEBA.
	Minimise impacts to coastal environmental sensitivities	Shoreline Protection and Clean Up Plan and TRPs	Shoreline Protection Plan & Tactical Response Plans (TRPs) that consider local environmental sensitivities and habitats are provided to the control agency.	Incident management records.

Response Objective	To recover spilt oil before shoreline or other sensitivity contact. To remove bulk floating oil and improve water quality.
Critical Outputs	For All Spills • When there are predicted shoreline impacts, a Tactical Response Plan will be implemented. • TRPs consists of shoreline and nearshore booms, sandbags, landscaping bags, and other building materials to prevent oil egress into estuaries or other for high-value sensitivities. • Shoreline booming (spur booming) will be used to reduce quantities of oil from re-stranding by containing and then recovering oil using skimmers.

Planning Section Instructions

The Planning Section EUL to provide advice about whether there are any specific sections of coastline with high-value sensitivities – in these areas, specific tactical planning should be put in place.
All planning for protection of coastlines is to be done in conjunction with the State IMT.
The following locations have pre-drafted TRPs which should be used to guide response planning.
Primary Sites

SITE NAME	Site Type	Latitude	Longitude
VICTORIA			
Corner Inlet	Inlet	38°47'49.23"S	146°30'3.86"E
Lakes Entrance	Inlet	37°53'26.16"S	147°58'23.12"E
Snowy River (Marlo)	River mouth	37°48'12.25"S	148°32'56.62"E
Wingan Inlet	Inlet	37°44'56.97"S	149°30'48.22"E
Betka River	River mouth	37°35'6.32"S	149°44'21.58"E
Mallacoota	Inlet	37°33'47.59"S	149°45'53.47"E
NEW SOUTH WALES			
Wonboyn River	River/Lake	37°14'57.55"S	149°57'59.54"E
Bittangabee Bay	Inlet	37°12'54.16"S	150° 0'57.51"E
Towamba River	River mouth	37° 6'44.56"S	149°54'45.62"E
Nullica River	River mouth	37° 5'26.91"S	149°52'20.21"E
FLINDERS ISLAND			
North East River	River mouth	39°43'51.81"S	147°57'38.73"E
Samphire River	river mouth	40°13'10.56"S	148°11'47.93"E

Secondary sites:

SITE NAME	Site Type	Latitude	Longitude
VICTORIA			
Merriman Creek (Seaspray)	River mouth	38°22'56.18"S	147°11'4.26"E

Lake Bunga	Inlet	37°56'50.00"S	147°48'18.98"E
Lake Tyers	Inlet	37°51'33.78"S	148° 5'18.55"E
Yeerung River	River mouth	37°47'28.02"S	148°46'26.67"E
Sydenham Inlet (Bemm River)	River mouth	37°46'49.61"S	149° 1'11.26"E
SITE NAME	Site Type	Latitude	Longitude
Tamboon Inlet (Cann River)	Inlet	37°46'39.31"S	149° 9'11.11"E
Thurra River	River mouth	37°46'56.67"S	149°18'45.94"E
Mueller River	River mouth	37°46'44.51"S	149°19'41.29"E
Shipwreck Creek	River mouth	37°38'51.45"S	149°41'58.05"E
Davis Creek	River mouth	37°34'43.46"S	149°44'59.14"E
NEW SOUTH WALES			
Saltwater & Woodburn Creek	Woodburn Creek	37°10'15.46"S	150° 0'17.18"E
	Saltwater Creek	37°10'8.25"S	150° 0'9.11"E
Fisheries Creek	Creek	37° 6'38.72"S	149°55'47.31"E
Boydtown Creek	River mouth	37° 6'9.86"S	149°52'51.59"E
FLINDERS ISLAND			
Foochow Inlet	Inlet	39°53'53.77"S	148° 7'20.71"E
Melrose Road Inlet	Inlet	39°55'34.85"S	148° 9'18.30"E
Patriarch Inlet	Inlet	39°56'45.22"S	148°11'0.45"E
Cameron Inlet	Inlet	40° 4'14.54"S	148°17'10.36"E
Reddins Creek	Creek mouth	40°15'44.19"S	148° 9'5.00"E
Cronleys Creek	Creek mouth	40°14'54.22"S	148° 3'32.09"E
Fotheringate Creek	Creek mouth	40°12'51.95"S	148° 2'15.05"E
Nalinga Creek	Creek mouth	40° 8'10.47"S	148° 1'1.70"E
Pats River	River mouth	40° 5'51.62"S	147°59'40.77"E
Arthur Bay Conservation Area	Bay	40° 5'12.38"S	147°58'1.53"E
Lughrata Salt Marsh	Marsh entrance	39°54'31.82"S	147°52'30.33"E
Mines Creek	Creek mouth	39°54'13.00"S	147°51'59.85"E
Boat Harbour Creek	Creek mouth	39°51'3.29"S	147°47'22.15"E
Killiecrankie Creek	Creek mouth	39°50'9.47"S	147°50'23.83"E
Edens Creek	Creek mouth	39°45'40.28"S	147°53'3.65"E

TRPs may need to be drafted in conjunction with the operations section for locations without existing TRPs. Shoreline TRPs and shoreline clean-up more generally should be executed consistent with guidance in the Tactical Response Plan - Shoreline Protection & Clean Up and/or the *ExxonMobil Oil Spill Response Handbook* s.12.

Critical Daily Tasking:

	Establish through a daily Net Environmental Benefit Assessment and SMV the ongoing benefit of shoreline booming. - Ensure that weather conditions are amenable to safe and effective operations. - Ensure that an operational and scientific monitoring programme is in place, with data being collated and sent back to the EUL and SITU. - Ensure daily operations are recorded (location, estimated amount of oil recovered, estimated amount of water recovered). - Assist operations to draft daily ICS 204 operations orders used by the shoreline and nearshore division for booming. - Work with the DOT LO to ensure agreement on the location of specific tactical operations. - Work with the safety officer to ensure that WHS risks are appropriately identified and managed. - Plan local temporary waste reception facilities co-located with shoreline recovery. - Activate long-term waste treatment contracts from temporary waste storage sites.
Operations Section Instructions	The Operations Section and Shoreline Protection Branch Director will need to coordinate with the DOT to ensure that resources under Esso command undertake shoreline protection tactics consistent with the requirements of the DOT. The Shoreline Protection Branch must work closely with the Planning Section to draft and 'truth' tactical response plans. Plan drafting will be prioritized based on time frame of impacts – with soonest and most critical sensitivities being done first. All operations are to be consistent with the IAP developed the previous day. The Shoreline Protection Branch is to divide the tasking between teams that are geographically focused – each with a number of plans to execute. For protection / deflection booming, teams will need to continuously monitor boom for effectiveness and adjust for changes in tide, current, and weather. When booming is used for containment with recovery operations, effective temporary waste storage must also be put in place. Safety planning for this strategy must focus on remote operations, the use of manual handling risks, and potential for exposure to hydrocarbons. Operational planning will be based on Tactical Response Plan - Shoreline Protection & Clean Up and/or the *ExxonMobil Oil Spill Response Handbook* s.12. Critical Daily Tasking: All spills - Execute the IAP for the current operational period. - Liaise with the planning section to ensure that field tasking (ICS 204's) is drafted and used for shoreline protection operations. - Booming operations are to be continuously monitored to ensure ongoing effectiveness.

	- SimOps planning needs to be part of the daily tasking. Operations must also adhere to good practise decontamination practices, establishing and keeping to hot, warm, and cold zones as well as personnel and equipment washdown facilities. Site setup must follow the practises outlined in the *ExxonMobil Oil Spill Response Handbook*.
Logistics Section Instructions	The Logistics Section is to activate contracts and provide ongoing services and supply (from in-house resources or from third parties) in support of the execution of this strategy. Shoreline protection strike teams may be directed to put in place tactics along any part of the mainland, Bass Strait, or Tasmanian Islands. Logistical support will be required at each of these locations to support spill response – moving operators in and out of these locations and supporting them while they are there. In extreme non-assessable locations, this could require rotary wing aircraft moving personnel and freight and equipment lifts/movement. The logistics section must ensure the correct type and volume of spill response equipment is divided into caches for each of the tactical response plans. This includes - Appropriate lengths of shoreline and shore seal booms, including land and sea anchoring systems. - Smaller portable skimming systems. - Temporary waste storage (on-site) of a volume equivalent to anticipated recovery. Support and services for on ground operators must also be provisioned, including - Shelter - Sustenance - Ablutions - Transport. The Logistics Section is to liaise with DOT on the shoreline needs and then utilise Esso standing support contractors for the provision of these services where there are gaps between what the DOT is able to provide and the need. Logistics is to also use the technical advice of AMOSC LO/OSRL LO as to the best equipment selection for the operation at the time. Factors to be considered include - Known and anticipated weather conditions. - Weathering of oil. - Anticipated volumes of oil . - Duration of operation.

	The logistics section is to prioritise Esso and AMOSC equipment for deployment for the execution of shoreline protection booming, with NatPlan/DOT/OSRL equipment to be deployed if there is a shortfall.
	
	For All Spills:
	- Tally up the total amount of booms, number of skimmers, and ancillaries required based on the recommended tactical response plans and those that are drafted at the time.
	  o These totals are to be tallied, and requests made to Esso, AMOSC and to AMSA for equipment as required.
	- Tally up the amount of personnel required to implement and monitor the tactical response plans:
	  o Source these personnel from the same sources as above – Esso and AMOSC, AMSA (NatPlan), and OSRL – and divide these personnel into appropriate teams.
	- Source the required transport and accommodation appropriate to the number of responders.
	
	Critical Daily Tasking:
	- Validate the quantities of oil spill equipment and personnel – adjust as needed.
	- Monitor that transfers, accommodation and provisioning arrangements are fit for the purpose.
	- Validate that temporary waste management storage capacity at each site is sufficient.

Termination criteria	Oil no longer threatens sensitive receptors. DOT directs that Esso is to demobilise from sites.

5.10 Shoreline Clean-up

Strategy Description:
Shorelines will be (1) assessed using SCAT and (2) shoreline treatment recommendations put in place.

Relevant environmental controls;

Aspect	Performance Outcome	Control	Performance Standard	Measurement Criteria
Planned Discharge / emissions from vessels (sewage, food, bilge, deck drainage, air emissions)	Change in water quality is limited to that allowed under MARPOL	Vessel Class Certification	Vessel compliant with MARPOL Annex I, IV, V and VI as appropriate to vessel class.	Vessels with class certification are verified by International Association of Classification Societies (IACS) member.
	Reduce overall impact of a spill	NEBA process	Develop incident specific NEBA.	Completed NEBA.

Aspect	Performance Outcome	Control	Performance Standard	Measurement Criteria
Destruction/damage to sensitive habitat due to trampling/4wd access Disturbance/damage/destruction of roosting/resting/nesting wildlife Disturbance to estuary and shoreline environments (vegetation and wildlife) Waste Generation Secondary Contamination Disposal of contaminated equipment	Minimise impacts to coastal environmental sensitivities	Shoreline Protection and Clean Up Plan and TRPs	Shoreline Protection Plan & Tactical Response Plans (TRPs) that consider local environmental sensitivities and habitats are provided to the control agency.	Incident management records.

Response Objective	To remove bulk stranded oil from accessible shorelines and speed up natural recovery of habitats.
Critical Outputs	SCAT teams formed by Esso (and Esso's contractors) and jurisdictional control agency personnel will assess shorelines for oiling. Shoreline clean-up teams formed by Esso (and Esso's contractors) with jurisdictional control agencies/under the control of jurisdictional control agencies will execute shoreline cleaning as per shoreline clean-up recommendations from SCAT teams.
Planning Section Instructions	All planning for protection of coastlines is to be done in conjunction with the State IMT. The Planning Section will oversee two distinct elements of the shoreline response: (1) Gathering data through the SCAT function (using Esso's or the State's collector application) and, (2) Using this data to plan for an extended shoreline clean-up. Shoreline surveys will ideally be done in conjunction with jurisdictional control agencies. Shoreline clean-up operations must be performed under the control and coordination of jurisdictions, unless this has been formally devolved to Esso or another group. (1) Data Collection

	SCAT teams undertaking field surveys need to consistently gather data on shoreline type, oiling description, and clean-up recommendations. This data gathering is a planning, not operations, function, so it becomes a prominent field component of the planning section. Ideally, teams will be multi-disciplinary/multi-agency and include an oil spill operator (for practical clean-up recommendations) combined with an environmental advisor/scientist. SMEs should be consulted for specialist shoreline types or where there are specific sensitivities exist (e.g. indigenous heritage areas). Data will be fed back from these teams to the Esso GIS CoP, allowing (close to) real-time data sharing with the IMT and forward planning for future operations. Critical Daily Tasking: - SCAT teams form up in the morning, head out to the fields, and report back on data collected. - Shoreline Treatment Recommendations to be issued for the section of the shoreline where oiling has occurred. These form the basis of the ICS204 for shoreline clean-up operations. - Where oil is likely to affect the shoreline, SCAT teams should be recommending the pre-cleaning of beaches to reduce future organic waste. (2) Shoreline Clean-up Based on the data collected from the SCAT surveys, work assignments (ICS 204 or similar) to be drafted that guide clean-up teams to execute the shoreline treatment recommendations. Shoreline divisions based on a span of control adequate to manage clean-up teams will need to be agreed on and established with the jurisdictional control agency. Pre-defined shoreline sectors have been developed for the Victorian coastline and should form the basis of planning. The EUL to provide advice on whether there are any specific sections of coastline with high-value sensitivities – in these areas, specific separate shoreline cleaning will be required. Refer to Tactical Response Plan - Shoreline Protection & Clean Up and/or the *ExxonMobil Oil Spill Response Handbook* for further guidance. Critical Daily Tasking: - Establish through a daily Net Environmental Benefit Assessment and SMV the ongoing benefits of shoreline clean-up. - Ensure that weather conditions are amenable to safe and effective operations. - Ensure that the operational and scientific monitoring programme is in place, with data being collated and sent back to the EUL and SITU. - Ensure daily operations are recorded (location, estimated amount of oil recovered, estimated amount of water recovered) - Assist operations to draft daily ICS 204 operations orders used by the shoreline clean-up operations. - Work with the DOT LO to ensure agreement on the location of specific tactical operations. - Work with the safety officer to ensure that WHS risks are appropriately identified and managed. - Plan local temporary waste reception facilities co-located with the shoreline clean-up. - Activate long-term waste treatment contracts from temporary waste storage sites.

Operations Section Instructions	Based on the advice received from Esso by DOT, the Operations Section, Shoreline Clean-Up Branch, will work along with DOT to ensure that resources under Esso command undertake shoreline clean-up consistently and under the control of the DOT. With no marine, aviation, or other spill response/source control interventions, the total shoreline WCCS discharge (from Seahorse) is estimated to be approx. 2750m3 of oil stranding after 100 days of an uncontrolled release. Shoreline loadings are anticipated to be heaviest along the Gippsland coastline, between the Honeysuckles and Mallacoota. Shoreline divisions based on a span of control adequate to manage these clean-up teams will need to be agreed on and established with the jurisdictional control agency. Esso's resources are likely to work in a blended teams with State resources. Teams to to execute the shoreline treatment recommendations developed by the SCAT teams in the planning section. Shorelines within the Area that May Be Affected are predominantly fine, medium, and coarse-grained beaches, interspersed with rocky headlands. There also exists a number of estuarine systems which shelter much higher sensitivity shorelines. The principle issue for response will be accessing the more isolated portions of coastline (far-east Victoria) and how to manage and stage large work forces working in these areas. Safety planning for this strategy must focus on remote operations, manual handling risks, and potential for exposure to hydrocarbons. Operational planning should be based on the Tactical Response Plan - Shoreline Protection & Clean Up and/or the ExxonMobil Oil Spill Response Field Manual s 12, and the instructions given by the State Control Agency. Critical Daily Tasking: All Spills: - Execute the IAP for the current operational period. - Liaise with the planning section to ensure that field tasking (ICS 204's – Shoreline Treatment Recommendations) is drafted and used for shoreline protection operations. - Work closely with the DOT Operations Officer as required to ensure ongoing unity of command. - Shoreline clean-up is continuously monitored to ensure ongoing effectiveness. - SimOps planning needs to be a part of the daily tasking. Operations must also adhere to good practise decontamination practices, establishing and keeping to hot, warm, and cold zones, as well as personnel and equipment washdown facilities.
Logistics Section Instructions	Based on the advice received from Esso by DOT, the Logistics Section will work alongside with DOT to ensure that resources are deployed to assist in the shoreline clean-up consistent with the request of the jurisdictional control agency DOT. With no marine, aviation, or other spill response/source control interventions, the total shoreline WCCS discharge (from Seahorse) is estimated to be approx. 2750m3 of oil stranding after 100 days of an uncontrolled release. This volume will be reduced with spill response measures, but oil is still very likely to be stranded along the coastline. Shoreline loadings are anticipated to be heaviest along the Gippsland coastline, between the Honeysuckles and Mallacoota. Shoreline divisions based on a span of control adequate to manage these clean-up teams will need to be agreed on and established with the jurisdictional control agency. Key support from Esso in this task includes

	- Activation of labour hire contracts* to provide 50 – 500 personnel available for medium-term (2–4 months) shoreline clean-up tasking. - AMOSC CG personnel to supervise and oversee clean-up teams. - Safety and Security personnel to support response activities - Working with the EPA and Esso's waste management contractor to come up with acceptable bunded temporary storage areas for recovered waste. - Deployment of all AMOSC, mutual aid, and NP temporary storage equipment to points along the coastline as directed by the DOT. - Activation of accommodation, transport, and sustenance. * *Utilise base business contractor or escalate to ExxonMobil Contingent Worker Contractors team to coordinate hire of additional personnel. Critical Daily Tasking: All Spills: - Execute the IAP for the current operational period; - Liaise with the planning/operations section to ensure that support and services for the ICS 204's – Shoreline Treatment Recommendations are delivered. - Work closely with the DOT logistics section to deliver services and supply under a unity of command. - Ensure that recovered waste is efficiently managed. - Develop a forward plan of rotations for shoreline staff engaged in physical labouring activity.
Termination Criteria	- Shoreline operations will cease once pre-spill levels are returned, and/or by direction of the jurisdiction control agency.

5.11 Oiled Wildlife Response

Strategy Description:
Esso will assist the state-led OWR response with equipment and technical personnel as requested.

Relevant environmental controls:

Aspect	Performance Outcome	Control	Performance Standard	Measurement Criteria
Destruction/damage to sensitive habitat due to trampling/4wd access	Reduce overall impact of a spill	NEBA process	Develop incident specific NEBA.	Completed NEBA.
	Minimise impacts to wildlife	Shoreline Protection and	Shoreline Protection Plan & Tactical Response Plans (TRPs) that consider local environmental	Incident management records.

Aspect	Performance Outcome	Control	Performance Standard	Measurement Criteria
Disturbance/damage/destruction of roosting/resting/nesting wildlife Disturbance to estuary and shoreline environments (vegetation and wildlife) Waste Generation Secondary Contamination Disposal of contaminated equipment		Clean Up Plan and TRPs.	sensitivities and habitats are provided to the control agency.	

Response Objective	Esso assists state government efforts through the timely provision of industry OWR resources.
Critical Outputs	For All Spills: - Esso will activate the OWR resources of AMOSC and OSRL, equipment, personnel, and technical. - These resources will be provided to the State led IMT for use in reducing the impact of oil on wildlife.
Planning Section Instructions	Allocate an Esso IMT member to act as Liaison Officer to State IMT. A dedicated Liaison Officer for oiled wildlife response will likely be required. This role may be filled by the AMOSC OWR Coordinator. Details of numbers, type, status and type of fauna impacted by marine pollution to be collated by SITU. Daily ICS 204 work assignments to be developed in consultation with Operations, Logistics and State IMT.
Operations Section Instructions	Support OWR activities as directed by State IMT and per ICS 204 work assignments
Logistics Section Instructions	On request from State IMT, mobilise OWR equipment from AMOSC and/or OSRL. AMOSC • 2x OWR Containers (Geelong and Fremantle) • 4x OWR Box Kits • OWR Facilities support via DwyerTech contract • OWR Industry Team

	• AMOSC OWR Coordinator OSRL* • 3x OWR Search and Rescue kits • 1x OWR Intake and Triage kit • 4x Cleaning and Rehabilitation kits • 1x Wildlife Rehabilitation Unit * 50% of the above inventory is available during an incident. Sea Alarm (via OSRL) • 1x Full time availability of one Sea Alarm expert for advice and potential mobilisation to the affected site. • 1x Full time availability of one Sea Alarm expert for advice and response support (based in Brussels). ExxonMobil RRT • RRT OWR Core Team • Third party OWR specialists Equipment owned by State agencies will be requisitioned via the State IMT under NatPlan arrangements.
Termination Criteria	Resources are no longer required/requested by the State government.

5.12 Waste Management

Esso holds a number of waste management contracts with third parties that will be called upon in the event of a spill. These parties will be used to:

- Provide a waste subject matter expert to the logistics section of the IMT;
- Work with the EPA to put in place waste management chains from point of collection to final disposal; and
- Ensure that the waste management practises put in place are ethical, legal and follow Australian best practise waste management principles.

Different wastes will be generated from a variety of different sources including:

- Liquid wastes (oil / water) – collected offshore by vessels from the shoreline through booming operations;
- Bulk hard wastes (oils mixed with organic materials, sand, rocks, pebbles, etc.) collected in bulk from shorelines by mechanical and manual means;
- Sundry wastes generated as a result of employing a large temporary workforce including PPE, waste from catering, etc.

Esso's waste contractor (Cleanaway) have confirmed that they have the capacity to manage 4500m3 of bulk hard waste and 3ML of liquid wastes. In addition to these waste management streams, Esso's own processing facilities at Long Island Point Longford and Altona could handle a further liquid wastes.

This capacity gives Esso sufficient waste management capability for at least the first two weeks of continuous shoreline and marine operations. During this time, further final waste management disposal options will be determined with the Victoria EPA.

6 Concept of Plan

6.1 Purpose

The purpose of the Esso Seahorse, Tarwhine, Kipper and West Barracouta Oil Pollution Plan (OPEP) is to describe the actions and arrangements Esso Australia has in place to respond to an oil pollution incident from one of these petroleum activities.
This includes:

- Drilling
- Well operations (platforms, both manned and unmanned)
- Workovers of wells
- Workovers of subsea, seabed or platform infrastructure
- Pipelines running from offshore fields to coastlines, and
- Plug and abandonment activities.

For vessel activities that enable Esso's petroleum activities, the OPEP includes arrangements for Esso to respond to such spills under the direction of the relevant control agency.
Refer to previous figure (Figure 2) for a graphical representation of where these activities are located.

6.2 Objectives

The objectives of this OPEP are to:

- Define the roles and responsibilities for Esso to assess and then respond to an oil spill;
- Describe the process for deployment of oil spill response strategies that will be used by Esso (and its partners);
- Describe the procedures for mobilising company, industry and national support resources to support these spill response strategies;
- Clearly outline guidance to plan-users on how the above is to be undertaken, consistent with regulatory requirements;
- Integrate Esso's response with relevant government and industry plans:
- National Plan for Maritime Environmental Emergencies (National Plan)3
- Victorian Maritime Emergencies (Non-Search & Rescue) Plan (SERP [NSR]) 4
- NSW State Waters Marine Oil and Chemical Spill Contingency Plan4
- Tasmanian Marine Oil Spill Contingency Plan (TASPLAN) 5
- The Australian Industry Cooperative Oil Spill Arrangements (AMOSPlan)6 and
- Describe how Esso will implement its Incident Management System in responding to oil spills; and
- Describe the link for ExxonMobil's global resources and services to be deployed as part of Esso's local response.

6.3 Scope

The activity scope of the OPEP encompasses the Esso petroleum activities within Bass Strait, known as Seahorse, Tarwhine, Kipper and West Barracouta.
The geographic scope of activities as directed by the OPEP (particularly for level two and three hydrocarbon spills) would likely apply to an area significantly beyond Esso's petroleum titles. This includes Commonwealth waters off south eastern Australia, and state waters of Victoria, New South Wales (NSW) and Tasmania. Staging areas for activities as far as practicable will be based in Victoria.

[3] https://www.amsa.gov.au/forms-and-publications/Publications/national_plan.pdf.

[4] https://www.emv.vic.gov.au/responsibilities/state-emergency-plans/state-maritime-emergencies-non-search-and-rescue-plan

[4] http://www.rms.nsw.gov.au/documents/about/environment/oil-spill-contingency-plan-nsw-state-waters.pdf

[5] http://epa.tas.gov.au/Documents/TasPlan.pdf

[6] http://www.amosc.com.au/amosc.php

6.4 Division of Responsibilities

Spill response activities in the zones outlined above are shared between a number of parties, known as control agencies (organisations leading response activities) and support agencies (organisations that help with the provision of labour, platforms, or services). The (legal) obligation to respond is outlined as below:

Table 6-1 Control Agencies

Location of spill	Source	Control Agency for oil spills	Supporting Agency
Commonwealth Waters (>3NM from shorelines)	Petroleum activity	Esso	AMSA
	Ship associated with petroleum activity	Esso as first responder, under the direction of the Australian Maritime Safety Authority	Esso
State waters or shorelines (<3NM of coastline)	Petroleum activity / Ship	State Government (Vic — DOT; NSW — Transport for NSW; Tas — EPA) with Esso supporting operations	Esso, local state port authorities, AMSA, state-based wildlife agencies

In all instances of spills from Esso's petroleum activities, Esso's response activities should be considered to be regulated by NOPSEMA and directed by this OPEP, until such time as another control agency verifies its intention to stand up and assert control.
As a response grows in size and complexity, a range of other parties and agencies may become involved, either to acquit a legislative obligation, or to provide support to a control agency.
In all cases, for spills originating from Esso assets and activities, Esso will facilitate the provision of resources to the control agency for their use in mitigating the consequences of the spill.

6.5 Safety, Health and Environment Policy

Oil spill response activities under the control of Esso shall be implemented in a manner that reflects Esso's legal commitments to best practice workplace health and safety (WHS). That is, in accordance with (1) Esso's Safety, Health and Environmental policies and consistent with the outcomes sought from the (2) National Plan guidance paper *NP–GUI–026: Marine oil spill response health and safety*.

Prior to implementing spill response operations, for activities that are outside Esso's business as usual operations, activities will be risk assessed and should additional consequences be introduced, these shall be mitigated as appropriate.
Esso will develop and implement a spill safety plan which documents this process.
Safety risk mitigation measures, using a mix of process and personnel safety, will be put in place using the established hierarchy of control methods, as shown below in the Fig 10:

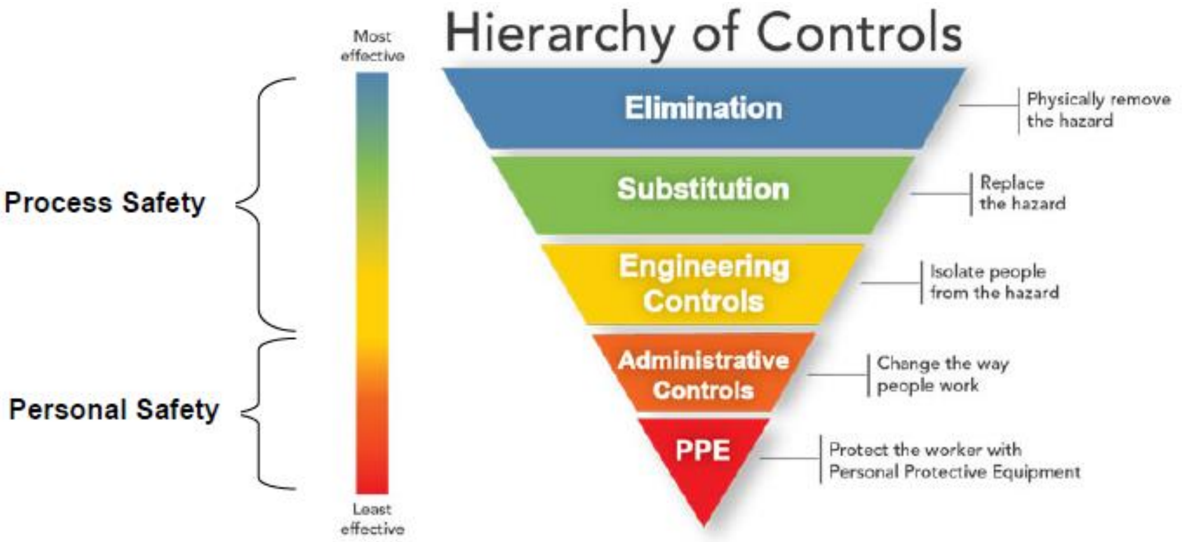


Figure 6-1 Workplace Health and Safety Hierarchy of Controls for Risk Mitigation

'Baseline' measures such as establishing controlled entry at polluted sites, wearing personal protective equipment and the use of safe working practices supported by suitable training, will be an integral part of response operations.

In cases where available measures to reduce the risk of injury or detrimental health implications cannot be lowered to an acceptable level, that activity or specific response strategy will not be viable until conditions change. Examples of this include situations where fresh hydrocarbons are releasing vapours, where sea conditions prevent safe working on the deck of a vessel, or where platforms and assets no longer present stable safe working platforms.

In implementing spill response activities, Esso, its contractors, and other parties supporting the response, shall always be mindful of the company's emergency response priorities, using the acronym 'PEAR':

P – People, E – Environment, A – Assets, R – Reputation

6.6 Interface with Other Documentation and Plans

This OPEP is subsidiary to the EP in force for the specific Esso petroleum activity taking place and outlines the measures that Esso will put in place for hydrocarbon spills from that activity.
The OPEP also has a relationship with a number of other key Esso documents as outlined below:

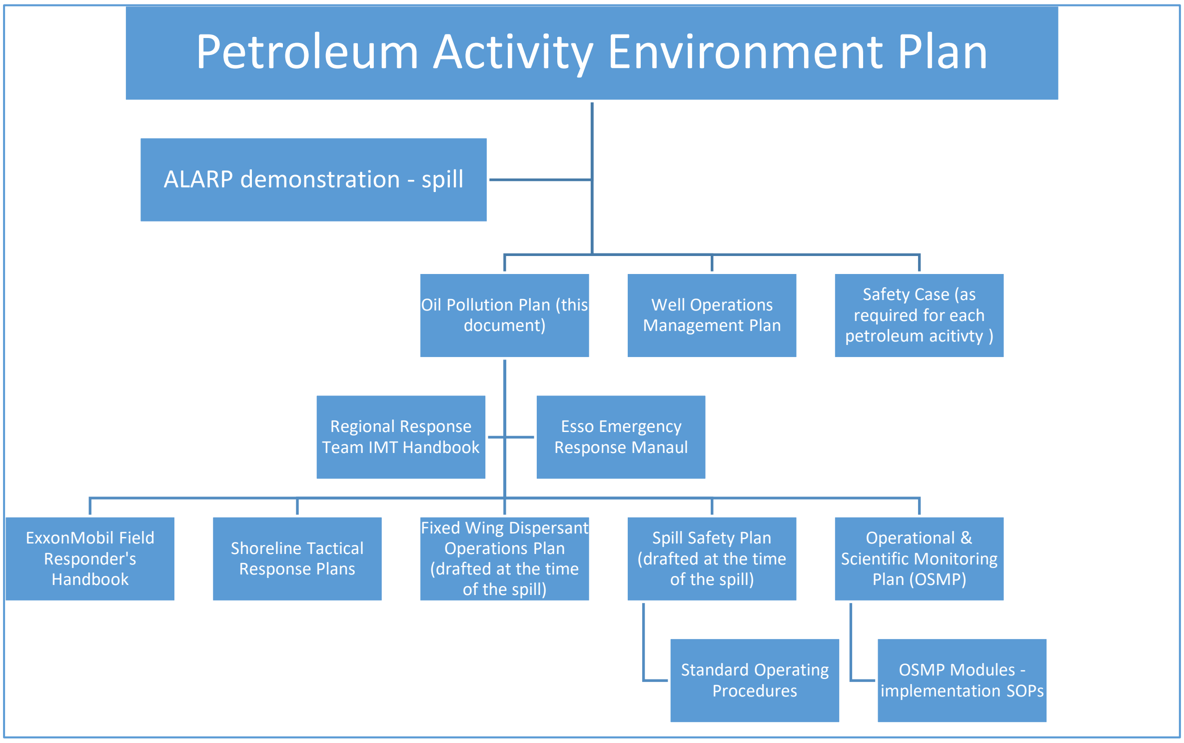


Figure 6-2 OPEP Relationship With Other Key Esso Environmental Documentation

This OPEP also has a number of linkages to external third-party spill response plans or documents. These outline how Esso is to engage with national and state government agencies for the provision of assistance to Esso, or from Esso to those parties, for spill response activities, and who is ultimately 'in charge' of clean up efforts in a particular geographical area. These links are detailed below:

Plan / Document
National Plan for Maritime Environmental Agencies (National Plan) (AMSA, 2014a) https://www.amsa.gov.au/marine-environment/national-plan-maritime-environmental-emergencies
Outlines the resources and services that may be provided by AMSA and other government agencies to assist Esso Details nationally consistent processes and procedures spill response management and tactics and Outlines a range of guidance documents on the same.
Victorian Maritime Emergencies (Non-Search & Rescue) Plan https://www.emv.vic.gov.au/responsibilities/state-emergency-plans/state-maritime-emergencies-non-search-and-rescue-plan
Specifies control agency responsibilities and obligations under Victorian laws in Victorian waters. Specifies the mechanism by which Esso will engage to support the state for oil spill response and wildlife affected by marine pollution.
Victorian Emergency Management Manual Victoria (EMMV) https://www.emv.vic.gov.au/policies/emmv
Outlines agency obligations for emergency management in Victorian state waters and shorelines.

Tasmanian Marine Oil Spill Contingency Plan (TASPLAN) https://epa.tas.gov.au/Pages/Document.aspx?docid=558
Specifies response agency responsibilities and obligations under Tasmanian laws in Tasmanian waters Specifies the mechanism by which Esso will support the state for oil spill response.
NSW State Waters Marine Oil and Chemical Spill Contingency Plan https://www.emergency.nsw.gov.au/Pages/publications/plans/sub-plans/state-waters-marine-oil-and-chemical-spill-contingency-plan.aspx
Specifies control agency responsibilities and obligations under NSW laws in NSW waters Specifies the mechanism by which Esso will support the state for oil spill response.
AMOSPlan www.amosc.com.au
Outlines the support (people, services and equipment) from AMOSC to Esso. Outlines the mutual aid (people, services and equipment) available from AMOSC's members to Esso. Details process to access surge spill response people, services and equipment.

Figure 6-3 External Plans That Inform and Influence Actions Under This OPEP

7 Concept of Spill Response Operations

Esso's concept of operations for responding to spills is based on Esso's environmental commitment detailed in the ExxonMobil Environment Policy.
This translates to a series of commitments by Esso for each occasion that a loss of containment occurs or is suspected. Esso will undertake

1. To conduct early and accurate identification of split hydrocarbons
2. To conduct a credible assessment and identification of defensible and proportionate spill response strategies
3. To tactically implement identified spill response strategies in a timely fashion and
4. To monitor the effectiveness of those strategies in order to achieve Esso's stated environmental performance outcomes for this OPEP.

Esso will mobilise its significant national and global processes, services, contracts and resources to achieve the above.

7.1 Reactive and Proactive Response Stages

This OPEP is broken into two broad sections: (1) background, contextual and supporting information; and (2) response processes. Response processes are then broken down into two further stages: (A) assessment / reactive planning and (B) proactive planning stages.

(A) Assessment/reactive planning are the actions that Esso will undertake in the field by the Esso IMT based on a first-pass assessment of the situation. They are the best planned, reactive actions that can be reasonably expected to assist in achieving Esso's Environmental Performance Outcomes (EPO). Should the assessment indicate a Level Two or Three spill, many of these actions will be focused on the mobilisation of resources likely to be used in future operational periods for the tactical spill response.

(B) Proactive planning is the more settled, longer term project planning mode that Esso will undertake. It requires the mobilisation and setup of a full incident management team and will be supported by Esso's Emergency Support Group for strategic support.

7.1.1.1 Incident Management System

Esso Australia has adopted the global ExxonMobil standard of the incident control system (ICS) as its internal incident management system. ICS maps well onto, and is compatible with, the Australian interagency incident management system (AIIMS) adopted by Australian governments under the National Plan.

At the core of ICS is the concept of the 'planning p'. This is a standardised, systemic process used to identify and then action all incidents. It follows a basic five-step process outlined below:
(1) Understand the situation
(2) Establish incident objectives and strategy
(3) Develop the plan that details the tactics to achieve the strategy/(ies)
(4) Prepare and disseminate the plan
(5) Execute, evaluate, and revise the plan

These steps are turned into the flow diagram below. This OPEP has the assessment/reactive and proactive stages mapped onto this diagram:

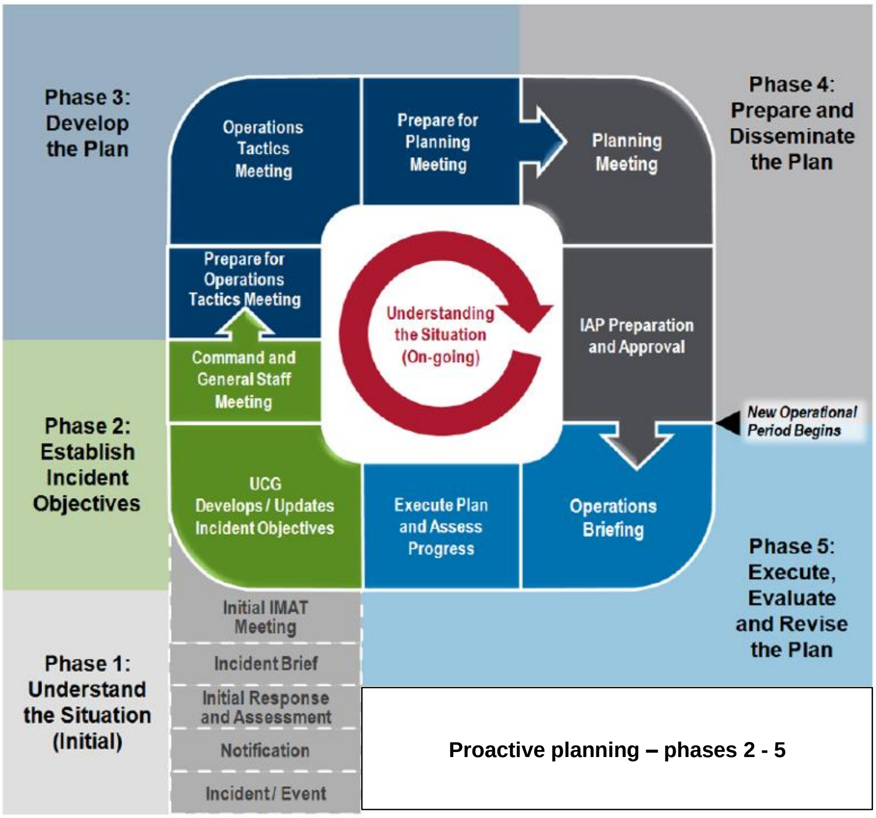


Figure 7-1 ICS Planning 'P'

Esso considers the use of ICS as one of the key controls to develop a robust and defensible incident action plan, which in turn is critical to achieve the best environmental outcomes at the time of the spill.

7.2 Banding of Responses Based on Control Agency Triggers and Stakeholder Interfaces with Esso

To hasten the implementation of appropriate spill response measures, Esso has developed three different action lists for use by the incident management team, based on the proximity of spilt oil to Victorian coastal waters and shorelines. The intent behind this 'banding' is to establish response measures which quickly establish the structure of and implement the most time critical responses using available resources.

The figure below outlines this intent:

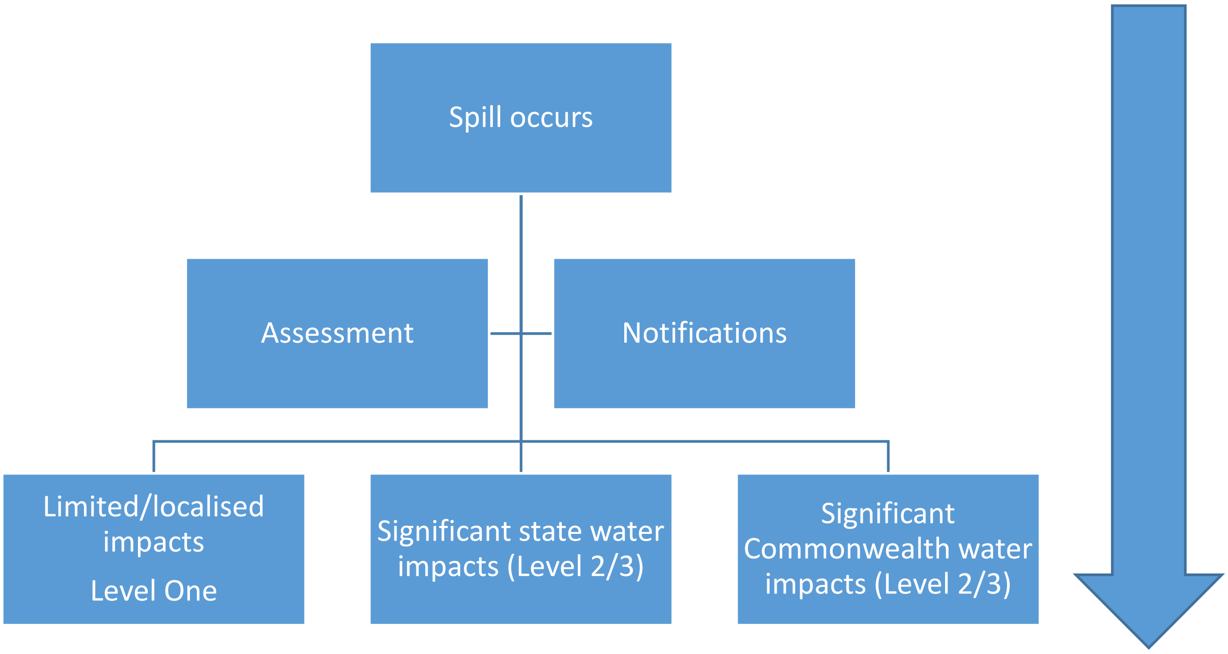


Figure 7-2 Banding Responses

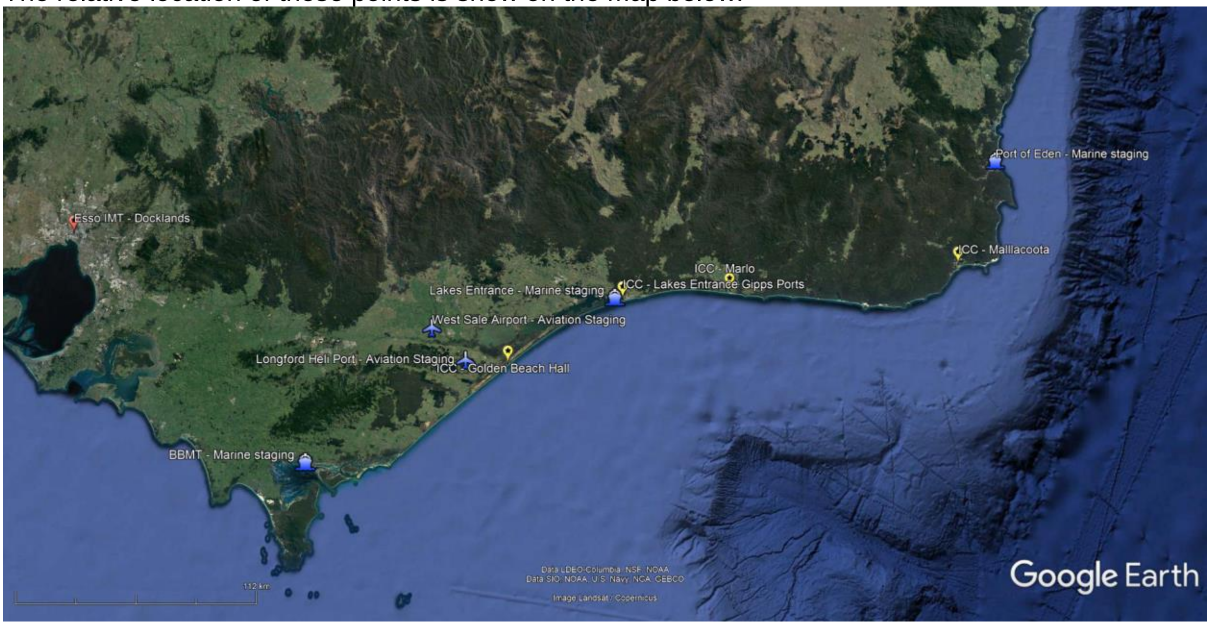
7.2.1 Command Points, Staging and Locations

Esso has a number of operational hubs located in metropolitan Melbourne and Gippsland, which have been predetermined as suitable areas to stage marine, aviation and personnel operations. If available for use, incident command points will be located in Victorian government identified regional ICCs (ref: Victorian Emergency Operations Handbook, pp 117).

These are as below:

Type of area	Location	Address
Incident Command Centre	Esso HQ, Docklands Melbourne	9/ 664 Collins Street Melbourne, VIC
Gippsland Incident Command Points	Bullock Island, Lakes Entrance	2 Bullock Island Lakes Entrance, VIC
Equipment staging area		
	Longford Plants, Longford	Garretts Rd, Longford, Vic
	Barry Beach Marine Terminal	Main Access Rd, Agnes VIC 3962
Marine staging areas		
	Bullock Island, Lakes Entrance	2 Bullock Island Lakes Entrance, VIC
Fixed wing staging areas & heliports	West Sale Airport (YWSL)	Princes Hwy, Fulham VIC
	Longford Heliport	Garretts Rd, Longford, Vic

The relative location of these points is show on the map below:



7.2.2 Oil Characteristics

The main physical properties that affect the behaviour of spilt oil are specific gravity, distillation characteristics, viscosity and pour points.

In the event of a spill, these oils will weather, or degrade, differently depending on the oil type and its physical / chemical properties as well as on the weather, the sea conditions and the length of time it is exposed to these conditions.

7.2.2.1 Diesel

Diesel is loaded from supply vessels onto all offshore platforms and is stored on platforms and vessels in bulk tanks. It is used in vessel and platform engines and operating equipment such as cranes.

Diesel (Group[7] 2 Oil) is a common marine fuel and is classed as a medium petroleum distillate. Marine diesel is a mixture of both volatile and persistent hydrocarbons.

Behaviour when spilt generally, rapid spreading, rapid evaporation and some dispersion or dissolution. Diesel may emulsify at low temperatures when fresh, but the emulsification is likely to be 'unstable'.

Marine diesel contains 95% light hydrocarbons (or non-persistent constituents) that are likely to evaporate when exposed to the atmosphere. The remaining 5% is composed of heavy hydrocarbons (or persistent compounds) that may persist on the sea-surface for extended periods.

The viscosity of marine diesel does not change significantly over time and hence has a strong tendency to physically entrain into the upper water column as oil droplets in the presence of waves but can refloat to the surface if wave energies abate (APASA, 2013).

7.2.2.2 Condensate

Condensate is produced from the Barracouta facility and it will likely be present in the Kipper and West Barracouta drilling campaign.
It is a Group 1 or Group 2 liquid hydrocarbon resulting from a change in pressure and or temperature of gas — 'liquid gas'.

When spilt, condensate behaves in a manner similar to diesel, with generally rapid spreading, rapid evaporation and dispersion/dissolution. There is a low likelihood of emulsification. However, it may contain inert, relatively non-toxic waxes which will persist for some time as they degrade.

Condensates comprise a very high content of volatile (or non-persistent) constituents (~97–99%). Therefore, it is expected that any hydrocarbons reaching the sea-surface would quickly be lost to the atmosphere via evaporation. Smaller droplets may remain in the water column for a longer period undergoing microbial degradation over time. Any persistent (heavy) hydrocarbons may persist longer in the form of small solid relatively non-toxic waxy flakes on the sea-surface or entrained in the water column in turbulent waters given the rough environmental conditions of the region.

7.2.2.3 Light Crude

Light crude oil is produced from the Barracouta, Tarwhine and Seashore facilities.

The remaining heavy hydrocarbons (or persistent compounds) will persist in the environment for a longer period of time as a liquid or semi-solid state, either on the sea surface, entrained in the water column or on shore. The nature of the weathered residues is likely to be a sticky, waxy paste-like oil that will become more crystalline over time as it weathers further.

The loss of volume through evaporation for some crude oils may be offset by tendency to form viscous emulsions ('water in oil'). Oils with more than 3% by weight of asphaltenes create 'stable emulsions'

[7] Classification of petroleum-based oils or 'oil groups' are compiled from various IMO, ITOPF, US EPA and US Coastguard publications. Ref AMSA 2012 Table 8 for classification criteria.

while oils containing less than 3% by weight of asphaltenes only develop unstable emulsions (Fingas and Fieldhouse, 2004).

The maximum value of asphaltenes present in the light crude oils are all less than 0.05%wt so are unlikely to form stable emulsions that would impact on shoreline response and clean-up strategies. It is more likely that only temporary emulsions are likely to be generated and only at sea.

7.2.2.4 Summary of Hydrocarbon Characteristics Used in Oil Spill Trajectory Models

The physical characteristics of the oil types that are present for Seahorse, Tarwhine, Kipper, and West Barracouta are as follows:

MDO Characteristics	Density	829 kg/m^3 @ 15˚C
	API	37.6
	Dynamic Viscosity	4.0 cP @ 25°C
	Pour Point	-14 ºC
	Oil Property Category	Group II (light persistent oil)
Condensate Characteristics	Density	770.6 kg/m^3 @ 15ºC
	API	52.15
	Dynamic Viscosity	0.14 cP @ 25ºC
	Pour Point	-3 ºC
	Oil Property Category	Group I (non-persistent oils)
Light Crude (West Seahorse-3)	Density	792.5 kg/m^3 @ 15ºC
	API	48.0
	Dynamic Viscosity	2.0 cP @ 20ºC
	Pour Point	-15 ºC
	Oil Property Category	Group II (light persistent oil)

8 Supporting Activities to Operations

8.1 Tiered Response Arrangements – Equipment, People and Staging Areas

Logistical and support arrangements for the supply of people, equipment and resources will operate in a tiered approach as below:

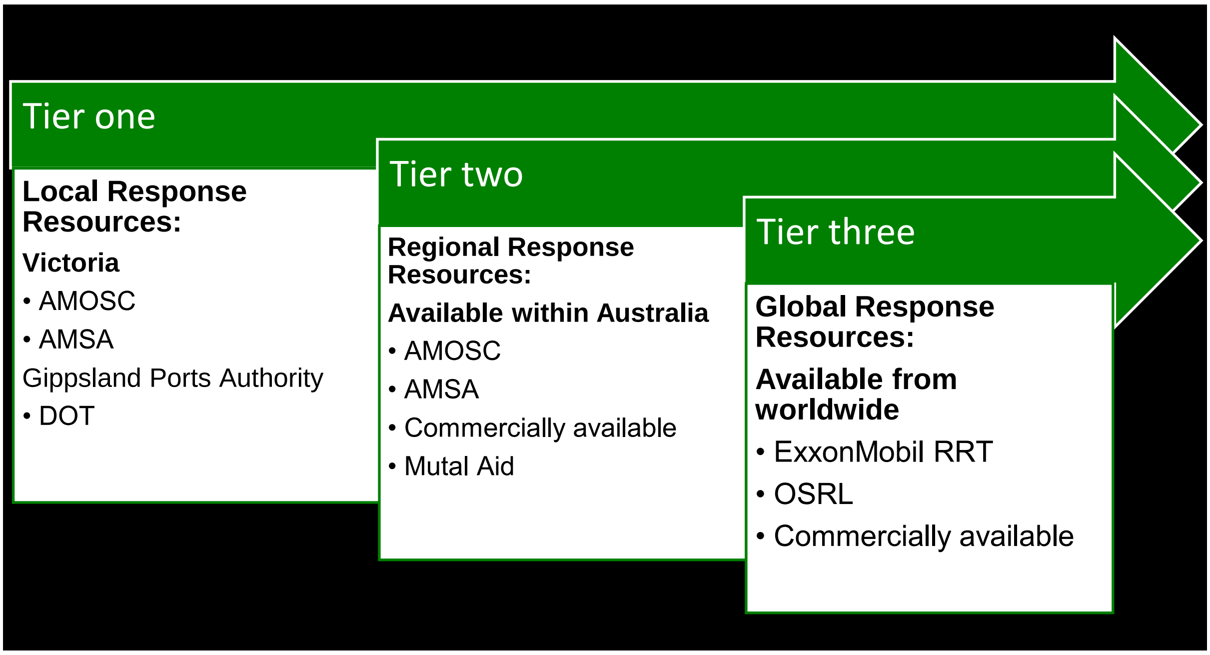


Figure 8-1 Tiered Response Arrangements

8.1.1 Tier 1 – Local Response Resources

Locally available resources consist of stockpiles of oil spill equipment and people in the Gippsland region of Victoria, including Esso and State government OSR equipment.

Esso's marine supply base at BBMT and oil spill response warehouse at LIP holds caches of equipment suitable for marine operations, shoreline protection and clean-up. This includes:

- shoreline protection/deflection boom
- shoreline skimming systems
- offshore booming packages
- offshore skimming systems
- shoreline temporary storage units,
- dispersant and
- decontamination kits

Esso's immediate spill response equipment needs will come from its own tier one stockpiles. For an up to date list of Esso's oil spill response equipment refer to EAPL OSR Equipment List

8.1.2 Tier 2 – Regional Response Resources

Response is conducted by Esso using resources available from within Australia.
Mobilisation of tier two equipment via AMOSC provides access to the nationwide AMOSC equipment stockpiles as well as the AMSA National Plan equipment stockpiles.
Surge labour hire personnel can be accessed through local providers and Esso contractors, including Esso's primary maintenance contractor.

ExxonMobil also has a Singapore based Contingent Worker Contractors Team who can coordinate hire of additional personnel through a number of labour hire firms that ExxonMobil routinely works with.
AMSA / National Plan Equipment

Esso has access to AMSA equipment Australia-wide through AMOSC and the National Plan. AMSA maintains significant stockpiles of equipment in Adelaide, Brisbane, Dampier, Darwin, Devonport, Fremantle, Melbourne, Sydney, and Townsville. The closest National Plan stockpile is located in Melbourne

.
A full inventory of AMSA equipment is available from the AMSA website:

https://amsa-forms.nogginoca.com/public/equipment.html?loc=%2Fapi%2Fv1%2Fasset%2F2615901

AMOSC

Esso has access to AMOSC equipment and resources Australia wide. Mobilisation time to Gippsland for the bulk of the equipment, based in Geelong, is <12 hrs. Additional equipment in Fremantle, Exmouth and Broome can be mobilised to Gippsland as needed by road or air.

A full inventory of AMOSC equipment is available from the AMOSC website http://www.amosc.com.au/equipment.php

Through AMOSC, Esso may also access equipment, personnel and resources owned or held by other oil companies within Australia — this is through the mutual aid provisions of the AMOSPLan. Details of this mutual aid is available through the AMOSC website above.

8.1.3 Tier 3 – Global Response Resources

Response is conducted by Esso using internationally available resources.

Additional resources, personnel and equipment shall be sourced internationally from Oil Spill Response Ltd through the Singapore base, and then from its other bases around the world to Gippsland. Esso global resources — such as the Regional Response Team — can also be mobilised to Gippsland or the IMT. Esso also has a contract with a firm that can provide IMT surge support.

OSRL

From the Esso global Tier 3 response contractor (OSRL) Esso can access 50% of the available stock. To this end the figures quoted for OSRL are representative of 50% of the total stockholding. A full inventory of OSRL equipment is available from the OSRL website http://www.oilspillresponse.com/activate-us/response-equipment

OSRL (UK) mobilisation to Gippsland, 3–5 days. OSRL (Singapore) mobilisation to Gippsland 2–4 days

9 Templates and Forms

Situation Report (SitRep)
Oil Spill Volume Calculator
Oil Spill Trajectory Modelling request form

ICS forms
ICS 201-1 Map and situation summary
ICS 201-2 Current objectives and actions
ICS 201-3 Current organisation
ICS 201-4 Resource Summary
Refer to EMPC Australia - SSHE portal for additional ICS forms. EP&R Tools, Forms and Guide

10 Appendix A – Preparedness NEBA

Preparedness NEBA

11 Appendix B - ICS 204 Work Assignment Templates

ICS 204 Aerial Dispersant Application - Air Tractor

ICS 204 Offshore Containment and Recovery

ICS 204 Vessel Dispersant Application

12 Appendix C – OPEP Consultation Plan

12.1 Relevant control agencies

The OPGGS Environmental Regulation 11A establishes that titleholders (and those with access authority) detail consultation arrangements with relevant control agencies within the potentially exposed area as described in the Environment Plan.

To address this, control agencies within the potentially exposed area as described in the Environment Plan shall be consulted to inform content of the OPEP (see Table 12-1).

Relevant control agencies will act as a single point of contact for their jurisdiction and may coordinate review and comment from other agencies.

Table 12-1 Relevant control agencies (includes but not limited to)

Control Agency	Relevance
Australian Maritime Safety Authority	Commonwealth government agency responsible for maritime safety, protection of the marine environment including marine pollution and maritime aviation search and rescue.
Department of Transport (VIC)	Relevant for unplanned events. A branch of Transport Safety Victoria, working closely with vessel operators and waterway and port managers to provide expert knowledge, education, support and direction
Roads and Maritime Services (NSW)	Relevant for unplanned events. The control agency for marine pollution incidents impacting NSW state waters. NSW waters could potentially be affected by an extended duration unplanned event.
Department of Primary Industries, Parks, Water and Environment (TAS)	Relevant for unplanned events as the control agency for marine pollution in Tasmanian state waters.

12.2 Sufficient time

Four to six weeks is generally considered sufficient time for relevant control agency to complete an internal review, based on prior feedback.

12.3 Relevant information

The following information may be provided to relevant control agencies:

- Brief description of activity, including the intended schedule, location, distances to nearest landfall and map
- Worst case spill volumes
- Known or indicative oil type/properties
- Amenability of oil to dispersants
- Brief description of existing environment and protection priorities
- Key inputs and outputs of the environmental risk assessment
- Outcomes of oil spill trajectory modeling, including predicted times to enter State waters and contact shorelines
- Details on initial response actions and key activation timeframes
- Potential Incident Control Centre arrangements
- Potential staging areas / Forward Operating Base
- Details on response strategies

- Details on proposed IMT structure
- Details on exercise and testing arrangements of OPEP/OSCP

This list has been extracted from the EPA Tasmania – Offshore Petroleum Industry Guidance Note – Annex 3 and forms the basis of information provided. Additional information may be requested by individual agencies.

The information may be provided in summary form or through the provision of a draft EP or OPEP.

12.4 Ongoing consultation

The methods and content of ongoing consultation will be determined with relevant stakeholders and may include meetings, exercises, forums or written communication (see Table 12-2).

Table 12-2 Ongoing consultation with relevant stakeholder

Stakeholder	Meeting	Exercises	Collaborative Forums	Ad-hoc
Victorian Department of Transport	Annual meeting	Annual review of Esso OSR exercise plan Participation in Esso and/or State exercises	Regional Marine Pollution Reference Group	Prior to commencement of new activities Changes to risk
Victoria Department Environment, Land, Water & Planning	Annual meeting	Annual review of Esso OSR exercise plan Participation in Esso and/or State exercises	Regional Marine Pollution Reference Group	-
NSW Roads and Maritime Services	Annual meeting	Participation in Esso and/or State exercises	-	Prior to commencement of new activities Changes to risk
Tasmanian Department of Primary Industries, Parks, Water and Environment	Annual meeting	Participation in Esso and/or State exercises	-	Prior to commencement of new activities Changes to risk
Australian Maritime Safety Authority	Annual meeting	Participation in Esso, National Plan and/or State exercises	ES&T Workshops	Prior to commencement of new activities Changes to risk
Gippsland Port	-	Participation in Esso, Regional and/or State exercises	Regional Marine Pollution Reference Group Esso Community Day	-
East Gippsland Shire Council	-	-	Regional Marine Pollution Reference Group	-

Stakeholder	Meeting	Exercises	Collaborative Forums	Ad-hoc
			Esso Community Day	
Victorian Environmental Protection Authority	-	-	Regional Marine Pollution Reference Group	-

12.5 Consultation during an unplanned event

In the occurrence of an unplanned event, the methods and content of consultation with relevant stakeholders may be determined by notification requirements and can include meetings, phone calls or written communication (see Table 12-3).

Table 12-3 Consultation with relevant stakeholders during an unplanned event

Stakeholder	Incident Notification Requirement	Trigger	Method
Australian Maritime Safety Authority	Required for all spills from vessels	Notification requirement met NatPlan resources needs Impact to shipping	PolRep / SitRep Liaison Officer JSCC
Department of Environment and Energy - Director of National Parks	Required for all spills that are within a marine park, or could impact a marine park.	Notification requirement met	Verbal
Department of Environment	Required for all spills that impact or have the potential to impact on matters of national environmental significance (NES)	Notification requirement met	Verbal
Aboriginal Affairs Victoria		Planned shoreline protection or clean-up activities	Via State IMT
NSW Roads and Maritime Services	Required for: all spills that could impact NSW waters.	Notification requirement met	SitRep Liaison Officer JSCC
VIC Department of Environment, Land, Water and Planning (Wildlife)		Potential impact to wildlife	Via State IMT OWR Coordinator / Liaison
VIC Department of Environment, Land, Water and Planning (Energy Emergency)		Potential impact to supply	Via ESG
TAS Department of Primary Industries, Parks, Water and Environment	Required for: all spills that could impact Tasmanian waters.	Notification requirement met	SitRep Liaison Officer

			JSCC
TAS Parks and Wildlife Service			Via State IMT
VIC Department of Transport - Marine Pollution	All spills that could impact Victorian state waters (>80 litres).		SitRep Liaison Officer JSCC
VIC Environment Protection Authority			Via State IMT
Transport Safety Victoria - Maritime Safety			Via State IMT
Parks Victoria		Impact to State waters or shoreline ParksVic resources required	Via State IMT
NSW Department of Primary Industries		Impact to NSW State waters or shoreline	Verbal
VIC Department Jobs, Preceincts & Regions Earth Resources Regulation	Required for: all spills >80 litres.	Notification requirement met	SitRep Liaison Officer JSCC
East Gipplsand Shire Council			Via State IMT
Victorian Regional Channels Authority			Via State IMT
East Gippsland Catchment Management Authority			Via State IMT
National Offshore Petroleum Titles Adminstrator	Required for: all spills >80 litres.		SitRep
National Offshore Safety Environmental Management Authority	Required for: all spills >80 litres.		SitRep

Appendix B – Bass Strait Oil Spill Monitoring Program

Esso Australia Resources Pty Ltd
Bass Strait Oil Spill Monitoring Program

Document Number: AUGO-EV-EPL-001

OIMS MANUAL - DOCUMENT CONTROL DETAILS

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APPROVALS:

Rev 0	Name	Position	Signature	Date
Prepared by:	Natasha Carroll	Senior Environmental Advisor		
Endorsed By:	Carolyn Thomas	Offshore Risk, Env. & Regulatory Supervisor	On file	
Document Owner:	Carolyn Thomas	Offshore Risk, Env. & Regulatory Supervisor		
Approved By	Simon Kemp	Offshore Asset Manager	On file	

Endorsed / approved by Esso Australia Pty Ltd, for and on behalf of Esso Australia Resources Pty Ltd.

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DOCUMENT REVIEW AND UPDATE:

The Document Owner is responsible for maintaining and controlling changes to this document in accordance with the Document Management Manual (AUGO-PO-DMM-001). In the course of using this document, users may identify opportunities to improve its content. They are requested to provide suggestions to the Document Owner.

This document should be reviewed for accuracy and currency on a 5 yearly basis commencing from the original formal issue date. Major revisions to this manual are to comply with the OIMS System Manual/Process Management of Change procedures.

DISTRIBUTION:

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00	SSHE Group Administrator	Docklands	Email/electronic

Quick Reference: Operational Monitoring Initiation & Termination Criteria

Module	Sub-Module(s)	Initiation Criteria	Position responsible for Initiation	Termination Criteria	Expected Implementation Time [2]
O1: Oil spill surveillance	O1.1 Weather and sea state; O1.2 Trajectory estimation; and O1.3 Aerial or underwater observation;	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred	Planning Section Chief (PSC) (or delegate)	✓ The IMT IC (or delegate) considers that continuation of monitoring under O1[1] will not result in a change to the scale or location of active response options; **or** ✓ Two consecutive aerial or underwater observations show that oil has weathered and disappated to <0.3 g/m2; or Bonn appearance 1; or ✓ The IMT IC (or delegate) has advised that agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the response; **or** ✓ The EUL (or delegate) has advised that continuation of monitoring under O1[1] may increase overall environmental impact.	Within 4 hours of initiation criteria being met.
	O1.4 Remote observation;	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ IMT IC (or delegate) confirms the event as a Level 2 or Level 3 hydrocarbon spill.			Within 24 hours of initiation criteria being met.
	O1.5 Satellite imagery;	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ IMT IC (or delegate) confirms the event as a Level 3 hydrocarbon spill;			Within 24 hours of initiation criteria being met.
	All sub-modules	✓ The IMT IC (or delegate) has advised that either full or partial implementation of O1 is to commence.			Per above
O2: Water and oil sampling	O2.1 Collection of an oil sample	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred	PSC (or delegate)	✓ The IMT IC (or delegate) has determined that continuation of monitoring under the module is not necessary to meet the objectives of the response; **or** ✓ The IMT IC (or delegate) has advised that agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the response**.**	As soon as practicable following initiation criteria being met
	O2.2 Fluorometry O2.3 Water samples;	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ IMT IC (or delegate) confirms the event as a Level 2 or Level 3 hydrocarbon spill; **or**			Within 24 hours of initiation criteria being met.

Module	Sub-Module(s)	Initiation Criteria	Position responsible for Initiation	Termination Criteria	Expected Implementation Time [2]
		✓ Application of dispersant has been selected as a response option by the IMT IC (or delegate).			
	All sub-modules	✓ The IMT IC (or delegate) has advised that either full or partial implementation of O2 is to commence.			Per above
O3: Shoreline assessment	O3.1 Shoreline segmentation O3.2 Shoreline character O3.3 Oil on shorelines	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ Results of Module O1 monitoring predict that shorelines could be impacted.	PSC (or delegate)	✓ The IMT IC (or delegate) has determined that continuation of monitoring under the module is not necessary to meet the objectives of the response; **or** ✓ Results of Module O1 and O3.3 monitoring demonstrate that shorelines have not been impacted and will not be impacted; **or** ✓ The IMT IC (or delegate) has advised that agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the response; **or** ✓ The EUL (or delegate) has advised that continuation of monitoring under O3[1] may increase overall environmental impact.	Within 24 hours of initiation criteria being met
	O3.4 Shoreline profile	✓ Modification of the shoreline profile is identified as a recommended strategy (e.g. through mechanical construction of pits, berms, or bulk waste removal)			Within 24 hours of initiation criteria being met
	All sub-modules	✓ The IMT IC (or delegate) has advised that either full or partial implementation of O2 is to commence.			Per above
O4: Fauna observations	O4.1 Fauna observation (at sea)	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred	PSC (or delegate)	✓ The IMT IC (or delegate) has determined that continuation of monitoring under the module is not necessary to meet the objectives of the response; **or** ✓ The IMT IC (or delegate) has advised that agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the response; **or** ✓ The EUL (or delegate) has advised that continuation of monitoring under O4[1] may increase overall environmental impact.	Within 4 hours of initiation criteria being met
	O4.2 Fauna observations (onshore)	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ IMT IC (or delegate) confirms that data from Modules O1 and/or O3 predicted/confirmed shoreline exposure.			Within 24 hours of initiation criteria being met.
	All sub-modules	✓ The IMT IC (or delegate) has advised that either full or partial implementation of O4 is to commence.			Per above

Module	Sub-Module(s)	Initiation Criteria	Position responsible for Initiation	Termination Criteria	Expected Implementation Time [2]
O5: Air quality	O5.1 Personnel and area monitoring O5.2 Laboratory analysis	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ Confirmation by the Safety Officer (SO) (or delegate) that a health and safety risk to personnel is present	SO (or delegate)	✓ The Safety Officer SO (or delegate) has determined that there is no longer a health and safety risk; **and** ✓ **or** ✓ The IMT IC (or delegate) has advised that agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the response.	Within 12 hours of initiation criteria being met.
	All sub-modules	✓ The IMT IC (or delegate) has advised that either full or partial implementation of O5 is to commence.			Per above
O6: Sediment sampling	O6.1 Sediment samples (intertidal)	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ IMT IC (or delegate) confirms that data from Modules O1, O2 and/or O3 have predicted/confirmed exposure of intertidal benthic substrate.	PSC (or delegate)	✓ The IMT IC (or delegate) has determined that continuation of monitoring under the module is not necessary to meet the objectives of the response; **or** ✓ The IMT IC (or delegate) has advised that agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the response; **or** ✓ The EUL (or delegate) has advised that continuation of monitoring under O6[1] may increase overall environmental impact.	Within 24 hours of initiation criteria being met
	O6.2 Sediment samples (offshore);	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ IMT IC (or delegate) confirms that data from Modules O1 and/or O2 have predicted/confirmed exposure of offshore benthic substrate.			Within 24 hours of initiation criteria being met
	All sub-modules	✓ The IMT IC (or delegate) has advised that either full or partial implementation of O6 is to commence.			Per above

Notes:

1. *Decision to terminate monitoring can be made for each individual sub-module independently.*
2. *A module is considered implemented when Esso have (i) confirmed initiation criteria have been met, (ii) the monitoring providers have been notified, (iii) sampling and analysis plans (where required) have been completed, and (iv) mobilisation has commenced.*

Quick Reference: Scientific Monitoring Initiation & Termination Criteria

Module	Sub-Module	Initiation Criteria	Position responsible for Initiation	Termination Criteria	Position responsible for Termination	Expected Activation Time[1]	Expected Implementation Time
S1: Hydrocarbons in intertidal sediments and water	S1.1 Water samples	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ EUL (or delegate) confirms that data from Modules O1 and/or O2 have predicted/confirmed exposure of intertidal waters	PSC (or delegate)	✓ Ambient hydrocarbon concentrations in intertidal waters have returned to within the expected natural dynamics of baseline state and/or control sites; **or** ✓ Ambient hydrocarbon concentrations in intertidal waters are below relevant ANZECC & ARMCANZ (2000) 99% species protection levels; **or** ✓ There has been no demonstrable impact on intertidal water quality from hydrocarbons.	EUL, in agreement with the Jurisdictional Authority relevant to the spill	Within 24 hours of initiation criteria being met;	Draft sampling and analysis plan to be ready for peer review within 7 days of initiation criteria being met; Mobilisation and monitoring to commence as soon as practicable after initiation criteria being met.
	S1.2 Sediment samples	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ EUL (or delegate) confirms that data from Modules O1 and/or O2 have predicted/confirmed exposure of intertidal or shoreline sediments		✓ Ambient hydrocarbon concentrations in intertidal sediments have returned to within the expected natural dynamics of baseline state and/or control sites; **or** ✓ Ambient hydrocarbon concentrations in intertidal sediments are below relevant ANZECC & ARMCANZ SQGV (Simpson et al. 2013) or NAGD (CoA 2009) trigger levels; **or** ✓ There has been no demonstrable impact on			

Module	Sub-Module	Initiation Criteria	Position responsible for Initiation	Termination Criteria	Position responsible for Termination	Expected Activation Time[1]	Expected Implementation Time
				intertidal sediment quality from hydrocarbons.			
	All sub-modules	✓ The IMT IC (or delegate) has advised that either full or partial implementation of S1 is to commence.		✓ Agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the monitoring.			
S2: Hydrocarbons in offshore sediments and water	S2.1 Water samples	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ EUL (or delegate) confirms that data from Modules O1 and/or O2 have predicted/confirmed exposure to offshore waters	PSC (or delegate)	✓ Ambient hydrocarbon concentrations in offshore waters have returned to within the expected natural dynamics of baseline state and/or control sites; **or** ✓ Ambient hydrocarbon concentrations in offshore waters are below relevant ANZECC/ARMCANZ (2000) 99% species protection levels; **or** ✓ Ambient Entrained hydrocarbon concentrations in offshore waters are <10 ppb, and dissolved hydrocarbon concentrations are <10 ppb; **or** ✓ There has been no demonstrable impact on offshore water quality from hydrocarbons.	EUL, in agreement with the Jurisdictional Authority relevant to the spill	Within 24 hours of initiation criteria being met;	Draft sampling and analysis plan to be ready for peer review within 7 days of initiation criteria being met; Mobilisation and monitoring to commence as soon as practicable after initiation criteria being met.
	S2.2 Sediment samples	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal		✓ Hydrocarbon concentrations in offshore sediments have returned to within the expected natural dynamics			

Module	Sub-Module	Initiation Criteria	Position responsible for Initiation	Termination Criteria	Position responsible for Termination	Expected Activation Time[1]	Expected Implementation Time
		waters has occurred; **and** ✓ EUL (or delegate) has determined that data from operational modules O1, O2 or O6 has confirmed exposure to either benthic substrate or waters within bottom 1 m of seabed		of baseline state and/or control sites; **or** ✓ Hydrocarbon concentrations in offshore sediments are below relevant ANZECC/ARMCANZ SQGV (Simpson et al. 2013) or NAGD (CoA 2009) trigger levels; **or** ✓ There has been no demonstrable impact on offshore sediment quality from hydrocarbons.			
	All sub-modules	✓ The IMT IC (or delegate) has advised that either full or partial implementation of S2 is to commence.		✓ **Or,** agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the monitoring.			
S3: Fish and shellfish taint and toxicity for human consumption	S3 Fish/shellfish tissue samples	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ EUL (or delegate) has determined that data from operational modules O2/O6 or scientific modules S1/S2 has confirmed either: (a) in-water hydrocarbon concentrations are above guideline levels known to cause tainting	PSC (or delegate)	✓ Two sequential sample sets show ambient hydrocarbon concentrations are below guideline levels for tainting in ANZECC & ARMCANZ 2000); **and either** ✓ PAH levels in fish and shellfish tissue have returned to within the expected natural dynamics of baseline state and/or control sites; **or** ✓ PAH levels in fish and shellfish tissue are at or below levels of concern (USFDA 2010) or screening values (USEPA 2000)	EUL, in agreement with the Jurisdictional Authority relevant to the spill	Within 24 hours of initiation criteria being met	Draft sampling and analysis plan to be ready for peer review within 7 days of initiation criteria being met; Mobilisation and monitoring to commence as soon as practicable after initiation criteria being met.

Module	Sub-Module	Initiation Criteria	Position responsible for Initiation	Termination Criteria	Position responsible for Termination	Expected Activation Time[1]	Expected Implementation Time
		(Table 4.4.5 in ANZECC & ARMCANZ 2000); or (b) sediment hydrocarbon concentrations are above SQGV levels (Simpson et al. 2013)		United States Food and Drug Administration (USFDA).			
	All sub-modules	✓ The IMT IC (or delegate) has advised that either full or partial implementation of S3 is to commence.		✓ **Or,** Agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the monitoring.			
S4: Short-term impacts to oiled fauna and flora	S4.1 Fauna surveys (vessel-based) S4.2 Fauna surveys (land-based) S4.3 Oiled fauna hydrocarbon testing;	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ EUL (or delegate) has determined that data from operational modules O4 has confirmed the presence of oiled fauna.	PSC (or delegate)	✓ Disturbance parameters (e.g. mortality, percentage oiled fauna/flora) have returned to within the expected natural dynamics of baseline state and/or control sites; and ✓ Hydrocarbon concentrations from fauna samples have returned to within the expected natural dynamics of baseline state and/or control sites.	EUL, in agreement with the Jurisdictional Authority relevant to the spill	Within 24 hours of initiation criteria being met	Draft sampling and analysis plan to be ready for peer review within 7 days of initiation criteria being met; Mobilisation and monitoring to commence as soon as practicable after initiation criteria being met.
	S4.4 Flora surveys	✓ Confirmation by the IMT IC (or delegate) that Level 2 or Level 3 hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ EUL (or delegate) has determined that data from operational					

Module	Sub-Module	Initiation Criteria	Position responsible for Initiation	Termination Criteria	Position responsible for Termination	Expected Activation Time[1]	Expected Implementation Time
		modules O3 has confirmed the presence of oiled shorelines					
	All sub-modules	✓ The IMT IC (or delegate) has advised that either full or partial implementation of S4 is to commence.		✓ Agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the monitoring.			
S5: Recovery of commercial and recreational fisheries	S5 Desktop review of fishery stock;	✓ Confirmation by the IMT IC (or delegate) that Level 2 or Level 3 hydrocarbon spill to marine or coastal waters has occurred; and EUL (or delegate) has confirmed that either: (a) data from S3 confirms tainting in fish or shellfish tissue; or (b) Advice has been provided to government to restrict, ban or close a fishery; or (c) Declarations of intent by commercial fisheries or government agencies to seek compensation for	PSC (or delegate)	✓ Catch per Unit Effort (CPUE) for fishery stock assessments have returned to within the expected natural dynamics of baseline state and/or control sites; **or** ✓ The physiological and biochemical parameters in the studied species have returned to baseline levels;	EUL, in agreement with the Jurisdictional Authority relevant to the spill	Within 24 hours of initiation criteria being met	Desktop assessment to commence as soon as practicable after initiation criteria being met.

Module	Sub-Module	Initiation Criteria	Position responsible for Initiation	Termination Criteria	Position responsible for Termination	Expected Activation Time[1]	Expected Implementation Time
		alleged or possible damage.					
	All sub-modules	✓ The IMT IC (or delegate) has advised that either full or partial implementation of S5 is to commence.		✓ **Or,** agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the monitoring.			
S6: Recovery of fauna	S6 Fauna surveys	✓ Confirmation by the IMT IC (or delegate) that Level 2 or Level 3 hydrocarbon spill to marine or coastal waters has occurred, **and** ✓ EUL (or delegate) has determined that data from operational module O4 or scientific module S4 has confirmed the exposure of fauna	PSC (or delegate)	✓ Disturbance parameters (e.g. estimated population) have returned to within the expected natural dynamics of baseline state and/or control sites; or ✓ There has been no demonstrable impact on fauna from hydrocarbons.	EUL, in agreement with the Jurisdictional Authority relevant to the spill	Within 24 hours of initiation criteria being met	Draft sampling and analysis plan to be ready for peer review within 7 days of initiation criteria being met; Mobilisation and monitoring to commence as soon as practicable after initiation criteria being met.
	All sub-modules	✓ The IMT IC (or delegate) has advised that either full or partial implementation of S6 is to commence.		✓ **Or,** agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the monitoring.			
S7: Recovery of subtidal and intertidal	S7.1 Habitat mapping; S7.2 Macroalgae and sponges	✓ Confirmation by the IMT IC (or delegate) that Level 2 or Level 3 hydrocarbon spill to marine or coastal	PSC (or delegate)	✓ Disturbance parameters (e.g. species composition, percent cover) and health parameters (e.g. leaf condition) have returned to	EUL, in agreement with the Jurisdictional Authority	Within 24 hours of initiation	Draft sampling and analysis plan to be ready for peer review within 7 days of

Module	Sub-Module	Initiation Criteria	Position responsible for Initiation	Termination Criteria	Position responsible for Termination	Expected Activation Time[1]	Expected Implementation Time
benthic habitat	S7.3 Benthic infauna monitoring; S7.4 Intertidal and subtidal fish monitoring	waters has occurred; **and** ✓ EUL (or delegate) has determined that data from operational module O2/O6 or scientific module S1/S2/S4 has confirmed the exposure of either benthic substrate or waters within bottom 1 m of seabed		within the expected natural dynamics of baseline state and/or control sites; **or** ✓ There has been no demonstrable impact on benthic or intertidal habitats from hydrocarbons.	relevant to the spill	criteria being met	initiation criteria being met; Mobilisation and monitoring to commence as soon as practicable after initiation criteria being met.
	All sub-modules	✓ The IMT IC (or delegate) has advised that either full or partial implementation of S7 is to commence.		✓ **Or,** agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the monitoring			
S8: Recovery of coastal flora	S8.1 Habitat mapping; S8.2 Condition monitoring	✓ Confirmation by the IMT IC (or delegate) that Level 2 or Level 3 hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ EUL (or delegate) has determined that data from operational module O3 or scientific module S4 has confirmed the exposure of coastal flora	PSC (or delegate)	✓ Disturbance parameters (e.g. abundance, percent cover) and health parameters (e.g. leaf condition) have returned to within the expected natural dynamics of baseline state and/or control sites; **or** ✓ There has been no demonstrable impact on coastal flora from hydrocarbons.	EUL, in agreement with the Jurisdictional Authority relevant to the spill	Within 24 hours of initiation criteria being met	Draft sampling and analysis plan to be ready for peer review within 7 days of initiation criteria being met; Mobilisation and monitoring to commence as soon as practicable after initiation criteria being met.
	All sub-modules	✓ The IMT IC (or delegate) has advised		✓ **Or,** agreement has been reached with the			

Module	Sub-Module	Initiation Criteria	Position responsible for Initiation	Termination Criteria	Position responsible for Termination	Expected Activation Time[1]	Expected Implementation Time
		that either full or partial implementation of S8 is to commence.		Jurisdictional Authority relevant to the spill to terminate the monitoring.			
S9: Recovery of Ramsar values	S9 Desktop review of wetland values	✓ Confirmation by the IMT IC (or delegate) that Level 2 or Level 3 hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ EUL (or delegate) has determined that (a) data from operational module O3 has confirmed the exposure of a Ramsar wetland; and (b) data from scientific modules S1, S4, S6, S7 or S8 confirm an impact to water/sediment quality, flora or fauna in the wetland.	PSC (or delegate)	✓ Wetland values have returned to within the expected natural dynamics of baseline state and/or control sites; or ✓ There has been no demonstrable impact on Ramsar wetlands from hydrocarbons.	EUL, in agreement with the Jurisdictional Authority relevant to the spill	Within 24 hours of initiation criteria being met	✓ Desktop assessment to commence as soon as practicable after initiation criteria being met.
	All sub-modules	✓ The IMT IC (or delegate) has advised that either full or partial implementation of S9 is to commence.		✓ **Or**, agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the monitoring.			

Notes:

1. A module is considered activated when Esso have confirmed initiation criteria have been met and the monitoring providers have been notified to initiate planning and implementation tasks.

Quick Reference: Event Level and Monitoring Modules

Spill Event	O1: Oil spill surveillance					O2: Water and oil sampling			O3: Shoreline assessment				O4: Fauna observations		O5: Air quality		O6: Sediment sampling	
	O1.1	O1.2	O1.3	O1.4	O1.5	O2.1	O2.2	O2.3	O3.1	O3.2	O3.3	O3.4	O4.1	O4.2	O5.1	O5.2	O6.1	O6.2
	Weather and sea state	Trajectory estimation	Aerial or underwater observation	Remote observation	Satellite imagery	Collection of an oil sample	Fluorometry	Water samples	Shoreline segmentation	Shoreline character	Oil on shorelines	Shoreline profile	Fauna observation (at sea)	Fauna observation (onshore)	Personnel and area monitoring	Laboratory analysis	Sediment samples (onshore)	Sediment samples (offshore)
Level 1	X	X	X			P			P	P	P	P	X	P	P	P		
Level 2	X	X	X	P		X	P	X	P	P	P	P	X	P	X	X	P	P
Level 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Key: X = always required; P = possibly required, dependent on the outcomes of Operational Module 1.

Spill Event	S1: Hydrocarbons in intertidal sediments and water		S2: Hydrocarbons in offshore sediments and water		S3: Fish and shellfish taint and toxicity for human consumption	S4: Short-term impacts to oiled fauna and flora				S5: Recovery of commercial and recreational fisheries	S6: Recovery of fauna	S7: Recovery of subtidal and intertidal benthic habitat				S8: Recovery of coastal flora		S9: Recovery of Ramsar values
	S1.1	S1.2	S2.1	S2.2	S3	S4.1	S4.2	S4.3	S4.4	S5	S6	S7.1	S7.2	S7.3	S7.4	S8.1	S8.2	S9
	Water samples	Sediment samples	Water samples	Sediment samples	Fish/shellfish tissue samples	Fauna surveys	Fauna surveys	Oiled fauna hydrocarbon	Flora surveys	Desktop review of fishery stock	Fauna surveys	Habitat mapping	Macroalgae and sponges	Benthic infauna monitoring	Intertidal and subtidal fish monitoring	Habitat mapping	Condition monitoring	Desktop review of wetland values
Level 1																		
Level 2	P	P	X	P	P	P	P	P	P	P	P	P		P	P	P	P	P
Level 3	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X

Abbreviations

AMOSC	Australian Marine Oil Spill Centre
AMSA	Australian Maritime Safety Authority
ANOVA	Analysis of variance
ANZECC	Australian and New Zealand Environment and Conservation Council
ARMCANZ	Agricultural and Resource Management Council of Australia and New Zealand
BACI	Before After Control Impact
BoM	Bureau of Meteorology
BTEX	Benzene, toluene, ethylbenzene and xylene
DJPR	Department of Jobs, Princints and Regions
DELWP	Department of Environment, Land, Water and Planning Victoria
DoEE	Department of the Environment and Energy
DOSS	Dioctyl sodium sulfosuccinate
DPI	Department of Primary Industry
DPIPWE	Department of Primary Industries, Parks, Water and Environment
EMBSI	ExxonMobil Biological Sciences Inc
EP	Environment Plan
ERT	Emergency Response Team
EUL	Environment Unit Lead
IC	Incident Commander
IMT	Incident Management Team
ITOPF	International Tanker Owners Pollution Federation Limited
IvC	Impact versus Control
LCL	Lower control limit
mBACI	Multiple Before After Control Impact
MES	Monitoring, evaluation and surveillance
NAGD	National Assessment Guidelines for Dredging
NATA	National Association of Testing Authorities
NOAA	National Oceanic and Atmospheric Administration
NOPSEMA	National Offshore Petroleum Safety and Environmental Management Authority
NSW	New South Wales
OIM	Offshore Installation Manager
OIMS	Operations Integrity Management System
OPEP	Oil Pollution Emergency Plan
OPGGS Act	Offshore Petroleum and Greenhouse Gas Storage Act 2006

OSC	Operations Section Chief
OSMP	Oil Spill Monitoring Program
OSRL	Oil Spill Response Limited
OSTM	Oil Spill Trajectory Modelling
PAH	Poly aromatic hydrocarbons
PERMANOVA	Permutational multivariate analysis of variance
PSC	Planning Section Chief
PSD	Particle size distribution
RAMSAR	Convention on Wetlands of International Importance
SCAT	Shoreline Clean-up Assessment Technique
SD	Standard deviation
SMART	Special Monitoring of Applied Response Technologies
SO	Safety Officer
SQG	Sediment Quality Guidelines
TOC	Total organic carbon
TPH	Total petroleum hydrocarbon
TRH	Total recoverable hydrocarbon
UCL	Upper control limit
USA	United States of America
USEPA	United States Environment Protection Agency
USFDA	United States Food and Drug Administration
VFA	Victorian Fisheries Authority
VM	Vessel Master

Contents

1. Introduction

1.1 Purpose

This Gippsland Oil Spill Monitoring Plan (OSMP) is a key component of the environmental management framework (which also includes activity-specific Environment Plans (EP) and the Gippsland Oil Pollution Emergency Plan (OPEP)) for offshore petroleum activities operated by Esso Australia Resources Pty Ltd (Esso) within the Gippsland region (Figure 1-1).

This OSMP outlines environmental monitoring that may be implemented in the event of a hydrocarbon spill to the marine or coastal environment. Information from operational monitoring provides situational awareness enabling the Incident Management Team (IMT) to make informed decisions regarding response options. Oil Spill monitoring are the principle tools for determining the extent, severity and persistence of environmental impacts from a hydrocarbon spill and associated response and/or remediation activities.

Note, this plan focuses on Oil Spill monitoring of a hydrocarbon spill event only. Hydrocarbon spill risks, prevention and response activities are described in the activity-specific EP and Gippsland OPEP.

This OSMP is supported by a set of internal implementation guides for each of the Oil Spill monitoring modules. It is important to note that the implementation guides are not a prescriptive set of procedures that must strictly be followed, but are intended to provide Esso and their monitoring providers with sufficient information to efficiently finalise a monitoring design of an appropriate nature and scale in the event of a hydrocarbon spill. It is expected that individual monitoring plans and operating procedures would only be finalised once a spill event has occurred. This is essential to ensure the finalised monitoring plan/s are fit for purpose and tailored to the specific location, hydrocarbon type, environmental sensitivities, and the nature and scale of the individual spill.

This OSMP is to be read in conjunction with the activity-specific EP and Gippsland OPEP when considering the existing environment, environmental impacts, risk management, performance standards, reporting compliance, and the decision processes that will apply in the event of a spill occuring.

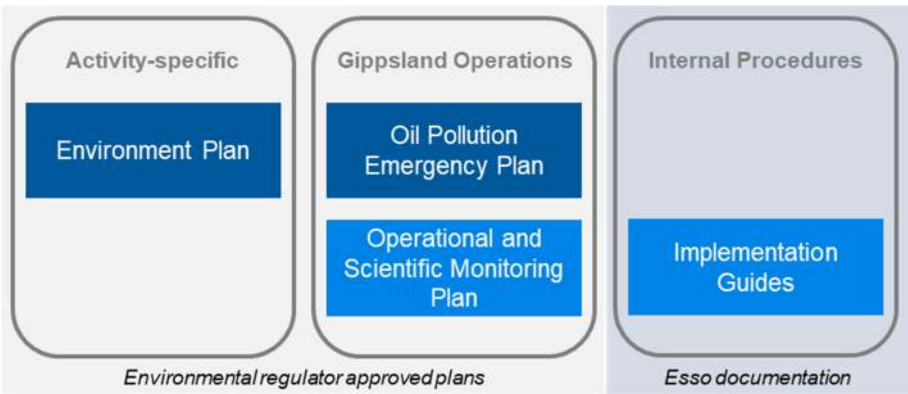

Figure 1-1: Environmental management framework for offshore petroleum activities in the Gippsland region

1.2 Objectives

The objectives of this OSMP are:

- Identify and describe the Oil Spill monitoring that may be implemented in the event of a hydrocarbon spill to the marine or coastal environment;

- Demonstrate an appropriate degree of readiness to implement this monitoring in the event of a hydrocarbon spill to the marine or coastal environment.

1.3 Scope

1.3.1. Activity types

This OSMP is relevant to all Esso petroleum activities within the Gippsland region regulated under the Commonwealth *Offshore Petroleum and Greenhouse Gas Storage Act 2006 (OPGGS) (Environment) Regulations 2009* and the Victorian *OPGGS Regulations 2011*. This includes, but is not limited to:

- Vessel operations;
- Drilling and completions;
- Well workovers and interventions;
- Subsea activities;
- Pipelay activities;
- Operations; and
- Decommissioning.

1.3.2. Hydrocarbon types and states

Esso's petroleum resources within the Gippsland region include both crude oil and natural gas; and petroleum activity related vessels typically use marine diesel oils. This OSMP is relevant to all hydrocarbon types and states (i.e. fresh and weathered); and all distributions throughout the environment (i.e. surface, entrained, dissolved and shoreline).

1.3.3. Geographical extent

This OSMP is relevant and applicable to all Commonwealth and State marine and coastal areas that are potentially at risk of exposure to hydrocarbons in the event of a spill resulting from petroleum activities. Petroleum titles and selected environmental features within the vicinity of the Gippsland region is shown in Figure 1-2.

The spatial boundaries of an individual monitoring study will depend primarily on the actual or potential exposed area affected by the spill. Spatial boundaries will be sufficient to meet monitoring objectives, usually by determining impacted areas and the level of effects, linking effects to the spill source, and supporting decisions on clean-up strategies. Monitoring may also be undertaken outside the boundaries of a spill where monitoring programs require un-impacted reference sites.The spatial extent of a monitoring study would only be finalised once a spill event has occurred.

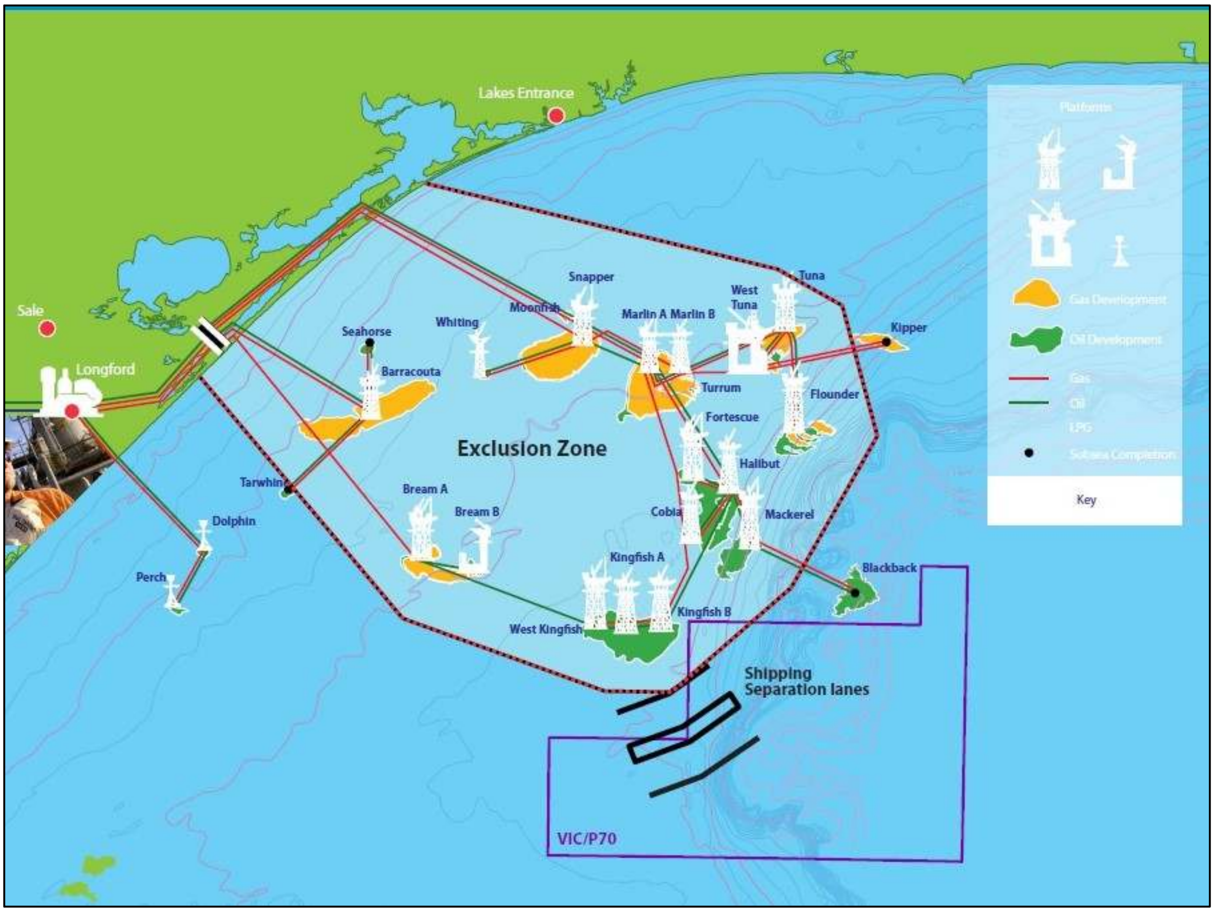

Figure 1-2: Esso assets within with Gippsland region

1.4 Regulatory requirements

Table 1-1 provides guidance on the OSMP requirements of the Commonwealth OPGGS (Environment) Regulations 2009, and Victorian OPGGS Regulations 2011, and reference to the relevant section of this document which addresses that requirement.

This OSMP incorporates regulatory guidance from the following documents:

- Guidance Note – Oil pollution risk management (NOPSEMA 2018)
- Information Paper – Oil Spill monitoring programs (NOPSEMA 2016).

Table 1-1: Relevant Commonwealth and State environmental regulations for OSMPs

Regulation	Relevant section in this OSMP
OPGGS (Environment) Regulations	
Part 2, Division 2.3, Regulation 14 (5) The implementation strategy must include measures to ensure that each employee or contractor working on, or in connection with, the activity is aware of his or her responsibilities in relation to the environment plan, including during emergencies or potential emergencies, and has the appropriate competencies and training.	Sections 2.3 and 2.4
Part 2, Division 2.3, Regulation 14 (8AA) The oil pollution emergency plan must include adequate arrangements for responding to and monitoring oil pollution, including the following: (a) the control measures necessary for timely response to an emergency that results or may result in oil pollution; (b) the arrangements and capability that will be in place, for the duration of the activity, to ensure timely implementation of the control measures, including arrangements for ongoing maintenance of response capability; (c) the arrangements and capability that will be in place for monitoring the effectiveness of the control measures and ensuring that the environmental performance standards for the control measures are met; (d) the arrangements and capability in place for monitoring oil pollution to inform response activities.	Sections 2, 3, and 4
Part 2, Division 2.3, Regulation 14 (8D) The implementation strategy must provide for monitoring of impacts to the environment from oil pollution and response activities that: (a) is appropriate to the nature and scale of the risk of environmental impacts for the activity; and (b) is sufficient to inform any remediation activities.	Sections 2, 3, and 4
Victoria OPGGS Regulations	
Part 2.2, Division 3, Regulation 16 (5) The implementation strategy must include measures to ensure that each employee or contractor working on, or in connection with, the activity is aware of his or her responsibilities in relation to the environment plan, including during emergencies or potential emergencies, and has the appropriate competencies and training	Sections 2.3 and 2.4

1.5 Target audience

In the event of a hydrocarbon spill, Esso is responsible for the implementation and adherence to this OSMP. This OSMP is intended for use by, but not limited to:

- Incident Management Team (IMT) personnel including:
  - Incident Commander (IC);
  - Operations Section Chief (OSC):
  - Planning Section Chief (PSC);
  - Environment Unit Lead (EUL)
  - Safety Officer (SO)
- Platform Emergency Response Team (ERT) personnel including:
  - Offshore Installation Manager (OIM);
  - Vessel Master (VM);
- Esso environment team;
- Monitoring provider personnel including:
  - Principal Investigator;
  - Monitoring/Field teams.

2. OSMP Framework and Implementation

2.1 Types of monitoring

Oil spill monitoring has been divided into two types (Oil Spill) which are undertaken for two distinct, but closely related, purposes (NOPSEMA 2016).

Operational monitoring collects information about the spill and associated response activities to aid planning and decision making for executing spill response or clean-up operations. Operational monitoring may include both initial response phase monitoring (i.e. rapid qualitative and observational data gathering for situational awareness) and advanced response phase monitoring (i.e. quantitative measurement) (Hook et al. 2016). Operational monitoring typically finishes when the spill response is terminated.

Six operational monitoring modules have been identified (see Section 3):

- O1: Oil spill surveillance;
- O2: Water and oil sampling;
- O3: Shoreline assessment;
- O4: Fauna observations;
- O5: Air quality;
- O6: Sediment sampling.

Scientific monitoring focusses on evaluating environmental impact and recovery from the spill and response activities. Scientific monitoring may be undertaken over an extended period to fully understand impacts.

Nine scientific monitoring modules have been identified (see Section 4):

- S1: Hydrocarbons in intertidal sediments and water;
- S2: Hydrocarbons in offshore sediments and water;
- S3: Fish and shellfish taint and toxicity for human consumption;
- S4: Short-term impacts to oiled fauna and flora;
- S5: Recovery of commercial and recreational fisheries;
- S6: Recovery offauna;
- S7: Recovery ofsubtidal and intertidal benthic habitat;
- S8: Recovery ofcoastal flora;
- S9: Recovery of Ramsar values.

Operational monitoring studies inform offshore and nearshore/shoreline response strategies, and information collected during these studies may trigger scientific monitoring. Oil Spill monitoring studies may occur simultaneously (i.e. scientific monitoring can start before a response operation is completed). Note, some data that may be used within scientific monitoring analyses can also only be collected during the initial phase of the oil spill response (e.g. 'reactive' baseline data) (Hook et al. 2016).

2.1 Initiation and termination of monitoring

Initiation and termination criteria have been defined for each individual operational monitoring (Section 3) and scientific monitoring (Section 4) module. The criteria for the initiation and termination of monitoring modules will be assessed on a daily basis during a response operation, and then as-required for any ongoing scientific monitoring modules.

Initiation for operational monitoring modules is typically dependent on presence of a spill, response options being implemented and information from surveillance activities. Termination criteria are typically based on there being no benefit to response planning or a response has ceased, no increase in environmental risk, compliance with relevant environmental guidelines or benchmarks (where available). Termination criteria for operational monitoring also require that any related scientific monitoring initiation criteria have been assessed.

Initiation for scientific monitoring modules is typically dependant on information from operational monitoring results, specifically outcomes of monitoring, evaluation and surveillance (MES) activities, and indications that relevant environmental guidelines or benchmarks have been exceeded (where available). Termination criteria are based on sufficient evidence to demonstrate no impact from hydrocarbon and/or a return to the expected natural dynamics of the area.

All Oil Spill monitoring modules can also be initiated by the IMT IC (or delegate) irrespective of other criteria being met. This may be an independent Esso decision, or made in conjunction with the relevant Jurisdictional Authority. Depending on the scenario, these discretionary studies may be a full or only partial implementation of the relevant operational or scientific module.

The safety of sampling personnel will be assed prior to the collection of any samples and will only occur if safe to do so. Sampling collection will only occur in daylight hours and when wind and sea states allow for the safe collection ofsamples. It may not be safe for a vessel to get close to a spill if there is positive gas detection. Samples will be undertaken when the presence of spilt oil is detectable.

2.2 Implementation guides

The implementation guides are not a prescriptive set of procedures that must strictly be followed, but are intended to provide Esso and their monitoring providers with sufficient information to efficiently finalise a monitoring design of an appropriate nature and scale in the event of a hydrocarbon spill. The guides include:

- A description of minimum requirements, adopted standards and/or best practice guidance for monitoring design, sampling techniques and reporting requirements;
- A list of resources (e.g. equipment, personnel) recommended to implement the monitoring;
- Draft standard operating procedures.

It is expected that individual monitoring plans and operating procedures would only be finalised once a spill event has occurred. This is essential to ensure the finalised monitoring plan/s are fit for purpose and tailored to the specific location, hydrocarbon type, environmental sensitivities, and the nature and scale of the individual spill.

Where practicable, the draft standard operating procedures are aligned with existing standards and processes (e.g. Hook et al. 2016; NOAA 2006).

2.3 Roles and responsibilities

The key roles (and their associated responsibilities) for the implementation of this OSMP are shown in

Table 2-1. Depending on the scale of the event, individual people may perform multiple roles; similarly, multiple people may share the same role.

Table 2-1: Key roles and responsibilities relating to implementation of the OSMP

Role	Responsibilities
IMT IC	• Day to day responsibility for facilitating/coordinating monitoring activities under this OSMP; • Initiation and termination of operational monitoring modules; • Initiation of scientific monitoring modules (discretionary).
PSC	• Initiating Oil Spill monitoring modules when initiation criteria met; • Coordination analysis and distribution of data obtained through operational monitoring, including integration of data into the common operating picture
EUL	• Advising IC on which Oil Spill monitoring modules should be implemented when initiation criteria met; • Activiation and liaison with service providers to implement scientific modules • Facilitating/coordinating data and reports from monitoring to the IMT for use in response planning; • Initiation and termination of operational monitoring modules; • Initiation and termination of scientific monitoring modules • Report review and approval for scientific monitoring modules.
OIM / VM	• Initiation of spill surveillance in the initial response phase of a spill; • May undertake day to day responsibilities (e.g. under delegation from the IMT IC).
Principal Investigator	• Responsible for implementation of a particular operational or scientific monitoring module; • Review and/or carry out study's monitoring reporting requirements; • Provides advice with respect to environmental issues as required.
Field Teams	• Implement the operational or scientific monitoring module; • Data QA/QC and reporting; • Compliance with the requirements of this OSMP

2.4 Training and competency

Minimum competencies for key OSMP-specific roles are detailed in each implementation guide Competency and experience for OSMP personnel, including Esso and any contractor personnel, will be confirmed prior to implementation. Depending on the scale of the event, individual people may perform multiple roles; similarly, multiple people may share the same role.

Training and competencies for members of the ERT/IMT are detailed in the associated EP.

2.5 External capabilities

Resources for monitoring (e.g. personnel and equipment) may be outsourced to contractors. Esso currently has a contract in place with a local environmental consultancy to provide this environmental support. In the event that additional resources are required, other consultancy capacity will be utilised (as needed) and may extend to specialist contractors such as research agencies engaged in long-term marine monitoring programs.

Esso will also access specialist capabilities as required (e.g. OSTM via AMOSC).

Esso has identified a pool of NATA accredited laboratories with capabilities for undertaking analyses required as part of Oil Spill monitoring scopes (

Table 2-2).

Table 2-2: NATA accredited laboratories

Laboratory	Contact Details
Australian Laboratory Services (Melbourne)	[redacted]
Australian Laboratory Services (Traralgon)	
Ecotox Services Australia	
Eurofins MGT	
Intertek Geotechnical	
Leeder Analytical Pty Ltd	
Longford Plants Laboratory	
National Measurement Institute	

2.6 Communication management

Stakeholder (including regulators) consultation and external reporting requirements are described in the activity-specific EPs. This includes the requirement to consult with the

- Department of Jobs, Precincts and Regions (DJPR) in the event that a hydrocarbon spill is likely to impact state waters;
- Department of the Environment and Energy (DoEE), in the event that a hydrocarbon spill is likely to impact matters of national environmental significance;
- Director of National Parks, in the event that a hydrocarbon spill and/or response activity are likely to impact an Australian Marine Park.

2.7 Review and revision

Regulation 19 of the OPGGS(E) Regulations provides for the revision of this OSMP at least 14 days before the end of the period of five years from the most recent approval of the associated activity-specific EP.

3. Operational Monitoring

The following sections outline the individual operational monitoring modules that may be implemented in the event of a hydrocarbon spill to the marine or coastal environment. The tables describe the key aims, initiation and termination criteria, implementation times, and provide a high-level description of monitoring, reporting and resources. The studies are presented separately below; however, in practice they may be undertaken simultaneously.

These overviews are supported by internal implementation guides for each of the operational monitoring modules. The implementation guides have been prepared to provide Esso and their monitoring providers' sufficient information to efficiently finalise a monitoring design of an appropriate nature and scale in the event of a hydrocarbon spill.

Six operational monitoring modules have been identified:

- O1: Oil spill surveillance;
- O2: Water and oil sampling;
- O3: Shoreline assessment;
- O4: Fauna observations;
- O5: Air quality;
- O6: Sediment sampling.

3.1 O1: Oil spill surveillance

3.1.1. Purpose

The development and implementation of effective responses to oil spills depends critically on the knowledge of the extent and likely fate and behaviour of oil once exposed to ambient weather and sea state conditions. The purpose of this module is to:

- Track the location, extent and thickness of the surface oil slick to gain situational awareness of the incident and validate and inform forecasting and Oil Spill Trajectory Modelling (OSTM);
- Collect and collate relevant weather and sea state conditions to inform OSTM and response actions;
- Predict sensitivities at risk and fate/behaviour of the spill to inform response actions and scientific monitoring;
- Provide location of slick to O2 (water and oil sampling) monitoring team;
- Provide feedback on the extent, location, appearance and thickness of a dispersed slick

- (applicable only if dispersants used).

3.1.2. Initiation and termination criteria

Initiation Criteria	O1.1 Weather and sea state; O1.2 Trajectory estimation; and O1.3 Aerial or underwater observation;	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred
	O1.4 Remote observation;	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ IMT IC (or delegate) confirms the event as a Level 2 or Level 3 hydrocarbon spill.
	O1.5 Satellite imagery;	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ IMT IC (or delegate) confirms the event as a Level 3 hydrocarbon spill;
	All sub-modules	✓ The IMT IC (or delegate) has advised that either full or partial implementation of O1 is to commence.
Termination Criteria	✓ The IMT IC (or delegate) considers that continuation of monitoring under O1[1] will not result in a change to the scale or location of active response options; **or** ✓ Two consecutive aerial or underwater observations show that oil has weathered and dissipated to <0.3 g/m2; or Bonn appearance code 1; or ✓ The IMT IC (or delegate) has advised that agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the response; **or** ✓ The EUL (or delegate) has advised that continuation of monitoring under O1[1] may increase overall environmental impact.	

Notes:

1. *Decision to terminate monitoring can be made for each individual sub-module independently.*

3.1.3. Implementation

Expected implementation time[1]	✓ O1.1, O1.2 and O1.3 within 4 hours of initiation criteria being met; ✓ O1.4 and O1.5 within 24 hours of initiation criteria being met.
Implementation Plan	✓ Refer to *Implementation Guide for O1: Oil Spill Surveillance*
Reporting	✓ Results from data collation, visual/remote surveillance, modelling and/or image analysis reported daily to PSC; ✓ Final report prepared within one-week of termination criteria being met; report provided to PSC.

Notes:

1. *A module is considered implemented when Esso have (i) confirmed initiation criteria have been met, (ii) the monitoring providers have been notified, (iii) sampling and analysis plans (where required) have been completed, and (iv) mobilisation has commenced.*

3.1.4. Monitoring overview

The below table provides an indication of the type of sampling techniques and analysis that may be undertaken during operational module O1. The final sampling design, including methods and analysis, will be determined by Esso in conjunction with their monitoring providers in the event of a spill.

Where practicable, sampling and analysis will be undertaken in line with relevant guidance documents, such as:

- Oil Spill Monitoring Handbook (Hook *et al*. 2016);
- Aerial Observation of Marine Oil Spills (ITOPF 2014);

- SMART Protocols (NOAA 2006).

Sub-module	Sampling technique	Data collection and/or analysis
O1.1 Weather and sea state	• Data records collation; • Visual surveillance	• Data records sourced from Bureau of Meteorology (BoM) or local weather stations; • Sea state observations manually recorded from vessels, offshore platform or shore.
O1.2 Trajectory estimation	• Manual estimation; • OSTM.	• Manual estimation can be completed quickly and with limited data (wind and currents, spill origin and/or present location) • OSTM is generally completed by specialist consultants.
O1.3 Aerial or underwater observation	• Visual surveillance; • Remote sensing.	• Visual observations of the location, extent, and appearance of the spill. • Estimates of percentage cover, volume and oil thickness.
O1.4 Remote observation	• Satellite tracking	• Buoys are deployed and position can be tracked via satellite.
O1.5 Satellite imagery	• Satellite imagery analysis	• Remote sensing and image analysis to determine presence of oil slicks.

3.1.5. Responsibilities, competencies, and resources

Emergency response team

The IMT IC and EUL have responsibilities relating to the initiation and termination of this operational monitoring module. These roles may delegate responsibilities as appropriate; e.g. the ERT VM/OIM may be responsible for the initiation if the IMT has not yet been established. Roles, responsibilities and competencies of the ERT and IMT teams are as detailed in the EP.

Monitoring team

The below table lists the minimum personnel requirements from the monitoring provider to implement operational module O1. The numbers of teams and final number of personnel may vary depending on the nature and scale of the spill.

Personnel	Responsibilities	Competencies
Principal Investigator (1 person)	• Finalise the sampling and analysis design for O1 in the event of a spill; • Implement O1; • Review and/or carry out reporting requirements; • Compliance with the requirements of O1 and the OSMP; • Provide advice with respect to environmental issues as required.	• Level 1 - Familiarisation with relevant requirements of the OSMP and OPEP. • Level 2/3 – Relevant experience or training coordination of operational monitoring
Field Teams (2 to 3 people)	• Conduct visual observations; • Completing field data sheets; • QA/QC data quality.	• Lead observer to be experienced in surveillance techniques; • All team members to be familiar with the relevant spill observation, estimation and recording techniques.

Resources

Esso (via ExxonMobil) is a member of the AMOSC. AMOSC membership allows access to RPS to provide predictive modelling capabilities in the event of an oil spill.

Alternatively, modelling may also be requested from:

- Oil Spill Response Limited (OSRL);
- Exxon Mobil's in-house service (EMBSI).
- Australian Maritime Safety Authority (AMSA), noting that requests for modelling under the National Plan can only be made by Commonwealth or State/Territory spill response control agencies, or by AMOSC

Esso Australia has tracking buoys available, and additional buoys are available for hire from AMOSC.

3.2 O2: Water and Oil Sampling

3.2.1. Purpose

The purpose of this module is to provide quantitative measures of water quality and oil (hydrocarbon) characteristics to:

- Determine the physical and chemical characteristics of the spilled oil to validate trajectory forecasts or models (i.e. provide information regarding the spill source characterisation);
- Obtain samples of spilled oil for retention or additional analysis (e.g. fingerprinting);
- Establish background concentrations of total petroleum hydrocarbon (TPH) and polyaromatic hydrocarbons (PAH), and non-hydrocarbon constituents in sea water;
- Determine concentrations of TPH and PAH within the spill plume to validate and enhance OSTM and support assessment of environmental and social impacts;
- Determine the concentrations of non-hydrocarbon constituents (e.g. heavy metals) within the spill plume;
- Determine the effectiveness of dispersants in reducing concentrations of oil in the water column (applicable only if dispersants used);
- To inform scientific monitoring.

3.2.2. Initiation and termination criteria

Initiation Criteria	O2.1 Collection of an oil sample	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred
	O2.2 Fluorometry O2.3 Water samples;	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ IMT IC (or delegate) confirms the event as a Level 2 or Level 3 hydrocarbon spill; **or** ✓ Application of dispersant has been selected as a response option by the IMT IC (or delegate).
	All sub-modules	✓ The IMT IC (or delegate) has advised that either full or partial implementation of O2 is to commence.
Termination Criteria	✓ The IMT IC (or delegate) has determined that continuation of monitoring under the module is not necessary to meet the objectives of the response **and** ✓ The IMT IC (or delegate) has advised that agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the response; **or** ✓ The EUL (or delegate) has advised that continuation of monitoring under O2[1] may increase overall environmental impact.	

Notes:

1. Decision to terminate monitoring can be made for each individual sub-module independently.

3.2.3. Implementation

Minimum time to implement[1]	✓ O2.1: as soon as practicable following initiation criteria being met; ✓ O2.2 and O2.3: within 24 hours of initiation criteria being met.
Implementation Plan	✓ Refer to *Implementation Guide for O2: Water and Oil Sampling*
Reporting	✓ Results from in-situ analysis of samples reported daily to PSC; ✓ Results from laboratory analysis of samples reported as available to PSC; ✓ Final report prepared within one-week of termination criteria being met; report provided to PSC.

Notes:

1. A module is considered implemented when Esso have (i) confirmed initiation criteria have been met, (ii) the monitoring providers have been notified, (iii) sampling and analysis plans (where required) have been completed, and (iv) mobilisation has commenced.

3.2.4. Monitoring overview

The below table provides an indication of the type of sampling techniques and analysis that may be undertaken during operational module O2. The final sampling design, including methods and analysis, will be determined by Esso in conjunction with their monitoring providers in the event of a spill.

Where practicable, sampling and analysis will be undertaken in line with relevant guidance documents, such as:

- Oil Spill Monitoring Handbook (Hook et al. 2016);
- SMART Protocols (NOAA 2006);
- ASTM D4489 2017 Standard Practices for Sampling of Waterborne Oils.

Sub-module	Sampling technique	Data collection and/or analysis
O2.1 Collection of an oil sample	• Surface oil sample collection[1]	• Physical characteristics (e.g. wax content, dynamic viscosity, density, volatiles); • Chemical characteristics (e.g. PAH)
O2.2 Fluorometry	• Water column profiling	• TPH
O2.3 Water samples	• Surface and sub-surface water sample collection	• Laboratory analysis for hydrocarbons (e.g. TPH, PAH); • Laboratory analysis for non-hydrocarbon parameters (e.g. heavy metals); • Dispersant (e.g. DOSS).

Notes:

1. The location of Initial response sampling kits has been identified to facilitate the sampling required under O2.1.

3.2.5. Responsibilities, competencies, and resources

Emergency response team

The IMT IC and EUL have responsibilities relating to the initiation and termination of this operational monitoring module. These roles may delegate responsibilities as appropriate; e.g. the ERT VM/OIM may be responsible for initiation if the IMT has not yet been established. Roles, responsibilities and competencies of the ERT and IMT teams are as detailed in the Gippsland OPEP.

Monitoring team

The below table lists the minimum personnel requirements from the monitoring provider to implement operational module O2. The numbers of teams and final number of personnel may vary depending on the nature and scale of the spill.

Personnel	Responsibilities	Competencies
Principal Investigator (1 person)	• Finalise the sampling and analysis design for O2 in the event of a spill; • Implement O2; • Review and/or carry out reporting requirements; • Compliance with the requirements of O2 and the OSMP; • Provide advice with respect to environmental issues as required.	• Level 1 - Familiarisation with relevant requirements of the OSMP and OPEP. • Level 2/3 – Relevant experience or training coordination of operational monitoring
Field Teams (2 to 3 people)	• Conduct sampling, record data and arrange transfer of samples to laboratories • Completing field data sheets • QA/QC data quality	• Familiarisation with oil and water sampling and recording techniques.

Resources

Initial response sampling kits

Given the short implementation time for sub-module O2.1, Esso has identified the following locations as stocking initial response spill sampling kits:

- Longford Plants Laboratory
- Long Island Point Laboratory
- Esso's contracted supply vessel
- Longford Heliport
- Sale Office (stored for deployment on inspection vessel when being used)
- Pipelines Warehouse - Sale
- Westbury Pumping Station

The initial response kits contain the equipment to obtain and store an oil sample from the water surface or from land.

Personnel should familiarise themselves with the sampling procedure (see *Implementation Guide for O2: Water and Oil Sampling*); but otherwise no specific training or qualifications are required to use the initial response kits to collect an oil sample.

Laboratories

Esso has also identified the following NATA accredited laboratories within the region with the capabilities to support the analysis for operational module O2:

NATA accredited laboratory	Details
Australian Laboratory Services (Melbourne)	[redacted]
Australian Laboratory Services (Traralgon)	[redacted]
National Measurement Institute	[redacted]
Leeder Analytical Pty Ltd	[redacted]

3.3 O3: Shoreline assessment

3.3.1. Purpose

This module outlines a Shoreline Clean-up Assessment Technique (SCAT) to be used to directly inform shoreline clean-up, provide recommendations to operations, and ensure the clean-up is completed. The purpose of this module is to:

- Determine the physical, biological and dynamic properties of shorelines at risk, in order to:
  - Predict the oil behaviour and distribution;
  - Determine the most appropriate clean-up methods;
  - Identify sensitive or vulnerable areas or resources;
  - Determine whether any pre-impact actions are warranted;
- Determine the characteristics and distribution of oil on the shoreline in order to predict the potential for oil persistence and / or natural removal;
- Determine the effectiveness of shoreline response strategies and provide feedback to the IMT.

3.3.2. Initiation and termination criteria

Initiation Criteria	O3.1 Shoreline segmentation O3.2 Shoreline character O3.3 Oil on shorelines	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred
	O3.4 Shoreline profile	✓ Modification of the shoreline profile is identified as a recommended strategy (e.g. through mechanical construction of pits, berms, or bulk waste removal)
	All sub-modules	✓ The IMT IC (or delegate) has advised that either full or partial implementation of O2 is to commence.
Termination Criteria	✓ The IMT IC (or delegate) has determined that continuation of monitoring under the module is not necessary to meet the objectives of the response **and** ✓ Results of Module O1 monitoring demonstrate that shorelines will not be impacted; **or** ✓ The IMT IC (or delegate) has advised that agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the response; **or** ✓ The EUL (or delegate) has advised that continuation of monitoring under O3[1] may increase overall environmental impact.	

Notes:

1. *Decision to terminate monitoring can be made for each individual sub-module independently.*

3.3.3. Implementation

Expected implementation time [1]	✓ O3.1, O3.2, O3.3 O3.4: within 24 hours of initiation criteria being met.
Implementation Plan	✓ Refer to *Implementation Guide for O3: Shoreline Assessment*
Reporting	✓ Results from data collation, visual surveillance, in-situ monitoring reported daily to PSC; ✓ Final report prepared within one-week of termination criteria being met; report provided to PSC.

Notes:

1. *A module is considered implemented when Esso have (i) confirmed initiation criteria have been met, (ii) the monitoring providers have been notified, (iii) sampling and analysis plans (where required) have been completed, and (iv) mobilisation has commenced.*

3.3.4. Monitoring overview

The below table provides an indication of the type of sampling techniques and analysis that may be undertaken during operational module O3. The final sampling design, including methods and analysis, will be determined by Esso in conjunction with their monitoring providers in the event of a spill.

Where practicable, sampling and analysis will be undertaken in line with relevant guidance documents, such as:

- Oil Spill Monitoring Handbook (Hook et al. 2016);
- SMART Protocols (NOAA 2006);
- Shoreline Assessment Job Aid (NOAA 2007)
- Shoreline Clean up Assessment Technique (SCAT) Oil Spill Response Limited (updated)
- The Open Water Oil Identification Job Aid for Aerial Observation (NOAA 2016)

Sub-module	Sampling technique	Data collection and/or analysis
O3.1 Shoreline character	• Visual surveillance	• Physical and biological characteristics (e.g. shoreline dimensions, habitat type, substrate type, wind/wave energy etc.).
O3.2 Oil on shorelines	• Visual surveillance; • Surface and sub-surface water sample collection	• Visual assessment of oil extent, percent cover, thickness etc.; • In-situ or laboratory analysis for hydrocarbon content (e.g. TPH). • Assessment of endpoints from cleanup, identification of suggested cleanup techniques

3.3.5. Responsibilities, competencies, and resources

Emergency response team

The IMT IC and EUL have responsibilities relating to the initiation and termination of this operational monitoring module. These roles may delegate responsibilities as appropriate. Roles, responsibilities and competencies of the ERT and IMT teams are as detailed in the Gippsland OPEP.

Monitoring team

The below table lists the minimum personnel requirements from the monitoring provider to implement operational module O3. The numbers of teams and final number of personnel may vary depending on the nature and scale of the spill.

Personnel	Responsibilities	Competencies
Principal Investigator (1 person)	• Finalise the sampling and analysis design for O3 in the event of a spill; • Implement O3; • Review and/or carry out reporting requirements; • Compliance with the requirements of O3 and the OSMP; • Provide advice with respect to environmental issues as required.	• Familiarisation with relevant requirements of the OSMP and OPEP. • Relevant experience or training in coordination of operational monitoring
Field Teams (2 to 3 people)	• Conduct sampling, record data and arrange transfer of samples to laboratories; • Completing field data sheets; • QA/QC data quality.	• Familiarisation with relevant observation and recording techniques • Zoologist for fauna observations.

Resources

Esso has also identified the following NATA accredited laboratories within the region with the capabilities to support the analysis for operational module O3:

NATA accredited laboratory	Details
Australian Laboratory Services (Melbourne)	[redacted]
Australian Laboratory Services (Traralgon)	[redacted]0
National Measurement Institute	[redacted]
Leeder Analytical Pty Ltd	[redacted]

3.4 O4: Fauna observations

3.4.1. Purpose

This module is designed to inform responses to spills where there is the potential for exposure to fauna either onshore (e.g. seals or birds on the shoreline) or offshore (e.g. whales or birds either in/on the water). The purpose of this module is to:

- Identify the presence of ‘onshore and offshore fauna, including marine mammals and seabirds, in the response area (i.e. near the oil slick, response vessels or aircraft) in order to implement mitigation strategies, such as reduce vessel speeds, halt operations, move vessels or aircraft from the area, increase flight altitude or consider “hazing” strategies.
- Locate potentially oiled fauna for recovery (i.e. by government agencies (Department of Environment, Land, Water and Planning (DELWP) and Parks Victoria or as directed).

3.4.2. Initiation and termination criteria

Initiation Criteria	O4.1 Fauna observation (at sea)	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred
	O4.2 Fauna observations (onshore)	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ IMT IC (or delegate) confirms that data from Modules O1 and/or O3 predicted/confirmed shoreline exposure.
	All sub-modules	✓ The IMT IC (or delegate) has advised that either full or partial implementation of O4 is to commence.
Termination Criteria	✓ The IMT IC (or delegate) has determined that continuation of monitoring under the module is not necessary to meet the objectives of the response **and** ✓ **or** ✓ Results of Module O1 monitoring demonstrate that shorelines will not be impacted; **or** ✓ The IMT IC (or delegate) has advised that agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the response; **or** ✓ The EUL (or delegate) has advised that continuation of monitoring under O4[1] may increase overall environmental impact.	

Notes:

1. Decision to terminate monitoring can be made for each individual sub-module independently.

3.4.3. Implementation

Expected implementation time [1]	✓ O4.1: within 4 hours of initiation criteria being met; ✓ O4.2: within 24 hours of initiation criteria being met.
Implementation Plan	✓ Refer to *Implementation Guide for O4: Fauna Observations*
Reporting	✓ Results from visual surveillance reported daily to PSC; ✓ Final report prepared within one-week of termination criteria being met; report provided to PSC.

Notes:

1. *A module is considered implemented when Esso have (i) confirmed initiation criteria have been met, (ii) the monitoring providers have been notified, (iii) sampling and analysis plans (where required) have been completed, and (iv) mobilisation has commenced.*

3.4.4. Monitoring overview

The below table provides an indication of the type of sampling techniques and analysis that may be undertaken during operational module O4. The final sampling design, including methods and analysis, will be determined by Esso in conjunction with their monitoring providers in the event of a spill.

Where practicable, sampling and analysis will be undertaken in line with relevant guidance documents, such as:

- Oil Spill Monitoring Handbook (Hook et al. 2016);
- Australian National Guidelines for Whale and Dolphin (DoEE 2017).

Sub-module	Sampling technique	Data collection and/or analysis
O4.1 Fauna observations (at sea)	• Visual surveillance	• Regular observations of the location, species, activity, evidence of oiling etc.
O4.2 Fauna observations (onshore)	• Visual surveillance	• Regular observations of the location, species, activity, evidence of oiling etc.

3.4.5. Responsibilities, competencies, and resources

Emergency response team

The IMT IC and EUL have responsibilities relating to the initiation and termination of this operational monitoring module. These roles may delegate responsibilities as appropriate; e.g. the ERT VM/OIM may be responsible for the initiation if the IMT has not yet been established. Roles, responsibilities and competencies of the ERT and IMT teams are as detailed in the Gippsland OPEP.

Monitoring team

The below table lists the minimum personnel requirements from the monitoring provider to implement operational module O4. The numbers of teams and final number of personnel may vary depending on the nature and scale of the spill.

Personnel	Responsibilities	Competencies
Principal Investigator (1 person)	• Finalise the sampling and analysis design for O4 in the event of a spill; • Implement O4; • Review and/or carry out reporting requirements; • Compliance with the requirements of O4 and the OSMP;	• Level 1 - Familiarisation with relevant requirements of the OSMP and OPEP. • Level 2/3 - Bachelor degree in environmental science or an engineering degree from a recognised institution or equivalent tertiary study in technical area;

Personnel	Responsibilities	Competencies
	• Provide advice with respect to environmental issues as required.	
Field Teams (1 to 2 people)	• Conduct sampling and record data; • Completing field data sheets; • QA/QC data quality.	• Familiarisation with the fauna identification and recording techniques.

3.5 O5: Air quality

3.5.1. Purpose

In the event of a hydrocarbon spill, people will need to be deployed on site for monitoring and/or response and clean-up operations. Monitoring of air quality is necessary to ensure the protection and safety of human health. The purpose of this module is to:

- Establish a safe perimeter prior to any response operations being conducted where personnel may be exposed to hazards of airborne gases and vapours
- Identify any hazards from airborne gases and vapours;
- Determine the need for respiratory protection for environmental monitoring and clean-up workers; and
- Comply with occupational health regulatory requirements.

3.5.2. Initiation and termination criteria

Initiation Criteria	O6.1 Sediment samples (intertidal)	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ IMT IC (or delegate) confirms that data from Modules O1, O2 and/or O3 have predicted/confirmed exposure of intertidal benthic substrate.
	O6.2 Sediment samples (offshore);	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ IMT IC (or delegate) confirms that data from Modules O1 and/or O2 have predicted/confirmed exposure of offshore benthic substrate.
Termination Criteria	✓ TheSO (or delegate) has determined that there is no longer a health and safety risk; **and** ✓ **or** ✓ The IMT IC (or delegate) has advised that agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the response.	

Notes:
1. *Decision to terminate monitoring can be made for each individual sub-module independently.*

3.5.3. Implementation

Expected implementation time [1]	✓ O5.1 and O5.2: within 12 hours of initiation criteria being met.
Implementation Plan	✓ Refer to *Implementation Guide for O5: Air Quality*
Reporting	✓ Results from personnel monitoring reported daily to SO; ✓ Results from laboratory sampling reported as available to SO; ✓ Final report prepared within one-week of termination criteria being met; report provided to SO.

Notes:
1. *A module is considered implemented when Esso have (i) confirmed initiation criteria have been met, (ii) the monitoring providers have been notified, (iii) sampling and analysis plans (where required) have been completed, and (iv) mobilisation has commenced.*

3.5.4. Monitoring overview

The below table provides an indication of the type of sampling techniques and analysis that may be undertaken during operational module O4. The final sampling design, including methods and analysis, will be determined by Esso in conjunction with their monitoring providers in the event of a spill.

Where practicable, sampling and analysis will be undertaken in line with relevant guidance documents, such as:

- Occupational Health Monitoring Plan (Centre for Toxicology and Environmental Health 2011);
- Oil Spill Response Field Manual (ExxonMobil 2008).

Sub-module	Sampling technique	Data collection and/or analysis
O5.1 Personnel and area monitoring	• Direct-read personal or area gas monitoring	• In-situ data collected and compared against known guideline levels.
O5.2 Laboratory analysis	• Laboratory analysis of vapour monitors	• Laboratory analysis for hydrocarbons (e.g. BTEX, TPH).

3.5.5. Responsibilities, competencies, and resources

Emergency response team

The IMT IC and EUL have responsibilities relating to the initiation and termination of this operational monitoring module. These roles may delegate responsibilities as appropriate; e.g. the ERT VM/OIM may be responsible for the initiation if the IMT has not yet been established. Roles, responsibilities and competencies of the ERT and IMT teams are as detailed in the Gippsland OPEP.

Monitoring team

The below table lists the minimum personnel requirements from the monitoring provider to implement operational module O5. The numbers of teams and final number of personnel may vary depending on the nature and scale of the spill.

Personnel	Responsibilities	Competencies
Principal Investigator (1 person)	• Finalise the sampling and analysis design for O5 in the event of a spill; • Implement O5; • Review and/or carry out reporting requirements; • Compliance with the requirements of O5 and the OSMP; • Provide advice with respect to environmental issues as required.	• Level 1 – Experience in implementation of safety or industrial hygiene programs in the oil & gas industry • Level 2/3 - Qualifications in Occupational Health & Safety, or Industrial Hygeine from a recognised institution or equivalent tertiary study in technical area; • Familiarisation with relevant requirements of the OSMP and OPEP.
Monitoring personnel	• To conduct air quality monitoring to determine safe exposure levels in operating environment	• Trained in use of personnel air monitoring equipment

Resources

Esso has also identified the following NATA accredited laboratories within the region with the capabilities to support the analysis for operational module O5:

NATA accredited laboratory	Details
Australian Laboratory Services (Traralgon)	[redacted]
Longford Plants Laboratory	[redacted]

3.6 O6: Sediment sampling

3.6.1. Purpose

The purpose of this module is to provide quantitative measures of sediment quality to:

- Establish background concentrations of TPH and PAH, and non-hydrocarbon constituents in sediment;
- Determine concentrations of TPH, PAH and non-hydrocarbon constituents (e.g. heavy metals) within exposed sediments to inform response strategies;
- Determine the effectiveness of clean-up operations;
- To inform scientific monitoring.

3.6.2. Initiation and termination criteria

Initiation Criteria	O6.1 Sediment samples (intertidal)	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ IMT IC (or delegate) confirms that data from Modules O1, O2 and/or O3 have predicted/confirmed exposure of intertidal benthic substrate.
	O6.2 Sediment samples (offshore);	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ IMT IC (or delegate) confirms that data from Modules O1 and/or O2 have predicted/confirmed exposure of offshore benthic substrate.
	All sub-modules	✓ The IMT IC (or delegate) has advised that either full or partial implementation of O6 is to commence.
Termination Criteria	✓ The IMT IC (or delegate) has determined that continuation of monitoring under the module is not necessary to meet the objectives of the response **and** ✓ The IMT IC (or delegate) has advised that agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the response; **or** ✓ The EUL (or delegate) has advised that continuation of monitoring under O6[1] may increase overall environmental impact.	

Notes:
1. *Decision to terminate monitoring can be made for each individual sub-module independently.*

3.6.3. Implementation

Expected implementation time [1]	✓ O6.1 and O6.2: within 24 hours of initiation criteria being met.
Implementation Plan	✓ Refer to *Implementation Guide for O6: Sediment Sampling*
Reporting	✓ Results from in-situ sampling reported daily to EUL; ✓ Results from laboratory sampling reported as available to EUL; ✓ Final report prepared within one-week of termination criteria being met; report provided to EUL.

Notes:
1. *A module is considered implemented when Esso have (i) confirmed initiation criteria have been met, (ii) the monitoring providers have been notified, (iii) sampling and analysis plans (where required) have been completed, and (iv) mobilisation has commenced.*

3.6.4. Monitoring overview

The below table provides an indication of the type of sampling techniques and analysis that may be undertaken during operational module O6. The final sampling design, including methods and analysis, will be determined by Esso in conjunction with their monitoring providers in the event of a spill.

Where practicable, sampling and analysis will be undertaken in line with relevant guidance documents, such as:

- Oil Spill Monitoring Handbook (Hook et al. 2016).

Sub-module	Sampling technique	Data collection and/or analysis
O6.1 Sediment samples (intertidal)	• Surface and sub-surface sediment sample collection	• Laboratory analysis for hydrocarbons (e.g. TPH, TRH, PAH, BTEX); • Laboratory analysis for non-hydrocarbon parameters (e.g. TOC, PSD, heavy metals, nutrients).
O6.2 Sediment samples (offshore)	• Surface sediment sample collection	• Laboratory analysis for hydrocarbons (e.g. TPH, TRH, PAH, BTEX); • Laboratory analysis for non-hydrocarbon parameters (e.g. TOC, PSD, heavy metals, nutrients).

3.6.5. Responsibilities, competencies, and resources

Emergency response team

The IMT IC and EUL have responsibilities relating to the initiation and termination of this operational monitoring module. These roles may delegate responsibilities as appropriate; e.g. the ERT VM/OIM may be responsible for the initiation if the IMT has not yet been established. Roles, responsibilities and competencies of the ERT and IMT teams are as detailed in the Gippsland OPEP.

Monitoring team

The below table lists the minimum personnel requirements from the monitoring provider to implement operational module O6. The numbers of teams and final number of personnel may vary depending on the nature and scale of the spill.

Personnel	Responsibilities	Competencies
Principal Investigator (1 person)	• Finalise the sampling and analysis design for O6 in the event of a spill; • Implement O6; • Review and/or carry out reporting requirements; • Compliance with the requirements of O6 and the OSMP; • Provide advice with respect to environmental issues as required.	• Level 1 - Familiarisation with relevant requirements of the OSMP and OPEP. • Level 2/3 -Bachelor degree in environmental science or an engineering degree from a recognised institution or equivalent tertiary study in technical area;
Field Teams (2 to 3 people)	• Conduct sampling, record data and arrange transfer of samples to laboratories • Completing field data sheets • QA/QC data quality	• Familiarisation with sediment sampling and recording techniques.

Resources

Esso has also identified the following NATA accredited laboratories within the region with the capabilities to support the analysis for operational module O6:

NATA accredited laboratory	Details
Australian Laboratory Services (Melbourne)	[redacted]
Australian Laboratory Services (Traralgon)	[redacted]
National Measurement Institute	[redacted]
Leeder Analytical Pty Ltd	[redacted]

4. Scientific Monitoring

The following sections outline the individual scientific monitoring modules that may be implemented in the event of a hydrocarbon spill to the marine or coastal environment. The sections describe the purpose, initiation and termination criteria, implementation timing, and provide a high-level description of monitoring, reporting and resources required. The modules are presented separately below; however, in practice they may be undertaken simultaneously.

These overviews are supported by internal implementation guides for each of the scientific monitoring modules. The implementation guides have been prepared to provide Esso and their monitoring providers sufficient information to efficiently finalise a monitoring design of an appropriate nature and scale in the event of a hydrocarbon spill.

Scientific monitoring generally has objectives relating to attributing cause-effect interactions of the spill with changes to the surrounding environment. Consequently, such studies are required to account for natural or sampling variation, and study designs must be robust and produce defensible data. Scientific monitoring is typically conducted over a wider study area taking into account the potentially exposed area, extending beyond the spill footprint, and a longer time period, extending beyond the spill response.

Nine scientific monitoring modules have been identified:

- S1: Hydrocarbons in intertidal sediments and water;
- S2: Hydrocarbons in offshore sediments and water;
- S3: Fish and shellfish taint and toxicity for human consumption;
- S4: Short-term impacts to oiled fauna and flora;
- S5: Recovery of commercial and recreational fisheries;
- S6: Recovery of fauna;
- S7: Recovery of subtidal and intertidal benthic habitat;
- S8: Recovery of coastal flora;
- S9: Recovery of Ramsar values.

Guidance on various experimental monitoring approaches for scientific monitoring (e.g. use of baseline data in ‘before versus after’ analyses, and alternative approaches such as ‘control versus impact’ and ‘gradient approach’) is provided in Appendix A. Appendix B describes an approach to utilising baseline data where and when available; and a list of known regional studies and/or data sources. Specific guidance and sampling approaches are described within the implementation guides for each scientific monitoring module.

Initiation and/or termination criteria for some of the scientific monitoring modules require the use of ‘accepted guidelines and/or benchmark values’. Where available, Australian guidelines (e.g. ANZECC & ARMCANZ 2000) or regionally relevant data is used. Where these are unavailable or inappropriate for a selected parameter, toxicity screening benchmarks developed by the USEPA in response to the Deepwater Horizon incident (e.g. USEPA 2015), or other international guidelines (e.g. USEPA 2017) may be adopted. Specific guidance on benchmark values are described within the overviews below, and in the implementation guides, for each individual scientific monitoring module.

4.1 S1: Hydrocarbons in intertidal sediments and water

4.1.1. Purpose

The purpose of this module is to provide quantitative measures of intertidal sediment and water quality. Scientific module S1 will assess and monitor concentrations of hydrocarbons and metals in intertidal sediments and water by:

- Establishing the baseline concentrations of hydrocarbons and metals in water and sediment at identified pre-impact (if practicable) or control (i.e. un-impacted) intertidal sites;
- Monitoring concentrations of hydrocarbons, metals and nutrients (if bioremediation techniques used as part of response operations) in intertidal water and sediments at identified control and impact sites.

4.1.2. Initiation and termination criteria

Initiation Criteria	S1.1 Water samples	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ EUL (or delegate) confirms that data from Modules O1 and/or O2 have predicted/confirmed exposure of intertidal waters
	S1.2 Sediment samples	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ EUL (or delegate) confirms that data from Modules O1 and/or O2 have predicted/confirmed exposure of intertidal or shoreline sediments
	All sub-modules	✓ The IMT IC (or delegate) has advised that either full or partial implementation of S1 is to commence.
Termination Criteria	S1.1 Water samples	✓ Ambient hydrocarbon concentrations in intertidal waters have returned to within the expected natural dynamics of baseline state and/or control sites; **or** ✓ Ambient hydrocarbon concentrations in intertidal waters are below relevant ANZECC & ARMCANZ (2000) 99% species protection levels; **or** ✓ There has been no demonstrable impact on intertidal water quality from hydrocarbons.
	S1.2 Sediment samples	✓ Ambient hydrocarbon concentrations in intertidal sediments have returned to within the expected natural dynamics of baseline state and/or control sites; **or** ✓ Ambient hydrocarbon concentrations in intertidal sediments are below relevant ANZECC & ARMCANZ SQGV (Simpson et al. 2013) or NAGD (CoA 2009) trigger levels; **or** ✓ There has been no demonstrable impact on intertidal sediment quality from hydrocarbons.
	All sub-modules	✓ **Or** agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the monitoring.

4.1.3. Implementation

Expected Activation Time[1]	✓ S1 to be activated within 24 hours of initiation criteria being met;
Expected Implementation Time	✓ Draft sampling and analysis plan to be ready for peer review within 7 days of initiation criteria being met; ✓ Mobilisation and monitoring to commence as soon as practicable after initiation criteria being met.
Implementation Plan	✓ Refer to *Implementation Guide for S1: Hydrocarbons in intertidal sediments and water*
Reporting	✓ Summary report to be provided to Esso Environment Lead following completion of each field survey event; ✓ Final report (including all data and associated interpretation and analysis) prepared following the termination criteria for the module being met.

Notes:

1. *A module is considered activated when Esso have confirmed initiation criteria have been met and the monitoring providers have been notified to initiate planning and implementation tasks.*

4.1.4. Monitoring overview

The below table provides an indication of the type of sampling techniques and analysis that may be undertaken during scientific module S1. The final sampling design, including methods and analysis, will be determined by Esso in conjunction with their monitoring providers in the event of a spill.

Where practicable, sampling and analysis will be undertaken in line with relevant guidance documents, such as:

- Oil Spill Monitoring Handbook (Hook et al. 2016);
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC & ARMCANZ 2000)
- Revision of the ANZECC/ARMCANZ Sediment Quality Guidelines (Simpson et al. 2013);
- National Assessment Guidelines for Dredging (CoA 2009).

Sub-module	Sampling technique	Data collection and/or analysis
S1.1 Water samples	• Surface and sub-surface water sample collection[1]	• Laboratory analysis for hydrocarbons (e.g. TPH, TRH, PAH, BTEX); • Laboratory analysis for non-hydrocarbon parameters (e.g. metals, nutrients).
S1.2 Sediment samples	• Surface and sub-surface sediment sample collection[2]	• Laboratory analysis for hydrocarbons (e.g. TPH, TRH, PAH, BTEX); • Laboratory analysis for non-hydrocarbon parameters (e.g. TOC, PSD, metals, nutrients).

Notes:

1. *Sampling techniques as per operational module O2.3.*
2. *Sampling techniques as per operational module O6.1.*

4.1.5. Responsibilities, competencies, and resources

Emergency response team

The IMT IC and EUL have responsibilities relating to the initiation of this scientific monitoring module. These roles may delegate responsibilities as appropriate. Roles, responsibilities and competencies of the ERT and IMT teams are as detailed in the Gippsland OPEP.

Esso environmental team

Termination of this scientific monitoring module is the responsibility of Esso Environment Lead.

Monitoring team

The below table lists the minimum personnel requirements from the monitoring provider to implement scientific module S1. The numbers of teams and final number of personnel may vary depending on the nature and scale of the spill.

Personnel	Responsibilities	Competencies
Principal Investigator (1 person)	• Finalise the sampling and analysis design for S1 in the event of a spill; • Implement S1; • Review and/or carry out reporting requirements; • Compliance with the requirements of S1 and the OSMP; • Provide advice with respect to environmental issues as required.	• Bachelor degree in environmental science or an engineering degree from a recognised institution or equivalent tertiary study in technical area; • Familiarisation with relevant requirements of the OSMP and OPEP.
Field Teams (2 to 3 people)	• Conduct sampling, record data and arrange transfer of samples to laboratories; • Completing field data sheets; • QA/QC data quality.	• Bachelor degree in environmental science or an engineering degree from a recognised institution or equivalent tertiary study in technical area; • Experienced in sediment and water quality sampling and recording techniques.

Resources

Esso has identified NATA accredited laboratories with the capabilities to support the analysis for scientific module S1, including but not limited to:

NATA accredited laboratory	Details
Australian Laboratory Services (Melbourne)	[redacted]
Eurofins MGT	[redacted]
National Measurement Institute	[redacted]
Leeder Analytical Pty Ltd	[redacted]

4.2 S2: Hydrocarbons in offshore sediments and water

4.2.1. Purpose

The purpose of this module is to provide quantitative measures of offshore sediment and water quality. Scientific module S2 will assess and monitor concentrations of hydrocarbons and metals in offshore sediments and water by:

- Establishing the baseline concentrations of hydrocarbons and metals in water and sediment at identified pre-impact (if practicable) or control (i.e. un-impacted) offshore sites;
- Monitoring concentrations of hydrocarbons, metals and nutrients (if bioremediation techniques used as part of response operations) in offshore sediments and water at identified control and impact sites.

4.2.2. Initiation and termination criteria

Initiation Criteria	S2.1 Water samples	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ EUL (or delegate) confirms that data from Modules O1 and/or O2 have predicted/confirmed exposure to offshore waters
	S2.2 Sediment samples	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ EUL (or delegate) has determined that data from operational modules O1, O2 or O6 has confirmed exposure to either benthic substrate or waters within bottom 1 m of seabed
	All sub-modules	✓ The IMT IC (or delegate) has advised that either full or partial implementation of S2 is to commence.
Termination Criteria	S2.1 Water samples	✓ Ambient hydrocarbon concentrations in offshore waters have returned to within the expected natural dynamics of baseline state and/or control sites; **or** ✓ Ambient hydrocarbon concentrations in offshore waters are below relevant ANZECC/ARMCANZ (2000) 99% species protection levels; **or** ✓ There has been no demonstrable impact on offshore water quality from hydrocarbons.
	S2.2 Sediment samples	✓ Hydrocarbon concentrations in offshore sediments have returned to within the expected natural dynamics of baseline state and/or control sites; **or** ✓ Hydrocarbon concentrations in offshore sediments are below relevant ANZECC/ARMCANZ SQGV (Simpson et al. 2013) or NAGD (CoA 2009) trigger levels; **or** ✓ There has been no demonstrable impact on offshore sediment quality from hydrocarbons.
	All sub-modules	✓ **Or,** agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the monitoring.

4.2.3. Implementation

Expected Activation Time[1]	✓ S2 to be activated within 24 hours of initiation criteria being met
Expected Implementation Time	✓ Draft sampling and analysis plan to be ready for peer review within 7 days of initiation criteria being met; ✓ Mobilisation and monitoring to commence as soon as practicable after initiation criteria being met.
Implementation Plan	✓ Refer to *Implementation Guide for S2: Hydrocarbons in offshore sediments and water*
Reporting	✓ Summary report to be provided to Esso Environment Lead following completion of each field survey event; ✓ Final report (including all data and associated interpretation and analysis) prepared following the termination criteria for the module being met.

Notes:

1. *A module is considered activated when Esso have confirmed initiation criteria have been met and the monitoring providers have been notified to initiate planning and implementation tasks.*

4.2.4. Monitoring overview

The below table provides an indication of the type of sampling techniques and analysis that may be undertaken during scientific module S2. The final sampling design, including methods and analysis, will be determined by Esso in conjunction with their monitoring providers in the event of a spill.

Where practicable, sampling and analysis will be undertaken in line with relevant guidance documents, such as:

- Oil Spill Monitoring Handbook (Hook et al. 2016);

- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC & ARMCANZ 2000)
- Revision of the ANZECC/ARMCANZ Sediment Quality Guidelines (Simpson et al. 2013);
- National Assessment Guidelines for Dredging (CoA 2009).

Sub-module	Sampling technique	Data collection and/or analysis
S2.1 Water samples	• Surface and sub-surface water sample collection[1]	• Laboratory analysis for hydrocarbons (e.g. TPH, TRH, PAH, BTEX); • Laboratory analysis for non-hydrocarbon parameters (e.g. metals, nutrients)
S2.2 Sediment samples	• Surface sediment sample collection[2]	• Laboratory analysis for hydrocarbons (e.g. TPH, TRH, PAH, BTEX); • Laboratory analysis for non-hydrocarbon parameters (e.g. TOC, PSD, metals, nutrients).

Notes:
1. *Sampling techniques as per operational module O2.3.*
2. *Sampling techniques as per operational module O6.2.*

4.2.5. Responsibilities, competencies, and resources

Emergency response team

The IMT IC and EUL have responsibilities relating to the initiation of this scientific monitoring module. These roles may delegate responsibilities as appropriate. Roles, responsibilities and competencies of the ERT and IMT teams are as detailed in the Gippsland OPEP.

Esso environmental team

Termination of this scientific monitoring module is the responsibility of Esso Environment Lead.

Monitoring team

The below table lists the minimum personnel requirements from the monitoring provider to implement scientific module S2. The numbers of teams and final number of personnel may vary depending on the nature and scale of the spill.

Personnel	Responsibilities	Competencies
Principal Investigator (1 person)	• Finalise the sampling and analysis design for S2 in the event of a spill • Implement S2 • Review and/or carry out reporting requirements • Compliance with the requirements of S2 and the OSMP • Provide advice with respect to environmental issues as required	• Bachelor degree in environmental science or an engineering degree from a recognised institution or equivalent tertiary study in technical area • Familiarisation with relevant requirements of the OSMP and OPEP
Field Teams (2 to 3 people)	• Conduct sampling, record data and arrange transfer of samples to laboratories • Completing field data sheets • QA/QC data quality	• Bachelor degree in environmental science or an engineering degree from a recognised institution or equivalent tertiary study in technical area • Experienced in the relevant sampling and/or recording techniques.

Resources

Esso has identified NATA accredited laboratories with the capabilities to support the analysis for scientific module S2, including but not limited to:

NATA accredited laboratory	Details
Australian Laboratory Services (Melbourne)	[redacted]
Eurofins MGT	[redacted]
National Measurement Institute	[redacted]
Leeder Analytical Pty Ltd	[redacted]

4.3 S3: Fish and shellfish taint and toxicity for human consumption

4.3.1. Purpose

The purpose of this module is to:

- Provide an understanding of the levels of taint in commercial and recreational fish and/or shellfish species;
- Undertake a chemical analysis of the level of PAH in fish and/or shellfish tissue to assess the level of risk for human consumption;
- Determine if differences exist in concentration of PAH in fish and/or shellfish samples collected from impact and control sites.
- Determine if differences exist in the olfactory status of fish and/or shellfish samples collected from areas exposed to an oil spill (impact) and from control sites;
- Assess possible sources of specific odours via qualitative evaluation;
- Determine the persistence of taint over a specified time period;

4.3.2. Initiation and termination criteria

Initiation Criteria	S3 Fish/shellfish tissue samples	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ EUL (or delegate) has determined that data from operational modules O2/O6 or scientific modules S1/S2 has confirmed either: (a) in-water hydrocarbon concentrations are above guideline levels known to cause tainting (Table 4.4.5 in ANZECC & ARMCANZ 2000); or (b) sediment hydrocarbon concentrations are above SQGV levels (Simpson et al. 2013)
	All sub-modules	✓ The IMT IC (or delegate) has advised that either full or partial implementation of S3 is to commence.
Termination Criteria	S3 Fish/shellfish tissue samples	✓ Two sequential sample sets show ambient hydrocarbon concentrations are below guideline levels for tainting in ANZECC & ARMCANZ 2000); **and either** ✓ PAH levels in fish and shellfish tissue have returned to within the expected natural dynamics of baseline state and/or control sites; **or** ✓ PAH levels in fish and shellfish tissue are at or below levels of concern (USFDA 2010) or screening values (USEPA 2000) United States Food and Drug Administration (USFDA).
	All sub-modules	✓ **Or,** agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the monitoring.

4.3.3. Implementation

Expected Activation Time[1]	✓ S3 to be activated within 24 hours of initiation criteria being met
Expected Implementation Time	✓ Draft sampling and analysis plan to be ready for peer review within 7 days of initiation criteria being met; ✓ Mobilisation and monitoring to commence as soon as practicable after initiation criteria being met.
Implementation Plan	✓ Refer to *Implementation Guide for S3: Fish and shellfish taint and toxicity for human consumption*
Reporting	✓ Summary report to be provided to Esso Environment Lead following completion of each field survey event; ✓ Final report (including all data and associated interpretation and analysis) prepared following the termination criteria for the module being met.

Notes:

1. *A module is considered activated when Esso have confirmed initiation criteria have been met and the monitoring providers have been notified to initiate planning and implementation tasks.*

4.3.4. Monitoring overview

The below table provides an indication of the type of sampling techniques and analysis that may be undertaken during scientific module S3. The final sampling design, including methods and analysis, will be determined by Esso in conjunction with their monitoring providers in the event of a spill.

Where practicable, sampling and analysis will be undertaken in line with relevant guidance documents, such as:

- Oil Spill Monitoring Handbook (Hook et al. 2016);
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC & ARMCANZ 2000)
- Protocol for Interpretation and Use of Sensory Testing and Analytical Chemistry Results for Re-Opening Oil-Impacted Areas Closed to Seafood Harvesting Due to The Deepwater Horizon Oil Spill (USFDA 2010)

Sub-module	Sampling technique	Data collection and/or analysis
S3 Fish/shellfish tissue samples	• Fish and/or shellfish collection; • Biological tissue sampling	• Physical specimen characteristics (e.g. length, sex, visible lesions etc); • Laboratory analysis of tissue samples for hydrocarbons (e.g. PAH); • Olfactory analysis.

4.3.5. Responsibilities, competencies, and resources

Emergency response team

The IMT IC and EUL have responsibilities relating to the initiation of this scientific monitoring module. These roles may delegate responsibilities as appropriate. Roles, responsibilities and competencies of the ERT and IMT teams are as detailed in the Gippsland OPEP.

Esso environmental team

Termination of this scientific monitoring module is the responsibility of Esso Environment Lead.

Monitoring team

The below table lists the minimum personnel requirements from the monitoring provider to implement scientific module S3. The numbers of teams and final number of personnel may vary depending on the nature and scale of the spill.

Personnel	Responsibilities	Competencies
Principal Investigator (1 person)	• Finalise the sampling and analysis design for S3 in the event of a spill; • Implement S3; • Review and/or carry out reporting requirements; • Compliance with the requirements of S3 and the OSMP; • Provide advice with respect to environmental issues as required.	• Bachelor degree in environmental science or an engineering degree from a recognised institution or equivalent tertiary study in technical area; • Familiarisation with relevant requirements of the OSMP and OPEP.
Field Teams (2 to 3 people)	• Conduct sampling, record data and arrange transfer of samples to laboratories; • Completing field data sheets; • QA/QC data quality.	• Bachelor degree in environmental science or an engineering degree degree from a recognised institution or equivalent tertiary study in technical area; • Experienced in the fish/shellfish collection, sampling and recording techniques.
Olfactory Analysis Panel (2 to 3 people)	• Conduct sensory evaluation of fish and/or shellfish samples.	• Bachelor degree in degree environmental science or an engineering degree from a recognised institution or equivalent tertiary study in technical area; • Experienced in olfactory analysis.

Resources

Esso has identified NATA accredited laboratories with the capabilities to support the analysis for scientific module S3, including but not limited to:

NATA accredited laboratory	Details
Australian Laboratory Services (Melbourne)	[redacted]
Intertek Geotechnical	[redacted]
National Measurement Institute	[redacted]
Leeder Analytical Pty Ltd	[redacted]

4.4 S4: Short-term impacts to oiled fauna and flora

4.4.1. Purpose

For the purposes of this module ‘fauna’ is defined as avifauna (seabirds and shorebirds) and marine megafauna (predominately pinnipeds). ‘Flora’ is defined as both aquatic flora (e.g. kelp present on subtidal reefs) and coastal flora (e.g. mangroves and saltmarsh).

The purpose of this module is to assess any short-term effects of oiling on marine fauna and flora which may have resulted from an oil spill. Module S5 is designed to conduct:

- Visual inspections of wildlife in the near shore marine environment and assess the number and species of oiled fauna and their health;
- Visual inspections of wildlife on shoreline environments, including at breeding areas and determine the number and species of oiled wildlife, and their general health;
- Surveys of coastal, subtidal and intertidal flora populations to identify the species present and record health condition parameters; and

- Fingerprint analysis of oil samples taken from oiled fauna to provide quantitative measures on the composition, type, estimated age and weathering and degradation of the product.

4.4.2. Initiation and termination criteria

Initiation Criteria	S4.1 Fauna surveys (vessel-based) S4.2 Fauna surveys (land-based) S4.3 Oiled fauna hydrocarbon testing;	✓ Confirmation by the IMT IC (or delegate) that a hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ EUL (or delegate) has determined that data from operational modules O4 has confirmed the presence of oiled fauna.
	S4.4 Flora surveys	✓ Confirmation by the IMT IC (or delegate) that Level 2 or Level 3 hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ EUL (or delegate) has determined that data from operational modules O3 has confirmed the presence of oiled shorelines
	All sub-modules	✓ The IMT IC (or delegate) has advised that either full or partial implementation of S4 is to commence.
Termination Criteria	S4.1 Fauna surveys (vessel-based) S4.2 Fauna surveys (land-based) S4.3 Oiled fauna hydrocarbon testing;	✓ Disturbance parameters (e.g. mortality, percentage oiled fauna/flora) have returned to within the expected natural dynamics of baseline state and/or control sites; and ✓ Hydrocarbon concentrations from fauna samples have returned to within the expected natural dynamics of baseline state and/or control sites.
	All sub-modules	✓ Or, agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the monitoring.

4.4.3. Implementation

Expected Activation Time[1]	✓ S4 to be activated within 24 hours of initiation criteria being met
Expected Implementation Time	✓ Draft sampling and analysis plan to be ready for peer review within 7 days of initiation criteria being met; ✓ Mobilisation and monitoring to commence as soon as practicable after initiation criteria being met.
Implementation Plan	✓ Refer to *Implementation Guide for S4: Short-term impacts to oiled fauna and flora*
Reporting	✓ Summary report to be provided to Esso Environment Lead following completion of each field survey event; ✓ Final report (including all data and associated interpretation and analysis) prepared following the termination criteria for the module being met.

Notes:

1. A module is considered activated when Esso have confirmed initiation criteria have been met and the monitoring providers have been notified to initiate planning and implementation tasks.

4.4.4. Monitoring overview

The below table provides an indication of the type of sampling techniques and analysis that may be undertaken during scientific module S4. The final sampling design, including methods and analysis, will be determined by Esso in conjunction with their monitoring providers in the event of a spill.

Where practicable, sampling and analysis will be undertaken in line with relevant guidance documents, such as:

- Oil Spill Monitoring Handbook (Hook et al. 2016).

Sub-module	Sampling technique	Data collection and/or analysis
S4.1 Fauna surveys (vessel-based)	• Visual surveillance	• Quantitative observation records (e.g. presence, abundance, behaviour etc).
S4.2 Fauna surveys (land-based)	• Visual surveillance	• Quantitative observation records (e.g. presence, abundance, behaviour etc).
S4.3 Oiled fauna hydrocarbon testing	• Oil sample collection	• Physical characteristics (e.g. wax content, dynamic viscosity, density, volatiles); • Chemical characteristics (e.g. PAH)
S4.4 Flora surveys	• Coastal vegetation surveys • Subtidal and intertidal benthic habitat surveys	• Quantitative observation records (e.g. vegetation type, percent cover, health parameters etc).

4.4.5. Responsibilities, competencies, and resources

Emergency response team

The IMT IC and EUL have responsibilities relating to the initiation of this scientific monitoring module. These roles may delegate responsibilities as appropriate. Roles, responsibilities and competencies of the ERT and IMT teams are as detailed in the Gippsland OPEP.

Esso environmental team

Termination of this scientific monitoring module is the responsibility of Esso Environment Lead.

Monitoring team

The below table lists the minimum personnel requirements from the monitoring provider to implement scientific module S4. The numbers of teams and final number of personnel may vary depending on the nature and scale of the spill.

Personnel	Responsibilities	Competencies
Principal Investigator (1 person)	• Finalise the sampling and analysis design for S4 in the event of a spill • Implement S4 • Review and/or carry out reporting requirements • Compliance with the requirements of S4 and the OSMP • Provide advice with respect to environmental issues as required	• Bachelor degree in environmental science / engineering degree from a recognised institution or equivalent tertiary study in technical area • Familiarisation with relevant requirements of the OSMP and OPEP
Field Teams (2 to 3 people)	• Conduct sampling, record data and arrange transfer of samples to laboratories • Completing field data sheets • QA/QC data quality	• Bachelor degree in environmental science or an engineering degree from a recognised institution or equivalent tertiary study in technical area • Experienced in the relevant sampling and/or recording techniques.

Resources

Esso has identified NATA accredited laboratories with the capabilities to support the analysis for scientific module S4, including but not limited to:

NATA accredited laboratory	Details
Australian Laboratory Services (Melbourne)	[redacted]
Intertek Geotechnical	[redacted]
Leeder Analytical Pty Ltd	[redacted]
National Measurement Institute	[redacted]

4.5 S5: Recovery of commercial and recreational fisheries

4.5.1. Purpose

This module provides a semi-quantitative longer-term assessment of whether commercial and recreational fisheries have been impacted by a spill and the level of that impact pertaining to fish catch volume and effort rates. Module S5 will assess changes to fishery stocks due to oil exposure by:

- Determining the catch composition of species in each of the main fisheries following exposure to the spill;
- Summarise commercial catch volume and effort data post-oil spill and compare to pre-existing (baseline) information provided by the Victorian Fisheries Authority (VFA), the New South Wales Department of Primary Industries (NSW DPI)), Tasmanian Department of Primary Industries, Parks, Water and Environment (DPIPWE), and/or Australian Fisheries Management Authority (AFMA); and,
- Calculate catch-per-unit effort for fish/shellfish species to determine any change in abundance.

4.5.2. Initiation and termination criteria

Initiation Criteria	S5 Desktop review of fishery stock;	✓ Confirmation by the IMT IC (or delegate) that Level 2 or Level 3 hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ EUL (or delegate) has confirmed that either: (a) data from S3 confirms tainting in fish or shellfish tissue; or (b) in response from government / State IC advice
	All sub-modules	✓ The IMT IC (or delegate) has advised that either full or partial implementation of S5 is to commence.
Termination Criteria	S5 Desktop review of fishery stock;	✓ Catch per Unit Effort (CPUE) for fishery stock assessments have returned to within the expected natural dynamics of baseline state and/or control sites; **or** ✓ There has been no demonstrable impact on commercial or recreational fisheries from hydrocarbons.
	All sub-modules	✓ **Or,** agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the monitoring.

4.5.3. Implementation

Expected Activation Time[1]	✓ S5 to be activated within 24 hours of initiation criteria being met
Expected Implementation Time	✓ Desktop assessment to commence as soon as practicable after initiation criteria being met.
Implementation Plan	✓ Refer to *Implementation Guide for S5: Long-term impacts to commercial and recreational fisheries*
Reporting	✓ Final report (including all data and associated interpretation and analysis) prepared following the termination criteria for the module being met.

Notes:

1. *A module is considered activated when Esso have confirmed initiation criteria have been met and the monitoring providers have been notified to initiate planning and implementation tasks.*

4.5.4. Monitoring overview

The below table provides an indication of the type of sampling techniques and analysis that may be undertaken during scientific module S6. The final sampling design, including methods and analysis, will be determined by Esso in conjunction with their monitoring providers in the event of a spill.

Sub-module	Sampling technique	Data collection and/or analysis
S5.1 Desktop review of fishery stock	• Desktop review.	• Stakeholder liaison and data collation; • CPUE analyses.

4.5.5. Responsibilities, competencies, and resources

Emergency response team

The IMT IC and EUL have responsibilities relating to the initiation of this scientific monitoring module. These roles may delegate responsibilities as appropriate. Roles, responsibilities and competencies of the ERT and IMT teams are as detailed in the Gippsland OPEP.

Esso environmental team

Termination of this scientific monitoring module is the responsibility of Esso Environment Lead.

Monitoring team

The below table lists the minimum personnel requirements from the monitoring provider to implement scientific module S6. The numbers of teams and final number of personnel may vary depending on the nature and scale of the spill.

Personnel	Responsibilities	Competencies
Principal Investigator (1 person)	• Implement S5; • Review and/or carry out reporting requirements; • Compliance with the requirements of S5 and the OSMP; • Provide advice with respect to environmental issues as required • QA/QC data quality.	• Bachelor degree in environmental scienceor an engineering degree from a recognised institution or equivalent tertiary study in technical area; • Familiarisation with relevant requirements of the OSMP and OPEP; • Experienced in fisheries data analysis.

4.6 S6: Recovery of fauna

4.6.1. Purpose

The purpose of this module is to provide semi-quantitative measures of changes to population dynamics of indicator fauna to assess long-term environmental effects on these species which may result from a hydrocarbon spill (i.e. assess the extent of damage and measure the degree of recovery, where possible). Module S6 will assess and monitor oil impacts to fauna populations by:

- Monitoring changes in population dynamics (pup counts, breeding success, population changes over time) at identified control and impact sites;
- Assessing the impact of a hydrocarbon spill on indicator fauna by analysing pre and post-impact data on population sizes at control and impact (where existing baseline data is available) sites.

4.6.2. Initiation and termination criteria

Initiation Criteria	S6 Fauna surveys	✓ Confirmation by the IMT IC (or delegate) that Level 2 or Level 3 hydrocarbon spill to marine or coastal waters has occurred, **and** ✓ EUL (or delegate) has determined that data from operational module O4 or scientific module S4 has confirmed the exposure of fauna
	All sub-modules	✓ The IMT IC (or delegate) has advised that either full or partial implementation of S6 is to commence.
Termination Criteria	S6 Fauna surveys	✓ Disturbance parameters (e.g. estimated population) have returned to within the expected natural dynamics of baseline state and/or control sites; or ✓ There has been no demonstrable impact on fauna from hydrocarbons.
	All sub-modules	✓ **Or,** agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the monitoring.

4.6.3. Implementation

Expected Activation Time[1]	✓ S6 to be activated within 24 hours of initiation criteria being met
Expected Implementation Time	✓ Draft sampling and analysis plan to be ready for peer review within 7 days of initiation criteria being met; ✓ Mobilisation and monitoring to commence as soon as practicable after initiation criteria being met.
Implementation Plan	✓ Refer to *Implementation Guide for S6: Long-term impacts to fauna*
Reporting	✓ Summary report to be provided to Esso Environment Lead following completion of each field survey event; ✓ Final report (including all data and associated interpretation and analysis) prepared following the termination criteria for the module being met.

Notes:

1. *A module is considered activated when Esso have confirmed initiation criteria have been met and the monitoring providers have been notified to initiate planning and implementation tasks.*

4.6.4. Monitoring overview

The below table provides an indication of the type of sampling techniques and analysis that may be undertaken during scientific module S6. The final sampling design, including methods and analysis, will be determined by Esso in conjunction with their monitoring providers in the event of a spill.

Where practicable, sampling and analysis will be undertaken in line with relevant guidance documents, such as:

- Oil Spill Monitoring Handbook (Hook et al. 2016).

Or other related scientific studies (e.g. Kirkwood et al. 2005; Goldsworth et al. 2000).

Sub-module	Sampling technique	Data collection and/or analysis
S6.1 Fauna surveys	• Visual surveillance	• Quantitative observation records (e.g. population, chicks/pups abundance, behaviour etc).

4.6.5. Responsibilities, competencies, and resources

Emergency response team

The IMT IC and EUL have responsibilities relating to the initiation of this scientific monitoring module. These roles may delegate responsibilities as appropriate. Roles, responsibilities and competencies of the ERT and IMT teams are as detailed in the Gippsland OPEP.

Esso environmental team

Termination of this scientific monitoring module is the responsibility of Esso Environment Lead.

Monitoring team

The below table lists the minimum personnel requirements from the monitoring provider to implement scientific module S6. The numbers of teams and final number of personnel may vary depending on the nature and scale of the spill.

Personnel	Responsibilities	Competencies
Principal Investigator (1 person)	• Finalise the sampling and analysis design for S6 in the event of a spill • Implement S6 • Review and/or carry out reporting requirements • Compliance with the requirements of S6 and the OSMP • Provide advice with respect to environmental issues as required	• Bachelor degree in environmental scienceor an engineering degree from a recognised institution or equivalent tertiary study in technical area • Familiarisation with relevant requirements of the OSMP and OPEP
Field Teams (2 to 3 people)	• Conduct sampling, record data and arrange transfer of samples to laboratories • Completing field data sheets • QA/QC data quality	• Bachelor degree in environmental science or an engineering degree from a recognised institution or equivalent tertiary study in technical area • Experienced in the relevant sampling and/or recording techniques.

4.7 S7: Recovery of subtidal and intertidal benthic habitat

4.7.1. Purpose

The purpose of this module is to assess long-term environmental effects on subtidal and intertidal benthic communities which may have resulted from an oil spill or response (i.e. assesses the extent of damage and measure the degree of recovery in benthic communities, where possible). Module S7 will assess and monitor long-term impacts to subtidal and intertidal benthic communities by:

- Undertaking habitat extent analysis to rapidly collect and process real-time data on abiotic and biotic parameters to determine subtidal and intertidal habitat classifications;

- Monitoring seagrass at impact and reference sites to determine extent of change (if any) in biomass and estimated cover due to oil impacts;
- Monitoring macroalgae and sponge at impact and reference sites to determine extent of change (if any) in biomass and estimated cover due to oil impacts;
- Monitoring benthic infauna at impact and reference sites to determine extent of change (if any) to species composition and abundance; and
- Monitoring fish at impact and reference sites to determine extent of change (if any) to species composition and abundance.

4.7.2. Initiation and termination criteria

Initiation Criteria	S7.1 Habitat mapping; S7.2 Macroalgae and sponges S7.3 Benthic infauna monitoring; S7.4 Intertidal and subtidal fish monitoring	✓ Confirmation by the IMT IC (or delegate) that Level 2 or Level 3 hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ EUL (or delegate) has determined that data from operational module O2/O6 or scientific module S1/S2/S4 has confirmed the exposure of either benthic substrate or waters within bottom 1 m of seabed
	All sub-modules	✓ The IMT IC (or delegate) has advised that either full or partial implementation of S7 is to commence.
Termination Criteria	S7.1 Habitat mapping; S7.2 Macroalgae and sponges S7.3 Benthic infauna monitoring; S7.4 Intertidal and subtidal fish monitoring	✓ Disturbance parameters (e.g. species composition, percent cover) and health parameters (e.g. leaf condition) have returned to within the expected natural dynamics of baseline state and/or control sites; **or** ✓ There has been no demonstrable impact on benthic or intertidal habitats from hydrocarbons.
	All sub-modules	✓ **Or,** agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the monitoring

4.7.3. Implementation

Expected Activation Time[1]	✓ S7 to be activated within 24 hours of initiation criteria being met
Expected Implementation Time	✓ Draft sampling and analysis plan to be ready for peer review within 7 days of initiation criteria being met; ✓ Mobilisation and monitoring to commence as soon as practicable after initiation criteria being met.
Implementation Plan	✓ Refer to *Implementation Guide for S7: Long-term impacts to subtidal and intertidal benthic habitat*
Reporting	✓ Summary report to be provided to Esso Environment Lead following completion of each field survey event; ✓ Final report (including all data and associated interpretation and analysis) prepared following the termination criteria for the module being met.

Notes:

1. *A module is considered activated when Esso have confirmed initiation criteria have been met and the monitoring providers have been notified to initiate planning and implementation tasks.*

4.7.4. Monitoring overview

The below table provides an indication of the type of sampling techniques and analysis that may be undertaken during scientific module S7. The final sampling design, including methods and analysis, will be determined by Esso in conjunction with their monitoring providers in the event of a spill.

Where practicable, sampling and analysis will be undertaken in line with relevant guidance documents, such as:

- Oil Spill Monitoring Handbook (Hook et al. 2016).

Or other related scientific studies (e.g. Anderson et al. 2009; English et al. 1997; Brown et al. 2004; Cappo et al. 2006).

Sub-module	Sampling technique	Data collection and/or analysis
S7.1 Habitat mapping	• Visual and/or remote sensing surveillance (e.g. towed camera, tagging, side-scanning sonar etc)	• Identification of habitat type and composition; • Mapping of habitat extent.
S7.2 Macroalgae and sponge	• Visual and/or remote sensing surveillance (e.g. towed camera, tagging, side-scanning sonar etc)	• Population and community parameters (composition, cover, abundance, diversity)
S7.3 Benthic Infauna monitoring	• Infauna sample collection (e.g. sediment grab sampling)	• Population parameters (abundance, composition etc).
S7.4 Intertidal and subtidal fish or monitoring	• Visual and/or remote sensing surveillance (e.g. divers, BRUVS etc)	• Population parameters (abundance, composition etc).

4.7.5. Responsibilities, competencies, and resources

The IMT IC and EUL have responsibilities relating to the initiation of this scientific monitoring module. These roles may delegate responsibilities as appropriate. Roles, responsibilities and competencies of the ERT and IMT teams are as detailed in the Gippsland OPEP.

Esso environmental team

Termination of this scientific monitoring module is the responsibility of Esso Environment Lead.

Monitoring team

The below table lists the minimum personnel requirements from the monitoring provider to implement scientific module S7. The numbers of teams and final number of personnel may vary depending on the nature and scale of the spill.

Personnel	Responsibilities	Competencies
Principal Investigator (1 person)	• Finalise the sampling and analysis design for S7 in the event of a spill • Implement S7 • Review and/or carry out reporting requirements • Compliance with the requirements of S7 and the OSMP • Provide advice with respect to environmental issues as required	• Bachelor degree in environmental science or an engineering degree from a recognised institution or equivalent tertiary study in technical area • Familiarisation with relevant requirements of the OSMP and OPEP
Field Teams (2 to 3 people)	• Conduct sampling, record data and arrange transfer of samples to laboratories • Completing field data sheets • QA/QC data quality	• Bachelor degree in environmental science or an engineering degree from a recognised institution or equivalent tertiary study in technical area • Experienced in the relevant sampling and/or recording techniques.

4.8 S8: Recovery of coastal flora

4.8.1. Purpose

The purpose of this module is to assess potential long-term environmental effects on the extent, composition and health of coastal flora communities which may have resulted from an oil spill (i.e. assess the extent of damage and measure the degree of recovery in coastal flora populations, where possible). Module S8 assesses and monitors long-term impacts to coastal flora by:

- Establishing the baseline (background) data on coastal flora community composition, structure and health at identified control and impact sites. Post-spill, pre-impact (reactive baseline) sampling will be undertaken if practicable e.g. if timing permits. This data will augment existing baseline information);
- Monitoring coastal flora communities over time at identified control and impact sites by assessing community extent, composition, structure and health; and
- Assessing the impact of a hydrocarbon spill on coastal flora communities by analysing long-term pre- and post-impact data at control and impact sites.

4.8.2. Initiation and termination criteria

Initiation Criteria	S8.1 Habitat mapping; S8.2 Condition monitoring	✓ Confirmation by the IMT IC (or delegate) that Level 2 or Level 3 hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ EUL (or delegate) has determined that data from operational module O3 or scientific module S4 has confirmed the exposure of coastal flora
	All sub-modules	✓ The IMT IC (or delegate) has advised that either full or partial implementation of S8 is to commence.
Termination Criteria	S8.1 Habitat mapping; S8.2 Condition monitoring	✓ Disturbance parameters (e.g. abundance, percent cover) and health parameters (e.g. leaf condition) have returned to within the expected natural dynamics of baseline state and/or control sites; **or** ✓ There has been no demonstrable impact on coastal flora from hydrocarbons.
	All sub-modules	✓ **Or,** agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the monitoring.

4.8.3. Implementation

Expected Activation Time[1]	✓ S8 to be activated within 24 hours of initiation criteria being met
Expected Implementation Time	✓ Draft sampling and analysis plan to be ready for peer review within 7 days of initiation criteria being met; ✓ Mobilisation and monitoring to commence as soon as practicable after initiation criteria being met.
Implementation Plan	✓ Refer to *Implementation Guide for S8: Long-term impacts to coastal fauna*
Reporting	✓ Summary report to be provided to Esso Environment Lead following completion of each field survey event; ✓ Final report (including all data and associated interpretation and analysis) prepared following the termination criteria for the module being met.

Notes:

1. *A module is considered activated when Esso have confirmed initiation criteria have been met and the monitoring providers have been notified to initiate planning and implementation tasks.*

4.8.4. Monitoring overview

The below table provides an indication of the type of sampling techniques and analysis that may be undertaken during scientific module S8. The final sampling design, including methods and analysis, will be determined by Esso in conjunction with their monitoring providers in the event of a spill.

Where practicable, sampling and analysis will be undertaken in line with relevant guidance documents, such as:

- Oil Spill Monitoring Handbook (Hook et al. 2016).

Or other related scientific studies (e.g. English et al. 1997).

Sub-module	Sampling technique	Data collection and/or analysis
S8.1 Habitat mapping	• Remote sensing surveillance (e.g. multispectral imagery)	• Identification of habitat type and composition; • Mapping of habitat extent.
S8.2 Condition monitoring	• Visual (e.g. quadrats, photographs)	• Population parameters (e.g. abundance, percent cover etc). • Health parameters (e.g. leaf cover, leaf damage, etc.)

4.8.5. Responsibilities, competencies, and resources

The IMT IC and EUL have responsibilities relating to the initiation of this scientific monitoring module. These roles may delegate responsibilities as appropriate; e.g. the ERT VM/OIM may be responsible for the initiation if the IMT has not yet been established. Roles, responsibilities and competencies of the ERT and IMT teams are as detailed in the Gippsland OPEP.

Esso environmental team

Termination of this scientific monitoring module is the responsibility of Esso Environment Lead.

Monitoring team

The below table lists the minimum personnel requirements from the monitoring provider to implement scientific module S8. The numbers of teams and final number of personnel may vary depending on the nature and scale of the spill.

Personnel	Responsibilities	Competencies
Principal Investigator (1 person)	• Finalise the sampling and analysis design for S8 in the event of a spill • Implement S8 • Review and/or carry out reporting requirements • Compliance with the requirements of S8 and the OSMP • Provide advice with respect to environmental issues as required	• Bachelor degree in environmental science or an engineering degree from a recognised institution or equivalent tertiary study in technical area • Familiarisation with relevant requirements of the OSMP and OPEP
Field Teams (2 to 3 people)	• Conduct sampling, record data and arrange transfer of samples to laboratories • Completing field data sheets • QA/QC data quality	• Bachelor degree in environmental science or an engineering degree from a recognised institution or equivalent tertiary study in technical area • Experienced in the relevant sampling and/or recording techniques.

4.9 S9: Recovery of Ramsar values

4.9.1. Purpose

This module is aimed at establishing whether oil entering Ramsar wetland has resulted in an alteration to the ecological character of the system. The purpose of this module is to:

- Assess long-term impacts of an oil spill on the ecological character of Ramsar sites.

4.9.2. Initiation and termination criteria

Initiation Criteria	S9 Desktop review of wetland values	✓ Confirmation by the IMT IC (or delegate) that Level 2 or Level 3 hydrocarbon spill to marine or coastal waters has occurred; **and** ✓ EUL (or delegate) has determined that (a) data from operational module O3 has confirmed the exposure of a Ramsar wetland; and (b) data from scientific modules S1, S4, S6, S7 or S8 confirm an impact to water/sediment quality, flora or fauna in the wetland.
	All sub-modules	✓ The IMT IC (or delegate) has advised that either full or partial implementation of S9 is to commence.
Termination Criteria	S9 Desktop review of wetland values	✓ Wetland values have returned to within the expected natural dynamics of baseline state and/or control sites; or ✓ There has been no demonstrable impact on Ramsar wetlands from hydrocarbons.
	All sub-modules	✓ **Or**, agreement has been reached with the Jurisdictional Authority relevant to the spill to terminate the monitoring.

4.9.3. Implementation

Expected Activation Time[1]	✓ S9 to be activated[1] within 24 hours of initiation criteria being met
Expected Implementation Time	✓ Desktop assessment to commence as soon as practicable after initiation criteria being met.
Implementation Plan	✓ Refer to *Implementation Guide for S9: Long-term impacts to Ramsar values*
Reporting	✓ Final report (including all data and associated interpretation and analysis) prepared following the termination criteria for the module being met.

Notes:

1. *A module is considered activated when Esso have confirmed initiation criteria have been met and the monitoring providers have been notified to initiate planning and implementation tasks.*

4.9.4. Monitoring overview

The below table provides an indication of the type of sampling techniques and analysis that may be undertaken during scientific module S9. The final sampling design, including methods and analysis, will be determined by Esso in conjunction with their monitoring providers in the event of a spill.

Where practicable, desktop reviews will be undertaken in line with relevant guidance documents, such as:

- National Framework and Guidance for Describing the Ecological Character of Australian Ramsar Wetlands (DEWHA 2008).

Sub-module	Sampling technique	Data collection and/or analysis
S9 Desktop review of wetland values	• Desktop review.	• Data collation (including relevant information from scientific modules S1, S4, S6, S7 and S8 where relevant). • Comparison to known ecological character descriptions of Ramsar wetlands.

4.9.5. Responsibilities, competencies, and resources

Emergency response team

The IMT IC and EUL have responsibilities relating to the initiation of this scientific monitoring module. These roles may delegate responsibilities as appropriate; e.g. the ERT VM/OIM may be responsible for the initiation if the IMT has not yet been established. Roles, responsibilities and competencies of the ERT and IMT teams are as detailed in the Gippsland OPEP.

Esso environmental team

Termination of this scientific monitoring module is the responsibility of Esso Environment Lead.

Monitoring team

The below table lists the minimum personnel requirements from the monitoring provider to implement scientific module S9. The numbers of teams and final number of personnel may vary depending on the nature and scale of the spill.

Personnel	Responsibilities	Competencies
Principal Investigator (1 person)	• Implement S9 • Review and/or carry out reporting requirements • Compliance with the requirements of S9 and the OSMP • Provide advice with respect to environmental issues as required • QA/QC data quality	• Bachelor degree in environmental science or an engineering degree from a recognised institution or equivalent tertiary study in technical area • Familiarisation with relevant requirements of the OSMP and OPEP • Experienced in wetland ecology.

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Appendix A: General guidance and approaches for scientific monitoring design

This appendix provides guidance on survey design approaches that are likely to be utilised for the scientific monitoring modules:

- Impact versus Control (IvC);
- Gradient of Impacts;
- Before-After-Control-Impact (BACI);
- Control Chart;
- Lines of Evidence.

The design of monitoring studies should ensure, as far as possible, that the planned monitoring activities are practicable and that the objectives of the study will be met. The design must result in the collection of meaningful data and, where practicable, data that are sufficiently powerful to detect ecologically relevant changes.

The final survey design(s) can depend on a variety of factors, included but not limited to:

- Scale and pattern of potential effects of the spill;
- Availability of baseline data and/or ability to rapidly obtain baseline data;
- Time frame available to gather pre- and post-spill data;
- Availability of operational monitoring data;
- Availability of appropriate control sites;
- Statistical approach proposed for data analysis;
- Range of possible chronic and acute effects on the parameters of concern, based on the characteristics of the spill;
- Monitoring frequency required to ensure short-and long-term impacts are detected;
- Legislative requirements;
- Available resources and equipment to conduct the work in terms of personnel, logistics, and access.

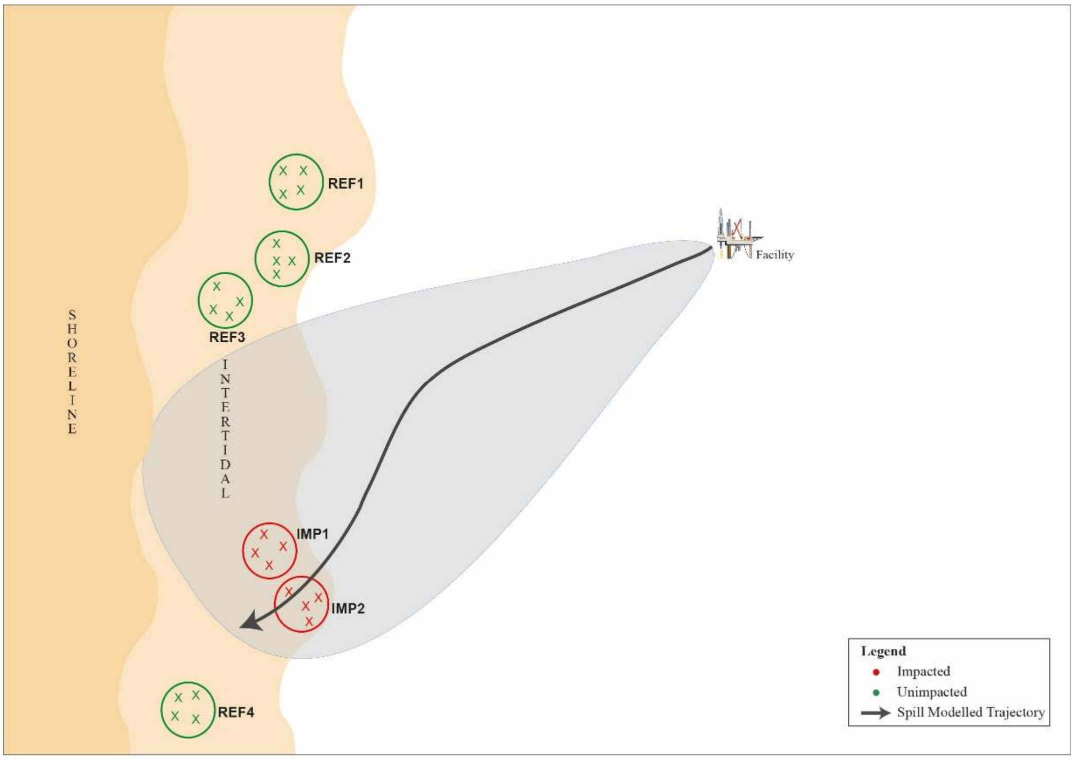
Note: data collection can depend on several constraints (as outlined above) and on access given logistical and safety constraints applicable to a particular spill event. Therefore, the survey designs recommended within the implementation guides for each scientific monitoring module, may not be able to be implemented exactly as intended. For example, there may be inadequate number of control sites because of the size of the spill and therefore data collected from an expected BACI design may need to be analysed as a gradient approach etc.

Before-After-Control-Impact (BACI) approach

Where appropriate baseline data are available, consideration should be given to developing a beyond BACI monitoring program design (Underwood 1991; 1994) or similar extended BACI design (mBACI), which monitors a range of control and impact sites, and can do so over time (Figure A-1). Where robust, appropriate baseline data for exposure sites are not available, pre-exposure sampling of locations that lie within the hydrocarbon spill trajectory should be prioritised to obtain baseline data prior to hydrocarbon exposure.

Exposure sites should be selected first, encompassing a representative selection of locations within the area affected by hydrocarbons. Where practicable, the monitoring program design may consider stratified sampling along environmental gradients (e.g. level of hydrocarbon exposure etc.). Comparable control sites beyond the area affected by hydrocarbons should then be selected, with monitoring conducted at all sites. Clearly obtaining control sites pre-exposure can be challenging and is heavily reliant on predicting the extent of hydrocarbon movement.

The suggested statistical analysis of data collected using the BACI approach includes a univariate or multi-factorial analysis of variance (ANOVA) and equivalent non-parametric tests, all of which will compare between treatment (impact versus reference) and time (before versus after). Components of variation may help partition a sum of squares into different sources and describe the importance of factors within tests.



Notes:

1. *A modification to the beyond BACI design, is known as an MBACI design. MBACI designs incorporate multiple impact locations, whereas beyond BACI designs include only one impact location.*
2. *The above design consists of four reference/control locations and two impact locations, with four nested sites in each. The number of replicates (e.g. quadrats or transects) per site should be set based on resourcing, and /or the results of the power analysis (if applicable).*
3. *The area affected by the spill is indicated by the grey shaded area, or the area of influence.*
4. *Design assumes the area of influence has been affected equally.*

Figure A-1: Example of an MBACI design for shoreline and/or intertidal communities

Impact versus Control (IvC) approach

For some locations and receptors, baseline data may not exist, may not be recent and applicable, or was collected using methods that are unrepeatable in the current study. If there is a lack of baseline information that can feed into a BACI design, an IvC approach can be used to assess impacts. However, due to the unknown status of the parameter before impact, there is a higher likelihood of encountering Type I error (falsely concluding that an impact has occurred) with this approach. For example, if the status of the parameter to be measured was already naturally lower at impact sites than control sites before the impact occurred, but this was not measured, a conclusion may be reached using the IvC approach that an impact has occurred when it may be natural variation. For this reason, sampling designs should always try to collect or use baseline data (i.e. aim for a BACI design), and if an IvC design is used, it is important to ensure that the control sites are comparable to the impact sites in every way possible except for the presence or absence of the studied effect (hydrocarbon). This may include, but not be limited to: site physical aspect, substrate, current regimes, and community composition.

Because of the higher likelihood of Type I error, it is also useful to collect additional data on relevant physical environmental parameters that are likely to be different at impact and control sites and may affect the conclusion of the assessment. Biological information may also be relevant, such as degree of sub-lethal and lethal impacts to populations. These parameters can be examined later for any potential co-variance with the observed changes in the parameter of interest, to understand whether hydrocarbons or natural variation affected the outcome. The physical and biological information can therefore augment and act as additional evidence to help interpret conclusions from any IvC analyses. As with the BACI approach, when using the IvC approach it is important to understand the scale of natural variation that may affect the outcome of the assessment by replicating sites within sampling locations and replicating samples within each site.

The suggested statistical approach for analysing the data collected using the IvC approach is a multi-factorial ANOVA (to account for nested data), including PERMANOVA and non-parametric tests, to test whether the level of variation among treatments (IvC) is greater than the level of variation within treatments. Components of variation may help partition variance into different sources and help infer whether the effect of hydrocarbons or spatial variation was responsible for any detected change in the receptors.

Gradient approach

The gradient approach can be used in some instances where a lack of suitable control sites prohibits using a BACI or IvC approach. Sampling should be established along a gradient of predicted effect (based on input of data from operational monitoring, surveillance or modelling), with sites established at various distances from the source of impact or along a gradient of magnitudes of concentrations of hydrocarbons. The gradient approach can also be used in combination with a BACI or IvC approach to help infer the cause of a detected impact and describe thresholds of impacts at which a response appears to have occurred. The gradient approach also provides a 'line of evidence' that the source of potential impact (hydrocarbons) was responsible for the observed effect, rather than natural variation. However, care should be taken to ensure awareness of any natural gradients in the parameter measured and take these into account when interpreting the data.

When designing a study using a gradient approach, relevant Oil Spill monitoring data (e.g. water and sediment quality), and modelling should be considered. Prior knowledge or prediction of the likely gradient of effect will greatly improve the efficiency of the sampling design by minimising the collection of data points that provide no additional information in the analysis (e.g. data points showing similar or no effects that do not help to characterise the gradient of effect), though noting these may aid in statistical power of gradient description so shouldn't necessarily be discouraged.

Typically, the level of observed impact will decline at distance from the source of a hydrocarbon release, with this decline likely to be exponential (i.e. large changes close to a release that quickly decrease in severity); therefore, sampling effort can be distributed along the gradient of effect in a way that best characterises the changes in the parameter measured.

If possible, multiple (> two) sites could be sampled at each distance along the gradient (if logistics and time permit) to provide an understanding of small-scale variation. Sites should also be sampled at distances where no environmental effect is predicted or observed, if possible, to characterise the full extent of the effect's gradient.

The suggested statistical analysis for the gradient approach includes correlation analysis between impact (measurements of hydrocarbon/stress; x-axis) and measurement parameter (biological response; y-axis), and associated regression analyses, may include least-squares regression line and hypotheses testing to determine if the trend is significantly different from zero.

Control chart approach

The control chart approach is applicable in the following circumstances:

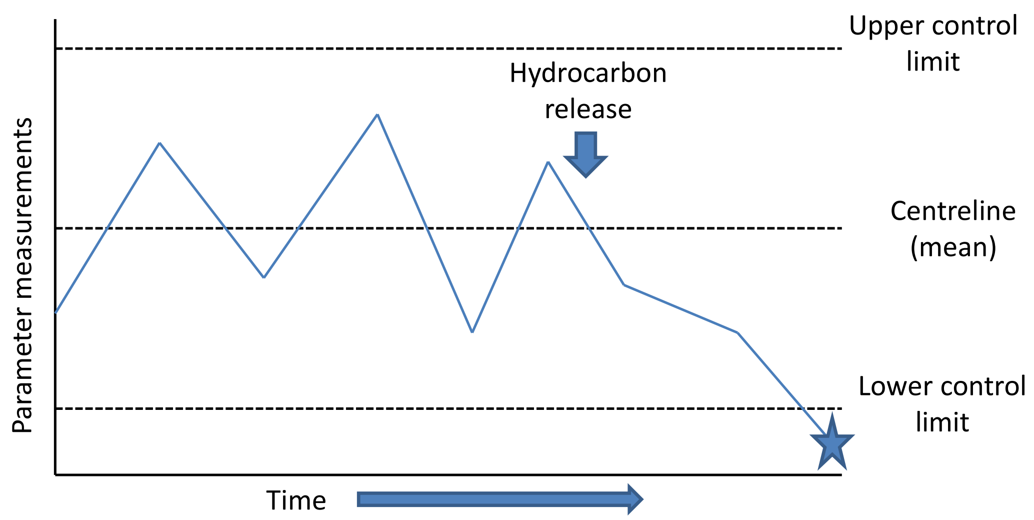
- When long-term (multi-year) datasets exist for the measured parameter;
- When a large amount of natural variation exists in the measured parameter;
- When predicting the expected range of outcomes from an impact.

One of the causal criteria described in the lines of evidence approach is ‘strength of association’ (Hill 1965), exemplified by a ‘larger decline in individuals in areas affected by hydrocarbon than in control areas’. The control chart approach takes this causal criterion a step further and uses rules to establish whether a detected change in a parameter at impact sites is outside what would be expected to occur naturally. This technique requires tracking a parameter over time and determining whether an observed change is within the bounds of what has been observed to occur naturally at that impact site or at control sites.

A control chart has a central line for the mean, an upper control limit (UCL; e.g. typically 3 standard deviations [SD] above the mean), and a lower control limit (LCL; e.g. typically 3SD below the mean), which are typically all determined from historical data (Gotelli and Ellison 2004). The mean line can be constructed using data from i) historical data of an impact site prior to it being affected by hydrocarbons (i.e. what the mean used to be), or ii) control locations, whereby either historical or recent data is used for comparison to other sites (i.e. a control site historical data compared to impact site). The approach is then based on calculating the mean (ongoing) for an impact site to compare against the control chart. Any observations outside the UCL and LCL suggest that increased variation has been observed that are inconsistent with other data and may post a simple way to detect change in a system (Figure A-2).

In addition, if ongoing data collection is possible following a potential impact, the control chart approach can be used to examine the direction of change and whether this is consistent or inconsistent with other data. These data and interpretation may provide a weight of evidence of a directional change in a given parameter.

The control chart approach is only useful if there is an adequate knowledge of natural variability in a given parameter whether from historical sources or similar sites/locations. Control chart approaches can be a powerful tool for detecting impacts for systems that are naturally highly variable.



Note: The star represents a measurement beyond the likely anticipated variation, which needs to be investigated.

Figure A-2: Example Control Chart showing Centreline (mean), Upper Control Limit (3 SD above mean), Lower Control Limit (3 SD below mean), and Measurements

Lines of evidence approach

The lines of evidence approach is applicable in the following circumstances:

- Can be combined with any of the above monitoring designs to provide inferential evidence of an effect;
- Are useful to support evidence of effect if there are limited (or only one) impact locations;
- Are useful to support evidence of effect if the effect radiates outward from source;
- Are useful to infer cause of change if limited or no baseline data exist;
- Are useful to infer cause of change if limited or no control sites exist.

When a sampling design is suboptimal, or if conclusions from more formal tests are inconclusive, a lines of evidence approach can be used to help infer the cause of an observed change (i.e. attribute change to the hydrocarbon release or to other causes, such as natural variation). Within the lines of evidence approach, inference is developed based on carefully structured arguments. A weakness of this method is that the evidence may be largely circumstantial because it is based on correlations (Downes et al. 2002), which does not necessarily imply causation. Each causal argument may be weak when considered independently but combined they may provide strong circumstantial evidence and support for a conclusion (Downes et al. 2002).

This approach was originally developed in medicine (Hill 1965) but has been used more recently in ecological studies (e.g. Downes et al. 2002; McArdle 1996; Suter 1996; Beyers 1998; Fabricius 2004). Causal criteria have been developed for categorizing arguments from studies on disease on humans (Hill 1965), and these can be applied to ecological arguments (Hill 1965). With lines of evidence, there is a need to seek evidence not only to support the impact prediction, but evidence to rule out plausible alternative predictions, such as that the observed difference was due to natural processes (Downes et al. 2002; Beyers 1998).

In the lines of evidence approach, a set of descriptions should be developed for all or some of the causal criteria listed in Table A-1 before the survey is undertaken (see Downes et al. 2002 for further criteria and examples). Data would then be collected that allows each line of evidence to be tested or objectively questioned. The final assessment of whether an impact is likely to have occurred should be based on the ‘weight of evidence’ from examining multiple lines of evidence.

Example generalised lines of evidence descriptions are provided in Table A-2. These should be modified and tailored to individual scientific monitoring module, as required and each parameter investigated.

Table A-1: Hills (1965) causal criteria and description in the context of ecological impact Assessment

Causal Criterion	Description
Strength of association	A large proportion of individuals are affected in the impact area relative to control areas
Consistency of association	The association was observed by other investigators at other times and places
Specificity of association	The effect is diagnostic of exposure
Temporality	Exposure must precede the effect in time
Biological gradient	The risk of effect is a function of magnitude of exposure
Biological plausibility	A plausible mechanism of action links cause and effect
Experimental evidence	A valid experiment provides strong evidence of causation
Coherence	Similar stressors cause similar effects
Analogy	The causal hypothesis does not conflict with existing knowledge of natural history and biology

Table A-2: Causal criteria and example lines of evidence descriptions that could be used to assess whether a change in a measured parameter was due to the effects of a hydrocarbon release

Causal Criterion	Evidence Supportive of a Hydrocarbon Release Impact	Evidence Unsupportive of a Hydrocarbon Release Impact
Strength of association	Larger decline in individuals in areas affected by hydrocarbon than in control areas	Similar declines in individuals in areas affected by hydrocarbon and control areas
Consistency of association	Consistent finding of declines in a range of biota in areas affected by hydrocarbon	Inconsistent declines in biota in areas affected by hydrocarbon (e.g. declines in one species but not in other similar species)
Specificity of association	Number of individuals affected correlates with hydrocarbon concentrations	No correlation between number of individuals affected and hydrocarbon concentration
Temporality	Decline in individuals immediately preceded by contact with hydrocarbon	Decline in individuals occurred before or long after hydrocarbon contact
Biological gradient	Changes in individuals aligned with exposure to hydrocarbon spills or concentrations	Decline in individuals occurs with increasing distance from a hydrocarbon spill or hydrocarbon concentrations
Biological plausibility	Evidence from literature of sensitivity to detected hydrocarbon concentration for species where declines are observed	Evidence from literature suggests lack of sensitivity to detected hydrocarbon concentration for species where declines are observed
Experimental evidence	A valid experiment provides strong evidence of causation	Not applicable (N/A)
Coherence	Evidence of a decline in species abundance, habitat, and food source with increasing hydrocarbon exposure	Evidence of a decline in species abundance, but no other evidence of expected declines associated with exposure
Analogy	Apparent declines in hatchling numbers despite no apparent decline in numbers of adults	Apparent declines in hatchling numbers associated with decreased numbers of adults

Appendix B: Baseline data

Rationale and approach

Baseline monitoring provides information on the condition of ecological receptors prior to, or spatially independent (e.g. if used in control chart analyses) of, a spill event and is used for comparison with the post-impact scientific monitoring where required. This is particularly important for scientific monitoring where the ability to detect changes between pre-impact and post-impact conditions is necessary.

There are Oil Spill monitoring modules that are suited to pre-impact baseline monitoring. In the event of a spill to marine or coastal waters, reactive pre-impact monitoring should, where practicable, be implemented to gather additional data on the current state of the environment. Note: the collection of ongoing baseline data (i.e. under regular operational conditions) is not planned or considered to be practicable.

Understanding priority areas for reactive pre-impact baseline monitoring is important. Stochastic modelling may be used to determine areas likely to be contacted with fresh hydrocarbons above impact thresholds within a specified timeframe. For example, stochastic modelling may indicate a number of shoreline receptors have a high probability of contact with fresh hydrocarbons above 100 g/m^2; these areas would then provide an initial focus for reactive pre-impact monitoring.

Control sites (i.e. similar to the impact or disturbance location) are sometimes more relevant than reference sites (undisturbed or natural sites) for determining the impact of a hydrocarbon spill as separate from other human or natural stressors (Downes et al. 2002). In the event of a spill, existing baseline information should be used to select relevant control sites outside the impact area of a single spill. It is expected that most control sites will be within the predicted environment that may be affected, but outside the impacted area for any given single spill. As all possible permutations or combination of sites cannot be realistically assessed in advance, control sites should be selected post-spill. The number of samples and/or sampling sites for a particular spill should depend on the extent of the spill, and the statistical power necessary to determine whether there is an impact and the ability of the monitoring program to determine recovery and termination criteria.

Existing baseline studies

The following table is a collection of known baseline data and relevant studies for the Gippsland region.

Table B-3: Regional environmental studies and available baseline data

Reference	Description	Summary	Relevant Location/s	Relevant scientific module
AFMA	Reported landed annual catch from Commonwealth fisheries	This dataset shows the annual catch for Commonwealth fisheries managed by AFMA. The catch data is provided by fishery, by species and by calendar year.	Commonwealth fisheries	S6
Barton et al. (2012)	Marine Natural Values Study Marine Protected Areas of the Flinders and Twofold Shelf bioregions	An inventory of accessible knowledge about the natural (environmental) values of marine parks and sanctuaries located on the flinders and Twofold shelf bioregions. For each park area the following are described: Physical parameters, Marine habitat classes, marine ecological communities, biological processes, species distribution information, Shorebirds, marine	Wilsons Promontory, Ninety Mile beach, Point Hicks, Cape Howe marine parks and Beware Reef Marine Sanctuary.	S8

Reference	Description	Summary	Relevant Location/s	Relevant scientific module
		mammals, knowledge gaps and existing research.		
Birdata web portal	Access to BirdLife Australia data	Birdata includes data from the Australian Bird Atlas project and also from various dedicated monitoring projects including Shorebirds 2020.	Gippsland Lakes	S10
Birds Australia	Biennial beach nesting birds count reports	Every two years, all suitable ocean beach habitat for Hooded Plovers along the coasts of Victoria, South Australia and NSW, are surveyed across a weekend in mid-November. The aim is to achieve a best estimate of the population and assess the state of the bird's habitat.	Ninety Mile Beach	S5 S7
Blake et al. (2000)	Seagrass mapping of Victoria's minor inlets	Remote sensing and aerial photograph analysis of seagrass bed extent in six Victorian inlets.		S8
BMT WBM (2011)	Ecological Character Description	This report provides the Ecological Character Description (ECD) for the Gippsland Lakes Ramsar site, prepared in accordance with the National Framework and Guidance for Describing the Ecological Character of Australia's Ramsar Wetlands 2008.	Gippsland Lakes Ramsar Site	S10
Boon et al (2011)	Mangrove and saltmarsh habitat	• Victorian mangrove distribution and extent; • Victorian coastal saltmarsh distribution and extent; • Zonation; • Sedimentation and successional change in communities; • Relation between mangrove and saltmarsh communities and water and salt; • Floristics and structure of coastal vegetation; • Mapping of mangrove and coastal saltmarsh extent and current ecological condition; • Pre-European distributions; and • Assessment of distribution under rising sea levels	Victoria	S9
Butler et al. (2002)	Assessment of the conservation values of the Bass Strait sponge beds area	Assessment of the conservation / marine biodiversity values of sponge bed areas across the Bass Strait. Locations and extent unable to be identified by the assessment, however gives a comprehensive outline of the biodiversity values in sponge based, including broad-scale mapping.	Twofold shelf	S8
CEE 2003	Marine issues assessment (including benthos) for the	Assessment of marine environmental components including (but not limited to) subtidal infauna and epifauna. Field survey included	Sole/Patricia Baleen	S8

Reference	Description	Summary	Relevant Location/s	Relevant scientific module
	Sole Gas Pipeline Extension	a benthic video survey along the proposed Patricia Baleen pipeline.		
DELWP	Victorian Biodiversity Atlas	The Victorian Biodiversity Atlas (VBA) is the collated information of flora and fauna sightings across Victoria.	Gippsland Lakes	S10
Edmunds et al. (2005)	Subtidal reef biota monitoring in marine protected areas in the Twofold Shelf region	Long-term Parks Victoria monitoring and mapping program of macroalgae, invertebrates and fish. Quantitative visual census method based on Edgar and Barrett 1997; Edgar et al. 1997) using transects. 18 sites monitored in total including seven (7) sites originally monitored in 2001. Site depth ranged between 4-10 m.	Twofold Shelf including: Beware Reef Marine Sanctuary, Point Hicks and Cape Howe Marine National Parks	S8
Edmunds et al. (2011)	Victorian Subtidal Reef Monitoring Program: The Reef Biota at Beware Reef Marine Sanctuary,	Inventory of subtidal reef biota at Beware Reef marine Sanctuary offshore from the Gippsland Coast. Marine habitat classes, marine ecological communities, biological processes, species distribution information, Shorebirds, marine mammals, knowledge gaps and existing research.	Beware Reef Marine Sanctuary	S8
Fisheries Research and Development Corporation	Biological, catch and effort information for Australia's key wild catch fish stocks	fish.gov.au provides reports by jurisdiction or species.	Australia-wide	S6
Fullagar et al. (2005)	Historic population data for Little penguin colony at Gabo Island	A reconnaissance of Gabo Island to assess the feasibility of a Little Penguin breeding population survey.	Gabo Island	S5 S7
Henry & Lyle (2003)	2000 National Survey of Recreational and Indigenous Fishing (NRIFS)	The first and most comprehensive snapshot of recreational fishing in Australia.	Australia-wide	S6
Higgins & Davies (eds.) (1996)	Handbook of Australian, New Zealand and Antarctic Birds, Volume 3.	Pre-eminent scientific reference on birds in the region, which includes Australia, New Zealand, Antarctica, and the surrounding ocean and sub-Antarctic islands.	Rigby Island, Gippsland Lakes	S5 S7 S10
Institute for Marine and Antarctic Studies (IMAS)	Fisheries and aquaculture reports	Current and past Fishery Assessment Reports conducted on behalf of DPIPWE for the following fisheries; • Scalefish • Rock Lobster • Abalone • Giant Crab • Other fisheries including recreational projects	Tasmanian fisheries	S6

Reference	Description	Summary	Relevant Location/s	Relevant scientific module
Kirkwood et al. (2010)	Continued population recovery by Australian fur seals	Includes Victorian population data for Australian fur seal up to 2008. Pups were recorded at 20 locations: 10 previously known colonies, three newly recognised colonies and seven haul-out sites where pups are occasionally born.	Gabo Island, The Skerries	S5 S7
Littnan & Mitchell (2002)	Australian And New Zealand Fur Seals at The Skerries, Victoria: Recovery of A Breeding Colony	The population size of Australian fur seals Arctocephalus pusillus doriferus and New Zealand fur seals A. forsteri at The Skerries, Victoria was estimated in two consecutive breeding seasons, 1999-2000 and 2000-2001.	The Skerries	S5 S7
Monk et al. (2011)	Corner Inlet and Nooramunga Seagrass Mapping Project	Commissioned by Parks Victoria this study creates two updated habitat maps for Corner Inlet and Nooramunga Marine and Coastal Park.		S8
NSW DPI	Fisheries Spatial Portal	NSW revised its fisheries reporting requirements in 2009 so catch and effort data is now more spatially and temporally detailed and as such is likely to be more useful in the assessment of potential impacts from an oil spill.	NSW fisheries	S6
O'Hara et al. (2002)	Baseline monitoring of Posidonia seagrass beds in Corner Inlet, Victoria	• Obtain qualitative baseline data on Corner Inlet subtidal seagrass communities; • Obtain data characterising fish, invertebrate and plant communities of Corner Inlet; • Assess status of invertebrate species of conservation concern that occur in Corner Inlet/Nooramunga		S8
Overeem et al. (2007)	Contrasting genetic structuring between colonies of the Little Penguin	Includes summary of population data for various Little Penguin, Contrasting genetic structuring between colonies of the world's smallest penguin, Eudyptula minor, colonies.	Gabo Island	S5 S7
Parks Victoria 2006a	Management Plan for Beware Reef Marine Sanctuary	Management Plan developed to help protect and conserve the sanctuary's natural and cultural values, make the sanctuary more widely known and appreciated, and ensure visitors both enjoy and respect its importance for current and future generations. Provides description of species, communities and habitat, however, mostly based on Edmunds et al. (2005)	Beware Reef	S8
Parks Victoria 2006b	Management Plan for Point Hicks marine National Park	Management Plan developed to help protect and conserve the sanctuary's natural and cultural values, make the sanctuary more widely known and	Point Hicks	S8

Reference	Description	Summary	Relevant Location/s	Relevant scientific module
		appreciated, and ensure visitors both enjoy and respect its importance for current and future generations. Provides description of species, communities and habitat, however, mostly based on Plummer et al. (2003 and Edmunds et al. (2005)		
Plummer et al. 2003	Marine Natural Values Study Victorian Marine National Parks and Sanctuaries	The "Marine Natural Values Study – Marine National Parks and Sanctuaries" is an inventory of accessible knowledge about the natural (environmental) values for all 24 of the newly declared Marine National Parks and Sanctuaries in Victoria. For each park area the following are described: Physical parameters, Marine habitat classes, marine ecological communities, biological processes, species distribution information, Shorebirds, marine mammals, knowledge gaps and existing research. Included Ninety-mile Beach Marine National Parka and Point Hicks Marine National Park.	Ninety Mile beach and Point Hicks	S8
Roob and Ball (1997)	Gippsland Lakes seagrass mapping	• Assessment of seagrass changes in the Gippsland Lakes through review of historical aerial photographs; and • Assessment of the spatial distribution of seagrass in the Gippsland Lakes.	Gippsland Lakes	S8 S10
Roob et al. (1998)	Corner Inlet and Nooramunga Seagrass Mapping	• Assessment of seagrass changes in Corner Inlet and Nooramunga through a review of historic aerial photographs; and • Assessment of the spatial distribution of seagrass in Corner Inlet and Nooramunga.	Corner Inlet Nooramunga	S8
Shorebirds 2020	Shorebird long-term data count	The Shorebirds 2020 database comprises the most complete shorebird count data available in Australia. The data have been collected by volunteer counters and BirdLife Australia staff for approximately 150 roosting and feeding sites, mainly in coastal Australia. The data goes back as far as 1981 for key areas.	Gippsland Lakes, Ninety Mile Beach	S5 S7
Taylor & Roe (2005)	Study on the Little tern population on Rigby Island, Gippsland Lakes	A study of the feeding ecology of Little terns Sterna albifrons sinensis breeding on Rigby Island, Gippsland Lakes. Includes data from the Victorian Little Tern Task Force on	Rigby Island, Gippsland Lakes	S5 S7 S10

Reference	Description	Summary	Relevant Location/s	Relevant scientific module
		Little tern numbers and breeding success between 1977 and 2002.		
VFA	Commercial Fish Production Information Bulletin	Victorian catch and effort data extends back to 1978/79.	Victorian fisheries	S6
Warry & Hindell (2012)	Fish Assemblages and Seagrass Condition of the Gippsland Lakes	Following a bloom of the blue-green alga in the Gippsland Lakes in 2007 - 2008, there was a widespread decline of seagrass over the same period. The Gippsland Lakes and Catchment Taskforce were concerned at the potential decline in seagrass within the lakes, and undertook an assessment of the condition of seagrass (and associated fish assemblages).	Gippsland Lakes	S8 S10
Warry et al. (2013)	Seagrass and Fish of the Gippsland Lakes	A summary presentation for the Gippsland Lakes Ministerial Advisory Committee	Gippsland Lakes	S10
West et al. (2015)	Survey of Recreational Fishing in New South Wales and the ACT, 2013/14	A state-wide survey in NSW to measure changes that had occurred since the NRIFS.	NSW	S6

Esso Australia Resources Pty Ltd

ENVIRONMENTAL PERFORMANCE AND IMPLEMENTATION STRATEGY

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Endorsed By:	Carolyn Thomas	Offshore RER Supervisor	On file	
Document Owner:	Carolyn Thomas	Offshore RER Supervisor		
Endorsed By:	Alex Bolzan	Wells Engineering Manager	On file	
Approved By:	Kathy Belton	Project Manager	On file	

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Abbreviations

AHS	Australian Hydrographic Service
ALARP	As Low As Reasonably Practicable
AMOSC	Australian Marine Oil Spill Centre
AMSA	Australian Maritime Safety Authority
APPEA	Australian Petroleum Production and Exploration Association
ASAP	As Soon As Possible
ASOG	Activity Specific Operating Guidelines
BWM	Ballast Water Management
CAMO	Critical Activity Mode
CEFAS	Centre for Environment, Fisheries and Aquaculture
CHARM	Chemical Hazard and Risk Management
DAWR	Department of Agriculture and Water Resources
DELWP	Department of Environment, Land, Water and Planning Victoria
DJPR	Department of Jobs, Precincts and Regions
DOEE	Department of the Environment and Energy
DP	Dynamic Positioning
EADS	Employee Assessment and Development Summary
EMS	Environmental Management System
EP	Environment Plan
EP&R	Emergency Preparedness and Response
EPBC	Environment Protection and Biodiversity Conservation
EPOs	Environmental Performance Objectives
EPS	Environmental Performance Standards
ERP	Emergency Response Plan

ESG	Emergency Support Group
ETS	Environmental Tag System
FMEA	Failure Mode and Effects Analysis
ft	feet
HMCS	Harmonised Mandatory Control Scheme
HSE	Health, Safety and Environment
HQ	Hazard Quotient
IACS	International Association of Classification Societies
IC	Integrity Critical
ICS	Incident Command System
IMCA	International Marine Contractors Association
IMS	Invasive Marine Species
IMT	Incident Management Team
IMO	International Maritime Organisation
JRCC	Joint Rescue Coordination Centre
JSA	Job Safety Analysis
JUR	Jack-up Rig
LEFCOL	Lakes Entrance Fishing Cooperative Limited
LOWC	Loss of well control
LSC	Logistics Section Chief
m	metre
MARPOL	International Convention for the Prevention of Pollution from Ships
MDO	Marine Diesel Oil
MOC	Management of Change
MODU	Mobile Offshore Drilling Unit
MoU	Memorandum of Understanding
MS	Management System
t	MetricTon
NAF	Non-Aqueous Fluid
NEBA	Net Environmental Benefit Analysis
NGO	Non-Governmental Organisation
NOPSEMA	National Offshore Petroleum Safety and Environmental Management Authority
NOPTA	National Offshore Petroleum Titles Authority
OCNS	Offshore Chemical Notification Scheme
OI	Operations Integrity
OIM	Offshore Installation Manager
OIMS	Operations Integrity Management System
OPEP	Oil Pollution Emergency Plan
OPGGS Act	Offshore Petroleum and Greenhouse Gas Storage Act 2006
OPGGS(E)R	Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009
OSC	Operations Section Chief
OSMP	Operational and Scientific Monitoring Program
OSR	Oil Spill Response
OSRL	Oil Spill Response Limited
OSRO	Oil Spill Response Organisation
P&A	Plug and Abandonment
PA	Production Annulus

PLONOR	Pose Little Or No Risk
PMS	Planned Maintenance System
PNG	Papua New Guinea
PSC	Planning Section Chief
PSF	Process Safety Framework
PS&O	Platform Surveillance and Operations
PSZ	Petroleum Safety Zone
PTW	Permit To Work
QA	Quality Assurance
RA	Risk Assessment
ROC	Residual Oil on Cuttings
RRT	Regional Response Team
SCAT	Shoreline Clean-up and Assessment Technique
SCB	Source Control Branch
SETVIA	South Eastern Trawl Fishing Industry Association
SFRT	Subsea First Response Toolkit
SSHE	Safety, Security, Health and Environment
SIV	Seafood Industry Victoria
SMS	Short Message Service
SOPEP	Shipboard Oil Pollution Emergency Plan
UK	United Kingdom
US	United States
WA	Western Australia
WWC	Wild Well Control

1 Environmental Performance

1.1 Environmental Performance Outcomes and Standards

This chapter presents the environmental performance outcomes (EPO), environmental performance standards (EPS) and measurement criteria required to manage the identified impacts and risks.

The following definitions are used in this section, as defined in Regulation 4 of the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (OPGGS(E)R):

- EPO – a measurable level of performance required for the management of environmental aspects of an activity to ensure that environmental impacts and risks will be of an acceptable level (i.e. a statement of the environmental objective).
- EPS – a statement of the performance required of a control measure.
- Measurement criteria (not defined in the regulations) – defines the measure by which environmental performance used to determine whether the EPO has been met.

1.2 Environmental Performance – Drilling

Table 1-1 Environmental Performance – Drilling

Aspect	Performance Outcome	Control	Performance Standard	Measurement Criteria
Aspects of Planned Activities				
Physical presence – Seabed Disturbance	Avoid physical damage to sensitive habitats (i.e. benthic features such as reefs).	Site specific geotechnical assessment	Results of the site specific geotechnical assessment are used to inform the JUR location and confirm the proposed location is free from seabed obstacles, including benthic features.	Location Approval Certificate from the JUR's Underwriter's Marine Surveyor, confirming location is free of seabed obstacles including benthic features, obtained prior to JUR moving into the operational area.
			JUR spud can placement as per Location Approval Certificate	JUR positioning report indicates JUR spud can placement as per Location Approval Certificate
Physical Interaction –	Marine users are informed prior to commencement	Petroleum Safety Zone (PSZ)	PSZs established in accordance with OPGGS Act.	Government Gazette contains notice of establishment of PSZs.

Aspect	Performance Outcome	Control	Performance Standard	Measurement Criteria
Other Marine Users	of the drilling campaign such that they are able to plan their activities and avoid unexpected interference.	Pre-start notifications	AMSA JRCC notified before operations commence to enable AMSA to distribute an AUSCOAST warning.	Records confirm that information to distribute an AUSCOAST warning was provided to the JRCC before operations commenced. Issued AUSCOAST warning dated prior to, or on the date operations commenced.
			AHS notified before operations commence to allow generation of navigation warnings (including Notice to Mariners).	Issued Notice to Mariners dated prior to, or on the date operations commenced.
			Relevant stakeholders are notified of activities approximately four weeks and again one week prior to commencement.	Stakeholder consultation records confirm that information was distributed to relevant stakeholders in required timeframes.
Planned Discharge – Sewage and Food Waste	Sewage discharges comply with MARPOL Annex IV requirements.	Class certification	Vessel compliant with MARPOL Annex IV as appropriate to vessel class	Vessels have class certification verified and issued by International Association of Classification Societies (IACS) member.
	Food waste discharges comply with MARPOL Annex V requirements.	Class certification	Vessel compliant with MARPOL Annex V as appropriate to vessel class.	Vessels have class certification verified and issued by IACS member.

Aspect	**Performance Outcome**	**Control**	**Performance Standard**	**Measurement Criteria**
Sound Emissions	Prevent injury or harm to cetaceans from sound emissions during support vessel operations	Vessel Master	Vessel masters will implement interaction management actions consistent with the EPBC Regulations 2000 – Part 8 Division 8.1 • Vessels will not knowingly travel faster than 6 knots within 300m of a whale or 150 m of a dolphin • Vessels will not knowingly get closer than 100m of a whale or 50m of a dolphin • If a cetacean approaches the vessel within the above zones, the vessel will avoid rapid changes in engine speed or direction.	Daily operations reports note when cetaceans were sighted in the caution zone and interaction management actions implemented.

Aspect	Performance Outcome	Control	Performance Standard	Measurement Criteria
	Prevent injury or harm to cetaceans from noise emissions during helicopter activities	Helicopter Pilot	Interaction between helicopters and cetaceans within the operational area will be consistent with EPBC Regulations 2000 – Part 8 Division 8.1: • Helicopters will not fly lower than 1650ft when within 500m horizontal distance of a cetacean except when landing or taking off and will not approach a cetacean from head on.	Flight reports note when cetaceans were sighted in the caution zone and interaction management actions implemented.
Planned Discharge – Treated Bilge Water and Deck Drainage	Deck drainage discharges comply with MARPOL Annex V requirements.	Class certification	Vessel compliant with MARPOL Annex V as appropriate to vessel class.	Vessels have class certification verified and issued by IACS member.
	Bilge discharges from vessels comply with MARPOL Annex I requirements.	Class certification	Vessel compliant with MARPOL Annex I as appropriate to vessel class.	Vessels have class certification verified and issued by IACS member.
Emissions to air	Fuel combustion equipment complies with the requirements of MARPOL Annex VI	Class certification	Vessel compliant with MARPOL Annex VI as appropriate to vessel class.	Vessels have class certification verified and issued by IACS member.
Planned Discharge - Cement	All cements and additives approved according to Esso Chemical Discharge Process	Esso Chemical Discharge Assessment Process	All cement and additives planned for discharge are evaluated as acceptable in accordance with the Chemical Discharge Assessment Process.	Chemical assessment records confirm evaluation of each component making up cement as acceptable prior to use / discharge and appropriate approvals documented.

Aspect	Performance Outcome	Control	Performance Standard	Measurement Criteria
				Daily drilling wellview reports show cement and additives used.
Planned Discharge – Operational (Surface)	All operational discharges approved according to Esso Chemical Discharge Process	Esso Chemical Discharge Assessment Process	All planned chemical discharges are evaluated as acceptable in accordance with the Chemical Discharge Assessment Process.	Chemical assessment records confirm evaluation of chemical discharges as acceptable prior to use/ discharge and appropriate approvals documented.
				Daily drilling wellview reports show components of all planned operational discharges.
Planned Discharge – Drilling Fluids and Cuttings	All drilling fluids planned for discharge approved according to Esso Chemical Discharge Process.	Esso Chemical Discharge Assessment Process	All drilling fluids planned for discharge are evaluated as acceptable in accordance with the Chemical Discharge Assessment Process.	Chemical assessment records confirm evaluation of all drilling fluids as acceptable prior to use / discharge and appropriate approvals documented.
				Daily drilling wellview reports show components of drilling fluids.
		Solids Control Equipment	Solids control equipment (shale shakers and/or dryer) will treat cuttings to a level below 10% residual oil on dry weight basis; averaged over each well section, where NAF is used.	Retort test reports document residual oil on cuttings (ROC) measured. Daily drilling wellview report shows progressive average ROC for the section being drilled. Actual average ROC per section shows required standard achieved.
			Frequency of ROC measurements will be once every twelve hours.	ROC retort test reports confirm frequency of measurements.

Aspect	Performance Outcome	Control	Performance Standard	Measurement Criteria
		Tank cleaning procedure	Retort test result for interface fluids / tank washings must be below 10% oil in water by volume to be acceptable for discharge	Retort test reports document interface fluids / tank washings oil in water content measured. Oil in water content of interface fluids / tank washings is recorded in the daily drilling wellview report, when discharge occurs.
Aspects of Unplanned Events				
Physical Interaction – Marine Fauna	No injury or death of megafauna resulting from vessel strike.	Vessel Master	Vessel Masters will implement interaction management actions consistent with the EPBC Regulations 2000 – Part 8 Division 8.1 • Vessels will not knowingly travel faster than 6 knots within 300m of a whale or 150 m of a dolphin • Vessels will not knowingly get closer than 100m of a whale or 50m of a dolphin • If a cetacean approaches the vessel within the above zones, the vessel will avoid rapid changes in engine speed or direction.	Daily operations reports note when cetaceans were sighted in the caution zone and interaction management actions implemented.

Aspect	Performance Outcome	Control	Performance Standard	Measurement Criteria
Physical Presence - Introduction of IMS	No introduction and establishment of IMS	Ballast Water Management Plan (BWMP) and Certificate (BWMC)	Ballast Water Management Plan approved in accordance with IMO Ballast Water Management Convention - Guidelines for Ballast Water Management and Development of Ballast Water Management Plans Ballast Water Management Certificate approved in accordance with Regulation E-1 of the Ballast Water Convention	Approved BWMP and BWMC
		Ballast Water Record System	A Ballast Water Record System will be maintained in accordance with Regulation B-2 of the Annex to the IMO Ballast Water Management Convention including • start and finish coordinates • actual pumping times • residual volume remaining in the tank at the end the empty cycle prior to refill (empty refill method only)	Ballast Water Records

Aspect	Performance Outcome	Control	Performance Standard	Measurement Criteria
		Vessel Master	Vessel Master to obtain DAWR clearance to enter Australian territory through pre-arrival information reported through Maritime Arrivals Reporting System (MARS).	Records confirm DAWR clearance obtained if vessel is arriving in Australian territory from a foreign port or is under biosecurity control.
			Vessel Master to adhere to ABWM requirements for ballast water exchange.	Ballast water records show location of ballast water uptake and discharge.
		Anti-fouling Coating (AFC)	Support vessels have effective and integral AFC.	Documents provided by Vessel Operator demonstrate that AFC is effective and integral. These documents could include: • antifouling record book; • paint specification report; • UWILD reports; or • hull maintenance / cleaning records. Note: If AFC does not meet the EPS advice will be sought from an IMS Expert and mitigation measures implemented as recommended.
		Anti-fouling Certificate	Vessels with AFC have an Anti-fouling Certificate which certifies that it complies with the requirements of Annex 1 to the International Convention of the Control of Anti-fouling Systems on Ships.	Vessels with AFC have a valid Anti-fouling Certificate.

Aspect	Performance Outcome	Control	Performance Standard	Measurement Criteria
		Biofouling records	Biofouling records maintained in accordance with IMO Guidelines for the Control and Management of Ships' Biofouling to Minimise the Transfer of Invasive Aquatic Species.	Biofouling records collected in order to conduct biofouling risk assessment confirm these are maintained.
		IMS Risk Assessment Procedure (IMS-RAP)	Biofouling risk assessment conducted in accordance with IMS RAP shows low risk.	Biofouling risk assessment record confirms vessel poses low risk of introducing IMS
		Immersible Retrievable - Equipment Cleaning	All immersible retrievable - equipment has been cleaned and / or inspected in accordance with National Biofouling Management Guidance for the Petroleum Production and Exploration Industry prior to commencement of the activity.	Records document cleaning and / or inspection of immersible retrievable - equipment.
Accidental Release – Dropped Objects	No dropped objects which result in disturbance of benthic habitat.	Crane handling and transfer procedures	The crane handling and transfer procedure is in place and implemented by crane operators (and others, such as dogmen).	Completed handling and transfer procedure checklist, PTWs and/or risk assessments verify that the procedure is implemented prior to each transfer.
		Planned Maintenance System (PMS)	Visual inspection of lifting gear is undertaken every quarter by a qualified competent person (e.g. maritime officer) and lifting gear is tested regularly in line with the PMS.	Inspection of PMS records and Lifting Register verifies that inspections and testing have been conducted to schedule.

Aspect	Performance Outcome	Control	Performance Standard	Measurement Criteria
		Cargo Securing Manual	All cargo securely fastened to or stored during transport in accordance with approved Cargo Securing Manual to prevent loss to sea.	A completed pre-departure inspection checklist verifies that cargo is securely sea-fastened.
Accidental Release – Waste	No unplanned overboard release of waste	Class certification	Vessel compliant with MARPOL Annex V as appropriate to vessel class.	Vessels have class certification verified and issued by IACS member.
Accidental Release – LOC Hazardous Substances	No unplanned release of hazardous substances to the marine environment	Bunkering / NAF and chemical transfer procedures	Bulk fluid transfer procedures are in place before commencing operations. The process will include: • communication protocols (including testing prior to commencement). • continuous visual monitoring. • tank volume monitoring. • hose and dry break coupling inspection, prior to each use.	Records (PTW, JSA or equivalent) demonstrate implementation of bulk fluid transfer process.
		Design and certification of hoses	Transfer hoses shall comprise sufficient floating devices and self-sealing weak-link couplings in the mid-section of the hose string, where required, and suitable pressure rating.	Hose certificate confirms suitable fittings and rating.
		Planned Maintenance System (PMS)	The transfer hoses are inspected and replaced in accordance with the PMS or when they are visibly degraded.	The hose register and PMS indicate regular inspection and replacement of fuel/chemical/mud hoses

Aspect	Performance Outcome	Control	Performance Standard	Measurement Criteria
		Bunding	Bulk liquid transfer points and equipment located on deck utilising hydraulic fluids (e.g. cranes, winches or other hydraulic equipment) will have primary bunding or sheathing.	Inspection records demonstrate that bulk transfer points and equipment located on deck utilising hydraulic fluids have primary bunding or sheathing.
		Class certification	Vessel compliant with MARPOL Annex I, as appropriate to class.	Vessels have class certification verified and issued by IACS member.
Accidental Release – LOC Refined Oils (Support Vessel Collision)	No unplanned release of MDO to the marine environment from support vessel collision	Support vessel approach procedure	OIM to coordinate with support vessels to avoid a collision	Radio operations communications log verifies coordination with approaching vessels have been issued when necessary
		ASOG / CAMO procedures	Activity Specific Operating guidelines (ASOG) / Critical Activity Mode (CAMO) procedures developed to IMCA Standard.	Agreed-for-Implementation (AFI) version of procedures signed by Vessel Master and available.
		Support vessel DP system	All support vessels have Class 2 or better DP systems.	Vessel has IACS member DP Notation, Failure Mode and Effects Analysis (FMEA) and proving trials.
			Watchkeepers in charge of watch hold DP certification.	Watchkeepers' DP certificates available.
		Pre-start notifications	AMSA JRCC notified before operatins commence to enable AMSA to distribute an AUSCOAST warning.	Records confirm that information to distribute an AUSCOAST warning was provided to the JRCC before operations commenced. Issued AUSCOAST warning dated prior to, or on the date operations commenced.

Aspect	Performance Outcome	Control	Performance Standard	Measurement Criteria
			AHS notified before operations commence to allow generation of navigation warnings (including Notice to Mariners).	Issued Notice to Mariners dated prior to, or on the date operations commenced.
			Relevant stakeholders are notified of activities approximately four weeks and again one week prior to commencement.	Stakeholder consultation records confirm that information was distributed to relevant stakeholders in required timeframes.
	Minimise the impact on the environment of an MDO spill.	Shipboard Marine Pollution Emergency Plan (SMPEP), or equivalent as appropriate to class.	Vessel compliant with MARPOL Annex I, as appropriate to class.	Vessels have class certification verified and issued by IACS member.
Accidental Release – Reservoir Hydrocarbons (Loss of Well Control (LOWC))	Maintain well control such that reservoir hydrocarbons are not released to the marine environment	NOPSEMA accepted WOMP	A NOPSEMA-accepted WOMP will be in place before drilling activities start	Records confirm a NOPSEMA-accepted WOMP was in place before operations commenced
		NOPSEMA accepted rig safety case	A NOPSEMA-accepted safety case for the rig will be in place before drilling activities start	Records confirm a NOPSEMA-accepted safety case for the rig was in place before operations commenced
	Minimise the impact on the environment from a LOWC	OPEP	Emergency response activities will be implemented in accordance with the OPEP	Records confirm that emergency response activities have been implemented in accordance with the OPEP
		OSMP	Operational and scientific monitoring will be implemented in accordance with the OSMP	Records confirm that operational and scientific monitoring have been implemented in accordance with the OSMP.

1.3 Environmental Performance – Emergency Response Capability

Table 1-2 Environmental Performance – Emergency Response Capability

Performance Outcome	Control	Performance Standard	Measurement Criteria
Esso Incident Management Team is available to respond as required	Esso Incident Management Team (IMT)	Trained personnel are available to fulfil Incident Commander, Operations Section Chief, Planning Section Chief, Logistics Section Chief, Safety Officer and Environmental Unit Lead roles with 1 hour of IMT activation.	Record of capability testing. Training records.
Source Control equipment is available when required to prevent further uncontrolled release of hydrocarbons into the marine environment.	Agreements in place with ROV specialist	Current global agreements state that a ROV appropriate to the task will be available when requested.	Current global agreement document.
	Support vessel identification process	Suitable support vessels and their location during the activity will be identified prior to rig activities.	Completed register in the Tier 2/3 Emergency Resonse Plan (ERP).
	Agreements with AMOSC for Subsea First Response Toolkit (SFRT)	Current agreements with AMOSC state SFRT will be available when requested.	Annual review of agreement document.
	Agreements with Capping Stack suppliers	Current agreement states capping stack will be available when requested.	Agreement document reviewed prior to rig activities.
	MoU with APPEA	Current APPEA MoU states that signatories will make best endeavours to make drilling units available for transfer between operators when requested for emergency response.	MoU document.
Equipment and third party services are available to complete oil spill surveillance and monitoring when required.	Esso helicopter fleet	An Esso helicopter is available to complete surveillance and monitoring in <4 hours of request, subject to safe flying conditions.	Record of capability testing.
	Arrangements with third party for provision of fixed wing aircraft	Third party fixed wing aircraft will be available <24 hours from request of service.	Record of capability testing.
	Support vessel	Support vessel is available to complete surveillance and monitoring when <24hours from request of service.	Record of capability testing.

Performance Outcome	Control	Performance Standard	Measurement Criteria
	Agreement with third party suppliers for provision of additional vessels.	Current agreement states additional vessels will be available when requested.	Agreement document.
	Agreement with AMOSC for trajectory modelling	Trajectory modelling is available in accordance with the AMOSC service level statement.	Record of capability testing.
	Esso owned tracking buoys	An Esso tracking buoy is available to complete surveillance and monitoring.	Record of functionality testing.
	ExxonMobil contract with satellite imagery provider.	Current agreement with satellite imagery provides 24/7 emergency response support.	Agreement document.
	Esso initial response sampling kits	Esso initial response sampling kit with required equipment is available when required.	Record of capability testing.
	Agreement with service provider for monitoring and sampling	Monitoring and sampling service provider has capability to implement OSMP.	Annual capability review.
Dispersant and equipment for applying dispersant is available when required.	Esso owned dispersant stocks	Sufficient stock of dispersant with greater than 50% effectiveness is available for the first 48 hours of a response ($65m^3$).	Annual dispersant testing report.
	Agreement with AMOSC for dispersant capabilities	Response capabilities maintained per service level statement including access to mutual aid and the National Plan (which provides dispersant stockpiles).	Annual assurance assessment report.
	Agreement with OSRL for dispersant capabilities	Response capabilities maintained per service level statement.	Annual assurance assessment report.
	SFRT agreement with AMOSC	Current agreement states SFRT and subsea dispersant stockpile available.	Agreement document.
	Contract with third party provider to install/operate SFRT.	Current agreement for provision of personnel to install and operate SFRT equipment.	Agreement document.

Performance Outcome	Control	Performance Standard	Measurement Criteria
	Agreement with third party suppliers for provision of additional vessels.	Current agreement states additional vessels will be available when requested.	Agreement document.
	Esso owned dispersant application equipment	Equipment is maintained in response ready condition.	Annual equipment inspection report.
Containment and recovery equipment is available when required	Support vessel	Support vessel is available to complete surveillance and monitoring when <24hours from request of service.	Record of capability testing.
	Agreements with third party suppliers to provide additional vessels.	Agreements state supply vessels are available	Agreement document. Record of capability testing.
	Esso owned containment and recovery equipment	Equipment is maintained in response ready condition	Annual equipment inspection report.
	Annual assurance assessment of AMOSC capabilities	Response capabilities maintained per AMOSC Service Level Statement.	Annual assurance assessment report.
	Personnel trained for containment and recovery activities	Personnel trained in OSR equipment operation available <24 hour of request of service.	Record of capability testing.
	Agreement with waste management contractor	Current contract in place for onshore waste management.	Agreement document.
Equipment and personnel available to support shoreline protection and clean-up when requested	Annual review of agreement with third party suppliers for provision of vessels.	Current agreement states vessels are available	Record of capability testing.
	Esso owned shoreline response equipment	Equipment is maintained in response ready condition.	Annual equipment inspection report.
	Agreement in place with AMOSC	Response capabilities maintained per AMOSC Service Level Statement.	Annual assurance assessment report.

Performance Outcome	Control	Performance Standard	Measurement Criteria
	Personnel hiring agreements	Current agreements in place with labour hiring companies.	Agreement documents.
	Agreement with waste management contractor	Current contract in place for onshore waste management.	Agreement Contract.
Equipment and personnel to support oiled wildlife response are available when requested	Agreement in place with AMOSC	Response capabilities maintained per AMOSC Service Level Statement.	Annual assurance assessment report.
	Agreement in place with OSRL	Response capabilities maintained per OSRL Service Level Statement.	Current Service Level Agreement with oiled wildlife response specialists. Annual assurance assessment report.
	ExxonMobil Regional Response Team (RRT)	ExxonMobil RRT personnel are available for incident support within 48 hours.	Record of capability testing.
	Agreement with waste management contractor	Current contract in place for onshore waste management.	Contract agreement.

2 Implementation Strategy

The OPGGS(E)R 14(1) requires that an implementation strategy must be included in an Environment Plan (EP). The implementation strategy identifies systems, practices and procedures to be used to ensure that the environmental impacts and risks of the activity are reduced to As Low As Reasonably Practicable (ALARP) and an acceptable levels, and that the environmental performance outcomes and standards in the EP are met.

2.1 Reporting

This section details the external (routine) notifications and reporting requirements to statutory authorities, together with the (non-routine) incident notifications and reporting requirements.

Relevant regulatory references are provided in Table 2-1.

2.1.1 Routine Notification and Reporting

Table 2-1 NOPSEMA routine notification and reporting requirements

Requirement	Timing	Contact	OPGGS(E) Regulations
Submit an annual or campaign specific EP environmental performance report to NOPSEMA. This reports compliance against each of the	The report will be submitted to NOPSEMA within 3 months of the completion of the drilling campaign.	NOPSEMA – submissions@nopsema.gov.au	26C 14 (2)(a) and (b)

EPOs and EPSs as outlined in Chapter 12 of this EP and provides the results of monitoring as outlined in Table 2-8.	Should the duration of the drilling campaign exceed one year, interim environmental performance reports will be submitted to NOPSEMA within three months of each anniversary of the commencement of the campaign to ensure that the interval between reports will not exceed one year		
Notify NOPSEMA of the commencement date	At least 10 days prior to activity	NOPSEMA – submissions@nopsema.gov.au	29
Notify NOPSEMA of the completion date	Within 10 days of activity completion	NOPSEMA – submissions@nopsema.gov.au	29
Notification of EP completion	At activity finalisation and obligaton completion	NOPSEMA – submissions@nopsema.gov.au	25A

2.1.2 Incident Notification and Reporting

The OPGGS(E)R define "*recordable incidents*" and "*reportable incidents*", and also describe reporting requirements for each type of incident.

The requirements for reporting environmental incidents to external agencies are listed in Table 2-2. These will be reported to the regulator by the Esso Wells Operations Superintendent (or Esso SSHE Group delegate).

Table 2-2 External incident notification and reporting requirements

Requirement	Timing	Contact
Recordable Incidents		
Recordable incident, for an activity, means a breach of an EPO or EPS, in the environment plan that applies to the activity, that is not a reportable incident. As a minimum, the written monthly recordable incident report must include a description of: • All recordable incidents which occurred during the calendar month; • All material facts and circumstances concerning	As soon as possible but before the 15th day of the following calendar month.	NOPSEMA – submissions@nopsema.gov.au

the incidents that the titleholder knows or is able, by reasonable search or enquiry, to find out. • Any action taken to avoid or mitigate any adverse environmental impacts of the recordable incidents; and • The action that has been taken, or is proposed to be taken, to prevent a similar incident occurring in the future Monthly reports will utilise the NOPSEMA Incident Monthly Summary Report template. If there are no recordable incidents a 'nil' report will be submitted.		
Reportable Incidents		
Reportable incidents are those that have caused, or have the potential to cause, moderate to significant environmental damage. This includes, but is not limited to, those identified through the risk assessment process as having a consequence ranking of I or II, or at a minimum the following incidents: • Unplanned release of hydrocarbon liquid or chemicals exceeding 80 litres into the marine environment caused by, or suspected to have been caused by, petroleum activities. • Unplanned injury or death of a cetacean or listed threatened / migratory / marine species caused by, or suspected to have been caused by, petroleum activities. The notification must contain: • All material facts and circumstances concerning the reportable incident that the titleholder knows or is able, by reasonable search or enquiry, to find out; • Any action taken to avoid or mitigate the adverse environmental impact of the reportable incident; and • The corrective action that has been taken or is proposed to be taken to	• **Verbally ASAP but within 2 hours of incident,** or, if the reportable incident was not detected by the Titleholder at the time of the first occurrence – the time the titleholder becomes aware of the reportable incident, then • **Written notification as soon as practicable** (copy to NOPTA and DJPR) • **Written report as soon as practicable but within 3 days** including specifying if a further written report will be provided (then copy to NOPTA and DJPR within 7 days) • **If formal investigation is triggered, a further written report within 30 days**	NOPSEMA - 08 6461 7090 DJPR - marine.pollution@ecodev.vic.gov.au (0409 858 715) NOPTA – reporting@nopta.gov.au

stop, control or remedy the reportable incident.		
Other Reporting Requirements		
Mandatory MARPOL report about a pollution incident involving: • a discharge (or probable discharge) of oil or noxious liquid substances in excess of permitted MARPOL discharge levels, quantities or rates, for whatever reason, including those for the purpose of securing the safety of the ship or for saving life at sea • a discharge (or probable discharge) of harmful substances in packaged form, including those in freight containers, portable tanks, road and rail vehicles and shipborne barges Report to include: • name of ship/s involved • time, type and location of incident • quantity and type of harmful substance • assistance and salvage measures • any other relevant information	**Vessel Master to notify AMSA verbally without delay. If AMSA asks for a written MARPOL report this must be provided within 24 hours after AMSA asks for the report.**	AMSA - +61 02 6230 6811 or 1800 641 792 rccaus@amsa.gov.au
Suspected or known IMS introduction	Immediately	Report a pest (as per marinepests.gov.au website): DELWP – 136 186
Oiled wildlife	Immediately	DJPR – 1300 134 444
Wildlife emergency	Immediately	DELWP – 136 186 DELWP Whale & 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.
Notification of activities affecting listed species or ecological communities in or on a Commonwealth area (specifically unintentional injury or death of a cetacean or listed threatened / migratory / marine species caused by, or suspected to have been caused by petroleum activity)	Within 7 days	DoEE – 1800 803 772 EPBC.Permits@environment.gov.au

Cetacean vessel strike	Within 3 days	DoEE – https://data.marinemammals.gov.au/report/shipstrike

2.2 Environmental Management System

2.2.1 Operations Integrity Management System (OIMS)

Esso is committed to conducting business in a manner that is compatible with the environmental and economic needs of the communities in which it operates, and that protects the safety, security, and health of its employees, those involved with its operations, its customers, and the public. These commitments are documented in the Safety, Security, Health, Environmental and Product Safety policies.

These policies are put into practice through a management system called the OIMS. ExxonMobil's OIMS Framework establishes common worldwide expectations for addressing risks inherent in the business (Figure 8-1). The term Operations Integrity (OI) is used by ExxonMobil to address all aspects of its business that can impact personnel and process safety, security, health and environmental performance.

The OIMS Management Systems were designed to ensure compliance with the International Standard for Environmental Management System (ISO 14001). Implementing these Systems achieves conformance with ISO 14001. All OIMS Management Systems contribute to the effective management of the environmental impacts and risks identified in this EP. Below is a description of the OIMS Management Systems that have been referenced specifically in the Implementation Strategy

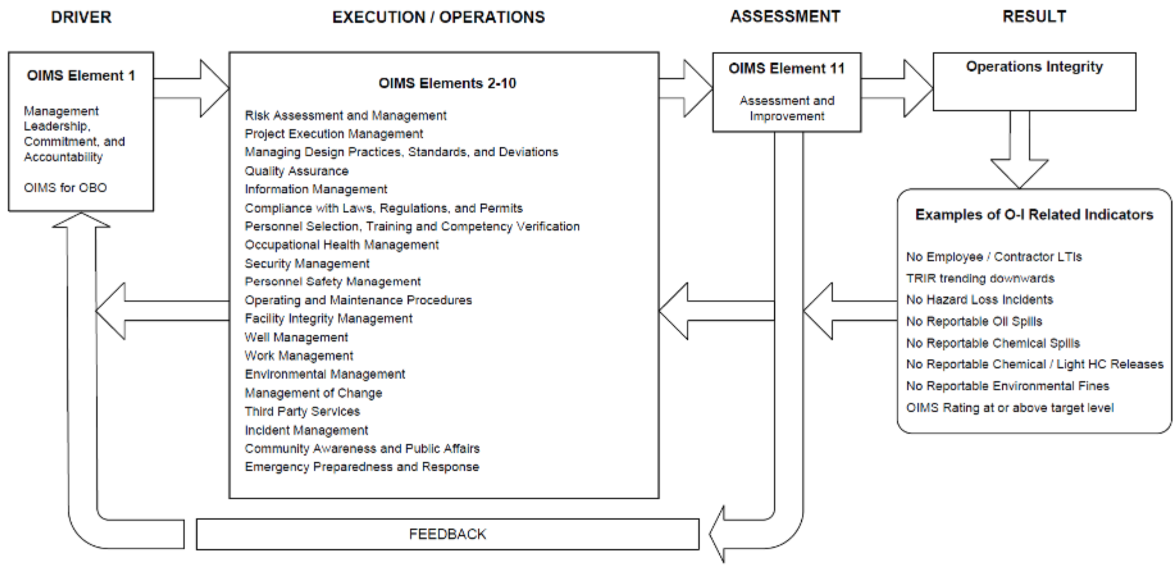


Figure 2-1 OIMS Management Systems

OIMS System 1-1 Management Leadership, Commitment and Accountability

The purpose of System 1-1 is to provide a mechanism for management to:

- Guide Management System implementation, execution and improvement of OIMS.
- Demonstrate visible commitment to OIMS.

The System objectives are:

- Management Systems for OI are established, and managers and supervisors demonstrate commitment and personal accountability to them through active and visible participation.
- Ensure processes are in place for sharing lessons learned.
- OIMS roles and responsibilities are established, accepted and exercised.

- Programs are in place to ensure active participation from the workforce relevant to OI.
- Interfaces between organisations are defined.
- Achievement of established targets and ongoing improvement with respect to OI performance is evaluated and stewarded.

OIMS System 4-1 Information Management

The purpose of OIMS System 4-1 is to ensure that actions taken and decisions made that impact OI are based on correct information. In the context of this System integrity critical (IC) information is the general term used to refer to both IC documentation and pertinent records.
The System objectives are:

- To ensure that IC documents and drawings are identified, accessible, accurate and appropriately safeguarded.
- To ensure that pertinent records are defined and appropriately maintained.

OIMS System 5-1 Personnel Selection, Training and Competency Verification

The purpose of OIMS System 5-1 is to ensure that personnel are trained in the knowledge and skills necessary to meet the requirements of their specific positions and roles.
The System objectives are:

- Personnel are trained to perform their assigned tasks, and the training includes OI risks and regulatory requirements.
- Key Positions are identified with competency requirements specified and documented.
- Personnel placements meet criteria defined in the System. Personnel resources are available and qualified to meet the manning criteria as needed by the Function.
- Training and competencies for Key Positions are reviewed and assessed periodically.

OIMS System 6-2 Facility Integrity Management

The purpose of OIMS System 6-2 is to ensure that the OI of all Esso-owned or controlled critical equipment is maintained over the operating life of the equipment preventing or mitigating a significant event that could result in significant safety, security, health and environment (SSHE) consequences.
The System objectives are:

- A systematic, risk-based approach is used to identify critical equipment and develop equipment strategies.
- Integrity programs for the operational integrity of critical equipment are developed, approved, and executed at all locations.
- Critical equipment undergoes programmatic condition monitoring, preventive maintenance, inspection, and/or testing, or other measures are in place to minimize the impact of failure.

OIMS System 6-3 Well Management

The purpose of OIMS System 6-3 is to provide the structure for wellwork planning and operations as well as ongoing well integrity activities. This System addresses the OI aspects of well work and well integrity activities.
The System objectives are:

- Wellwork programs are documented, understood, and effectively executed.
- Well integrity activities are in place to effectively address OI for all well types and well status.

OIMS System 6-4 Work Management

The purpose of OIMS System 6-4 is to ensure that the work activities at Esso-owned, managed or controlled sites are undertaken in a structured and controlled manner to reduce the risk of incidents. This System provides a structure for managing the risks associated with the work to be performed and confirming that interfaces with the work activities are appropriately considered.
The System objectives are:

- Work permits are executed to protect personnel, equipment, and the environment from mechanical and operational risks.

- Controls are in place for the temporary disarming, deactivation, or unavailability of integrity critical equipment.
- Work interfaces are evaluated and procedures are in place to manage identified risks, including hand-over and simultaneous operations.

OIMS System 6-5 Environmental Management

The purpose of OIMS System 6-5 is to establish the requirements for environmental management, including socioeconomic and community health aspects. It provides a framework for environmental objectives to be included in business planning processes, and thereby, enables Esso to conduct its business in a manner that is compatible with the balanced environmental and economic needs of the communities in which it operates.
The System objectives are:

- Environmental aspects are identified and assessed as part of Environmental Management Plans; significant aspects are addressed and controlled consistent with policy and regulatory requirements.
- Environmental management is fully integrated into Esso's business planning and stewardship process. Environmental performance, including emissions, discharges and waste, is tracked and stewarded to meet performance goals.
- Facilities (including wells and pipelines) are designed, constructed, operated, and assessed taking into account consideration end of life aspects.
- Facilities are assessed to determine the extent of contamination prior to long term shut down or abandonment of facilities, and appropriate remedial action is planned and implemented.

Processes within this System include:

Chemical Discharge Assessment Process

In the absence of Australian standards regarding the suitability of drilling mud chemical additives, the Offshore Chemical Notification Scheme (OCNS) is generally used as a basis for selecting environmentally-acceptable chemicals in the Australian offshore petroleum industry. The OCNS manages chemical use and discharge by the UK and Netherlands offshore petroleum industries. The scheme is regulated in the UK by the Department of Energy and Climate Change using scientific and environmental advice from the UK's Centre for Environment, Fisheries and Aquaculture Science (CEFAS) and Marine Scotland.

The OCNS uses the Harmonised Mandatory Control Scheme (HMCS) developed through the OSPAR Convention 1992. This ranks chemical products according to Hazard Quotient (HQ), calculated using the Chemical Hazard and Risk Management (CHARM) model. The CHARM model requires the biodegradation, bioaccumulation and toxicity data of the product to be provided.

Under the OSPAR Convention, organic-based compounds used in production, completion and workovers, drilling and cementing are subject to the CHARM model. The CHARM model calculates the ratio of the 'Predicted Effect Concentration' against the 'No Effect Concentration' expressed as a HQ, which is then used to rank the product. The HQ is converted to a colour banding to denote its environmental hazard, which is then published on the Definitive Ranked Lists of Approved Products (by the OCNS on its website, https://www.cefas.co.uk/cefas-data-hub/offshore-chemical-notification-scheme/). Gold has the lowest hazard, followed by silver, white, blue, orange and purple (having the highest hazard).

Products not amenable to assessment under the CHARM model (i.e. inorganic substances, synthetic based muds, hydraulic fluids or chemicals used only in pipelines) are assigned an OCNS grouping A – E, with 'A' having the greatest potential environmental hazard and 'E' having the least. Products that only contain substances termed PLONORs (Pose Little or No Risk to the environment) are given the OCNS 'E' grouping. Data used for the assessment includes toxicity, biodegradation and bioaccumulation.

In accordance with the Esso Chemical Discharge Assessment Process only chemicals highly ranked under the OCNS rating system (i.e. 'Gold' or 'Silver' [CHARM] and 'E' or 'D' [non-CHARM], or equivalent) will be approved for discharge without further assessment. Where a chemical has not been ranked under OCNS, a 'pseudo rating' using toxicity and environmental data for the individual substances of a product will be conducted. The rating is conducted following the hazard assessment process outlined by CEFAS for the OCNS scheme https://www.cefas.co.uk/cefas-data-hub/offshore-chemical-notification-scheme/hazard-assessment-process/.

Chemicals that are hazardous to the marine environment are subject to substitution warnings under the HMCS. The UK follows and applies the OSPAR harmonised pre-screening scheme and complies with the REACH recommendation to replace chemical substances identified as candidates for substitution. These substances are flagged with a substitution warning on the product template and CEFAS encourages operators to select products without a substitution warning.

Esso will review all chemicals planned for discharge against the Definitive Ranked Lists of Approved Products (current at the time). Where there is a technical justification for a chemical that doesn't meet the requirements regarding its hazard ranking or has a substitution warning in place, Esso will review and assess the chemical proposed to ensure environmental risks are reduced to ALARP and acceptable levels.

IMS Risk Assessment Process

Esso's IMS Risk Assessment Process was developed to complement Australian IMS prevention efforts in the context of Esso's operations offshore in Bass Strait. The assessment is undertaken prior to the mobilisation of a vessel (inclusive of MODUs) to an Esso Operational Area (as defined under the EP for the activity). The IMS Risk Assessment incorporates key considerations from other established risk assessment processes (e.g. WA Vessel Check and DAWR 2009).

OIMS System 7-1 Management of Change

The objective of the Esso MOC process is to manage permanent or temporary changes that arise during the duration of activities under this EP and ensure that additional impacts and risks are not introduced by changes that could increase the risk of harm to people, assets or the environment. The System objectives are:

- Permanent, temporary, and emergency changes are managed effectively.
- Change is evaluated against an established set of criteria and necessary endorsement / approval levels are established.
- Temporary changes do not exceed initial authorisation for scope or time without review and approval.

Changes to equipment and procedures are continually required in order to improve efficiencies, safety and environmental performance and to address safety and operational problems. The purpose of the MOC system is to ensure changes are evaluated, approved and documented, prior to implementation. This is to make sure that all safety and environmental issues are identified and addressed.

Environmentally relevant changes which could trigger the MOC process include:

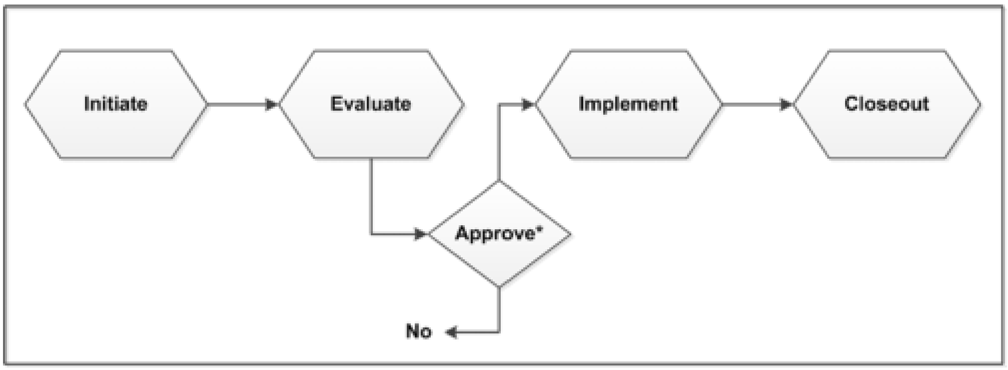
- New activities, assets, equipment, processes or procedures proposed to be undertaken or implemented that have the potential to impact on the environment and have not been:
    - Assessed for environmental impact previously, in accordance with the relevant standard, or
    - Authorised in the existing management plans, procedures, work instructions or maintenance plans.
- Proposed changes to activities, assets, equipment, processes or procedures that have the potential to impact on the environment or interface with an environmental receptor;
- Changes to the existing environment including (but not limited to) fisheries, tourism and other commercial and recreational uses, and any changes to protected areas, plans or requirements for protected species;
- Changes to the requirements of an existing external approval (e.g. changes to conditions of environmental licences);

- New information or changes in information from research, stakeholders, legal and other requirements, and any other sources used to inform the EP; and
- Changes or updates identified from audits, inspections and assessments, incident investigations, emergency response activities or emergency response exercises.

The Esso MOC Manual documents the applicability of the MOC process and describes the change management process (Figure 2-2). Following initiation, a MOC checklist is completed which identifies impacts of the change and the reviews which are required.

A 'SHE risk screen' assessment is undertaken for all MOC to evaluate the effect of the change on the associated environmental impacts or risks and the adopted control measures. Additional controls identified as part of the MOC must be effective in reducing the environmental impact or risk to a level which is ALARP and acceptable; and meet the nominated EPOs and EPSs set out in the accepted EP for the activity. If the change is approved, we will then plan and execute the change.

Esso also has a comprehensive process to identify amended and new regulation which is described in Section 2.9).



*Note: Changes are approved before they are implemented; other reviews/endorsements/approvals/ may occur between other process steps.

Figure 2-2 Management of Change (MOC) System Cycle

In the event that a proposed change, including new stages or significant modifications, identified through the MOC process trigger the requirement for a revision under OPGGS(E)R 17, this EP will be revised for re-submission to NOPSEMA. Note all changes to the accepted EP will be traceable via 'track-changes' within the revised document and any changes will be fully justified.

In accordance with OPGGS(E)R 17, a revision of this EP will be submitted to NOPSEMA before, or as soon as practicable after, where:

- any significant new environmental impact or risk, or significant increase in an existing environmental impact or risk, has been identified, not provided for in the in-force EP;
- the occurrence of a series of new environmental impacts or risks, or a series of increases in existing environmental impacts or risks, which, taken together, amount to the occurrence of:
  - a significant new environmental impact or risk; or
  - a significant increase in an existing environmental impact or risk.

The risk assessment undertaken as part of the MOC process determines whether an environmental impact or risk is considered 'significant' (i.e. has resulted in an increased impact consequence level or risk category) based on information available at that time (e.g. reviewed scientific information, stakeholder claims or concerns).

OIMS System 8-1 Third Party Services

The purpose of OIMS System 8-1 is to provide a systematic approach for the selection of stewardable contractors and subsequent management of interfaces between Esso and contractors and between contractors to lead to work being performed in a safe, secure, and environmentally sound manner. This

System covers requirements for evaluating and selecting contractors, communication and verification of OI requirements, interface management, and performance monitoring and stewardship.
The System objectives are:

- Contractors are qualified, evaluated, and selected based on their ability to perform work in a safe, secure, and environmentally sound manner at the best total value.
- OI requirements are clearly defined and communicated to the third party contractors.
- Effective interface plans are developed, and interfaces are managed between the business line and contractors.
- Contractor performance is monitored, feedback provided, and deficiencies corrected.

The Third Party Services Management Manual defines the evaluation and verification of a contractor's capability and willingness to meet Esso's SSHE expectations through either document review or site assessment (or both). The Esso SSHE Group participates in the pre-qualification screening and bid evaluation process including contractor site assessments, as required.

OIMS System 9-1 Incident Management

The purpose of System 9-1 is to provide the requirements for proper management of SSHE incidents including initial response and notifications, investigation and analysis, documentation, communication of lessons learned, corrective actions management and the analysis of trends. In the context of this System, incidents (including near misses) are related to:

- Personnel Safety
- Process Safety
- Security
- Occupational Health
- Regulatory Compliance
- Equipment Reliability (with SSHE consequences)

The System applies to incidents that:

- Occur on operated or controlled premises
- Occur to employees or contractors
- Result in damage to property or the property of others
- Are determined to have potential legal implications and/or result in impact to the community or third parties

The System objectives are:

- Incidents with SSHE consequences are reported, investigated, analysed to identify the root cause(s), linked to relevant OIMS Systems, and documented within official corporate databases.
- Corrective actions are identified and implemented to prevent recurrence.
- Lessons learned are communicated within and outside of the organisation, as appropriate.

OIMS System 10-1 Community Awareness and Public Affairs

The purpose of OIMS System 10-1 is to establish and maintain community confidence and trust in Esso activities through consultative and collaborative interactions and relationships that establish Esso as a responsible corporate citizen and good neighbour. This System addresses all forms of communication and interaction with employees, contractors, government and law enforcement officials, non-governmental organisations (NGOs), the media and local communities where Esso's offices and operations could have an impact on the communities.
The System objectives are:

- Recognise and respond to community concerns and impacts so as to establish and maintain public trust and confidence in the OI of Esso operations and facilities.
- Anticipate community concerns and develop response plans, as appropriate.

OIMS System 10-2 Emergency Preparedness and Response

The purpose of OIMS System 10-2 is to ensure that Esso establishes effective response to emergencies and business disruptions that threaten the safety, security and health of the public, contractors and employees, the environment, asset integrity, and critical business operations. This System addresses all sites for which Esso has responsibility and includes emergencies, disruptions to critical business operations, and security threats that could occur throughout the business line's sphere of influence (e.g., processing, drilling, transportation, office).
The System objectives are as follows:

- Emergency response plan(s) and business continuity plan(s) are documented, resourced with qualified personnel, accessible, current, and clearly communicated.
- Required training, exercises, simulations, and/or drills are conducted to determine the adequacy of the emergency response and business continuity plans.

2.2.2 Noble Environmental Management System

The Tom Prosser operations will be conducted in accordance with the Noble integrated management system, known as P2R. Noble is committed to maintaining sound health, safety and environmental (HSE) performance by controlling the impacts of its operations on employees, contractors, clients, communities and the environment. As such, Noble's executive management and Board of Directors has developed a Process Safety Framework (PSF).

There are 14 areas of management focus within the PSF. The PSF is embedded along with HSE, Major Accident Prevention Policy and Quality Assurance Policies within the wider corporate integrated management system, P2R, framework as depicted in Figure 2-3.

Noble has implemented the requirements of ISO14001 throughout all its operations and the elements of the Environmental Management System (EMS) are embedded within, and fully covered by, the integrated HSE Management Ystem (MS).

Figure 2-3 Process Safety Framework

In addition to those policies and procedures described above, there will also be operations/location specific working practices which will be incorporated into the operation of the JUR facility by project specific HSE MS bridging documents, developed where required.

2.3 Roles and Responsibilities

As required by OPGGS(E)R 14(4), this section sets out the the roles and responsibilities of personnel in relation to the implementation, management and review of this EP.

The organisation structure for the activities described in this EP is illustrated in Figure 2-4. The key roles with environmental responsibilities relevant to JUR Campaign are described in Table 2-3. This is aligned with OIMS System 5-1 Personnel Selection, Training and Competency Verification. Each Key Position within the Esso organisation which could have a significant impact on OI has a clearly defined and documented position description outlining their role, responsibilities, accountabilities and authorities.

The key roles relevant to the JUR campaign activities are:

- Wells OperationsSuperintendent (Esso)
- Wells Engineering Manager (Esso)
- Wells Operations Supervisor (Esso)
- Offshore Installation Manager (Noble)
- JUR Drilling Operations Supervisor (Noble)
- Offshore Risk, Environment & Regulatory Supervisor (Esso)
- Environment & Regulatory Advisor (Esso)
- JUR Maintenance Supervisor (Noble)
- JUR Safety Supervisor (Noble)

The key roles relevant to support operations are:

- Vessel Masters (Vessel Contractors)
- Helicopter Pilots (Esso)

2.3.1 OIMS Management Committee

The OIMS Management Committee (OIMS MC), has overall accountability for the implementation, execution, and continuous improvement of OIMS within Esso.
Key responsibilities of the OIMS MC include:

- Demonstrate commitment to OIMS through active and visible participation in OIMS implementation, execution and improvement;
- Ensure that Annual System Reviews are conducted;
- Review key OI performance indicators that show the status and effectiveness of OIMS implementation and execution; and
- Periodically review OI incidents for learning and continuous improvements to OIMS.

Figure 2-4 Organisation Chart

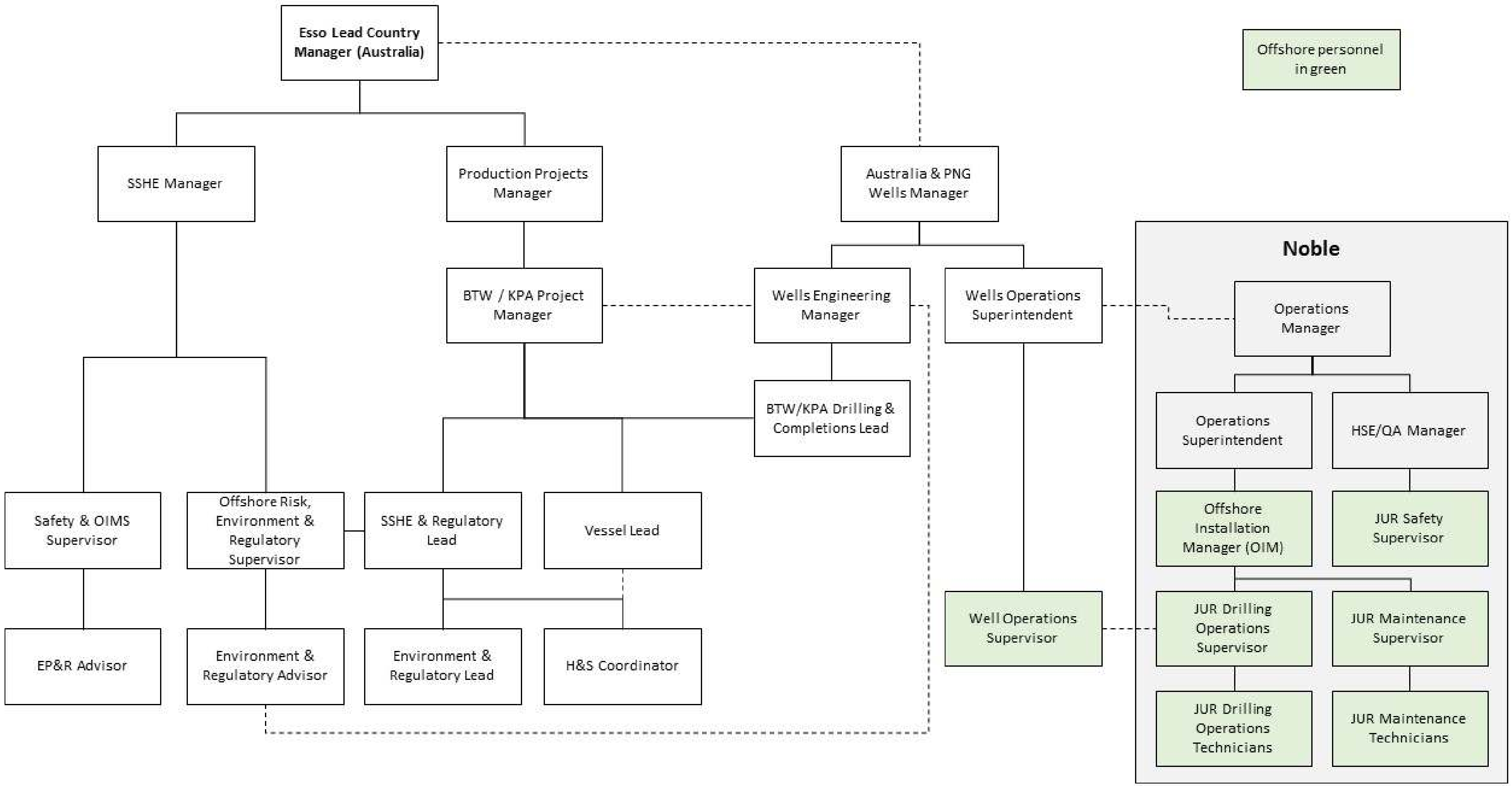


Table 2-3 Key Roles and Responsibilities

Role	Responsibilities
Wells Operations Superintendent (Esso)	• Oversees day to day operations to ensure compliance with relevant environmental legislative requirements, commitments, conditions and procedures as provided in this EP. • Primary point of contact between shore-based Wells Team and Noble • Ensures campaign-related induction is delivered. • Ensures procedures are in place and used effectively for the safe and efficient work management during drilling operations. • Ensures prompt follow-up action is initiated and completed after inspections/audits, incidents and emergency drills.
Wells Engineering Manager (Esso)	• Ensures an effective organisational structure is in place, with defined roles and responsibilities to ensure the implementation of OIMS for drilling operations. • Ensures sufficient competent staff to execute drilling operations. • Ensures systems are in place to provide technical support and competent field personnel to maintain facility integrity during drilling operations. • Reports to regulatory authorities as appropriate, including the reporting of environmental incidents. • Ensures that arrangements are in place to respond to a well control incident • Member of the Esso Incident Management Team. • Facilitates lessons learnt review at completion of drilling campaign.
Wells Operations Supervisor (Esso)	• Monitors drilling activities to ensure that the relevant environmental legislative requirements, commitments, conditions and procedures as detailed in this EP are being followed. • Maintains clear communication between Esso and JUR personnel. • Reports 'reportable incidents' to NOPSEMA within 2 hours. • Reports 'recordable incidents' to Environment & Regulatory Advisor (Esso) for monthly reporting to NOPSEMA. • Facilitates environmental inspections and/or audits. • Ensures follow up actions identified during environmental inspections/audits, incidents and emergency drills are implemented. • Notifies Wells Operations Superintendent of any incidents. • Prepares Daily Drilling Report. • Maintains chemical assessment records and approvals • Maintains retort test reports • Maintains records of all operational discharges • Complete Annual and/or End of Activity Environmental Performance Reporting
Offshore Installation Manager (Noble)	• Implements and ensures adherence to relevant environmental legislative requirements, commitments, conditions and procedures on-board. • Overall responsibility for meeting requirements and standards of JUR environmental performance. • Maintains clear communication with workforce. • Communicates environmental hazards and risks to the workforce and the importance of following good work practices. • Implements follow up actions from inspections/audits in a timely manner. • Maintains JUR in a state of preparedness for emergency response. • Reports environmental incidents to the Esso Wells Operations Supervisor and ensures follow-up actions are carried out. • Ensures that personnel are competent and trained for their role. • Ensures JUR is positioned in accordance with Location Approval Certificate and prepares JUR positioning report • Ensures compliance with Cargo Securing Manual and completes pre-departure inspection checklist • Ensures compliance with requirements of ABWM Requirements • Maintains records of ballast water uptake and discharge • Coordinates / communicates with approaching support vessels to prevent collision
JUR Drilling Operations Supervisor (Noble)	• Supervises all drilling activities to ensure these are undertaken in accordance with Noble EMS. • Prepares Contractor Daily Drilling Report • Participates in environmental inspections and/or audits.

Role	Responsibilities
	• Ensures follow up actions identified during environmental inspections/audits and emergency drills are implemented.
Offshore Risk, Environment & RegulatorySupervisor (Esso)	• Ensures all regulatory reporting requirements are met. • Reports to regulatory authorities as appropriate, including the reporting of environmental incidents. • Coordinates EP compliance audits. • Maintains communication with government agencies.
Environment & Regulatory Advisor (Esso)	• Undertakes duties as delegated by Offshore Risk, Environment & Regulatory Supervisor. • Interface between Esso SSHE and JUR Safety Supervisor. • Prepares pre-start notifications • Prepares environmental / regulatory content for inductions and ensures personnel receive the induction and that attendance records are maintained. • Completes / cordinates EP compliance audits, as delegated by Offshore Risk, Environment & Regulatory Supervisor. • Undertakes incident investigations. • Completes Monthly Incident Reporting to NOPSEMA. • Completes Annual and/or End of Activity Environmental Performance Reporting (if delegated by Wells Operations Supervisor).
JUR Maintenance Supervisor (Noble)	• Ensures maintenance and testing activities are carried out in accordance with the preventative maintenance systems (PMS). • Maintains PMS records • Ensures sufficient competent staff to maintain the JUR. • Reviews current operations and maintenance issues with the Offshore Installation Manager (OIM) and the Noble Operations Superintendent.
JUR Safety Supervisor (Noble)	• Oversees day to day operations onboard MODU to ensure operations are in accordance with approved procedures • Undertakes inspections, monitoring and reporting in accordance with approved procedures, including this EP. • Coordinates daily tool box meetings. • Coordinates environmental inductions onboard the JUR • Provides input into incident reporting • Undertakes incident investigation in collaboration with Environment & Regulatory Advisor
Support Vessel Masters (Vessel Contractors)	• Implements and ensures adherence to relevant environmental legislative requirements, commitments, conditions and procedures on-board. • Overall responsibility for meeting requirements and standards of environmental performance. • Maintains clear communication with the crew. • Communicates environmental hazards and risks to the crew. • Maintains vessel in a state of preparedness for emergency response. • Reports environmental incidents to the Esso Wells Operations Supervisor and ensures follow-up actions are carried out. • Ensures that personnel are competent and trained for their roles. • Maintains records of DP Notation, Failure Mode and Effects Analysis (FMEA) and proving trials. • Maintains records of watchkeeper-in-charge DP Certification • Complies with Cargo Securing Manual and completes pre-departure inspection checklist • Implements AFI ASOG / CAMO procedures • Implements cetacean interaction management actions consistent with EPBC Regulations 2000 – Part 8 Division 8.1 • Prepares Daily Operations Reports including cetacean sightings and management actions implemented
Helicopter Pilots (Esso)	• Implements cetacean interaction management actions consistent with EPBC Regulations 2000 – Part 8 Division 8.1 • Prepares Flight Reports including cetacean sightings and management actions implemented

2.4 Training and Awareness

OPGGS(E) Reg 14(5) requires that the implementation strategy detail measures for ensuring that employeee and contractors working on, or in connection with, the activity are aware of their responsibilities in relation to the EP, incuding during mergencies or potential emergencies, and have the appropriate competencies and training.

2.4.1 Environmental Induction

All Esso personnel and third party contractors involved in the JUR campaign will undergo environmental awareness training prior to the activities commencing as part of their induction.
The environmental awareness component of the induction will include the following:

- Environmental regulatory requirements.
- Description of the environmental sensitivities and conservation values of the operational area and surrounding waters.
- Roles and environmental responsibilities of key positions as defined in the EP.
- Overview of cetacean interaction management actions consistent with the EPBC Regulations – Part 8 Division 8.1.
- Overview of the waste management requirements.
- Chemical discharge assessment and approval process requirements.
- Overview of housekeeping and spill prevention
- Procedures for reporting reportable and recordable environmental incidents.
- Overview of emergency response and spill management procedures.

The Esso Wells Operations Superintendent and Esso Environment & Regulatory Advisor are responsible for ensuring personnel receive this induction prior to the commencement of JUR campaign activities. All induction attendees will sign an attendance sheet to confirm their participation in, and understanding of, the induction which is retained by the Esso Environment & Regulatory Advisor.

2.4.2 Competency and Training

This section describes the competency and training programs in place for Esso personnel and contractors.

2.4.2.1 Esso Personnel

OIMS System 5-1 Personnel Selection, Placement and Competency Verification addresses the selection, placement, training and ongoing verification of competency of employees and contractors to meet specific job requirements

Position descriptions for Key Positions, which could have a significant impact on OI (personnel and process safety, security, health or environment), document required OI related competencies and/or experience. This provides the basis for ensuring personnel selection and placement decisions meet specific job requirements. Personnel performing tasks with environmental aspects and impacts / risks will have the knowledge and skills necessary to perform their work in a manner consistent with the environmental policy and the requirements of OIMS System 6-5 Environmental Management.

The placement of personnel is subject to verification of completion of any needed training and/or experience, and demonstration of the required competencies for the performance of the job. The extent of initial, ongoing and refresher training provided is based on established requirements for OI related training and an individual's competency and/or experience gaps. These training requirements are documented in a training plan. The requirements may be met through training and/or developmental activities (i.e. training assignments).

Learning management systems are used for competency tracking, e-learning, training, scheduling and tracking of re-qualification requirements. Training progress is reviewed periodically by an individual's Supervisor. Any new training requirements are completed per the training plan.

In addition to the process of assuring that a person is competent in the knowledge and skills necessary to perform in a position, an assessment of the individual's performance and behaviours in that position is conducted annually. The Employee Assessment and Development Summary (EADS) process includes OI aspects and behaviours such as compliance with OIMS systems and associated procedures.

2.4.2.2 Third party service providers

Third party requirements for competency assurance of workers are addressed in OIMS System 8-1 Third Party Services. Job specific OI requirements are defined and communicated to third parties during the contracting process and included in third party contracts. Esso requires that all contractor personnel are screened, trained and qualified in accordance with their respective contractor-established requirements as well as Esso contractually specified requirements, and able to perform specified duties.

Each third party service provider is required to maintain training files for their personnel. Selected providers undergo a validation process in which Esso verifies these records as part of the initial contracting process and at a minimum annually for OI critical contractors.

2.4.3 Oil Spill Response Competency and Training

In accordance with OPGGS(E)R 14(5), the implementation strategy must ensure personnel have the appropriate competencies and training to undertake their roles and responsibilities in emergency situations.

Oil spill response training will be made available to specific personnel required to undertake a role in oil spill response.

Table 2-4 Oil spill response competency and training

Section	Role	Training and competency
Command	Incident Commander	• Incident Management Training (PMAOMIR418). • Oil Spill Response training. • IMO III - Command & Control Training (for Level II/III incidents)
	Safety Officer	• Incident Management Training (PMAOMIR320). • Experience in implementing safety management systems
	Liaison Officer	• Incident Management Training (PMAOMIR320).
Planning Section	Planning Section Chief (PSC)	• Incident Management Training (PMAOMIR320). • Oil Spill Response training. • Experience in fulfilling PSC role
	Environment Unit Lead*	• IMO II - Oil Spill Management or University of Spill Management • Incident Management Training (PMAOMIR320). • Familiarity with OSMP
	All other roles	• ICS 200
Operations Section	Operations Section Chief (OSC)	• Incident Management Training (PMAOMIR320). • Oil Spill Response training. • Experience in fulfilling OSC role
	Maritime Unit	• ICS 200 • Experience in marine operations
	Aviation Unit	• ICS 200 • Experience in aviation operations
	Aerial Observer	• Aerial Surveillance Course
	Source Control Branch Director / Deputy Director (for loss of well control incidents)	• ICS 300

Section	Role	Training and competency
	Source Control Branch – team member	• ICS 100/200
Logistics Section	Logistics Section Chief (LSC)	• Incident Management Training (PMAOMIR320). • Oil Spill Response training • Experience in fulfilling LSC role
	All other roles	• ICS 200
Finance & Admin Section	Finance & Admin Section Chief	• ICS 200
	All other roles	• ICS 200

* *When the IMT is activated, the Environmental Unit Lead becomes responsible for managing implementation of the OSMP modules, as directed by the Planning Section Chief.*

The selection of the Environmental Unit Lead is based on relevant experience as an Environment Advisor, with experience and/or training in the implementation of scientific monitoring. Minimum requirements include involvement in drills and spill exercises, management of marine monitoring programmes, such as produced formation water monitoring, and monitoring of parameters relating to offshore drilling and operations activities. In addition, the minimum requirement includes a relevant tertiary degree in engineering, environmental science, environmental management or similar.

Esso implements incident management based on the Incident Command System (ICS). The ICS is a system designed to provide a consistent organisation to respond to emergency situations. Positions within the ICS are fixed and have specific functions, ensuring that all responders know what to do and where they report in the organisation structure. The ICS is based on the US National Incident Management System 2006 ICS Structure, with slight modifications for industry. ICS is the primary emergency response framework for an oil spill response from all offshore activities.Typical incident management roles and training requirements are outlined in Table 2-4 and discussed further below.

2.4.3.1 Incident Management Training

The training program has been designed to meet the PMA08 Chemical, Hydrocarbons and Refining training standard. Personnel with an oil spill response role undertake Incident Management Training including ICS and oil spill response specific training, as defined by their role and in accordance with the Emergency Response Training Plan.

ICS 100 & 200 Training

ICS 100 & 200 Training consists of computer based training which addresses fundamental principles of the ICS including key roles and functions.

ICS 300

ICS 300 training is instructor led training that expands upon the information covered in the ICS 200 course. ICS 300 training may be obtained through completion of the ExxonMobil University of Spill Management course where the training provider is accredited to provide the certification.

2.4.3.2 Oil Spill Response Training

To supplement Incident Management Training, identified IMT members must also complete Oil Spill Response Training. Oil Spill Response Training may be completed through participation in a bespoke training program for Esso, completion of training delivered by AMOSC (or another training provider) or ExxonMobil University of Spill Management. Key aspects that must be addressed in this training include:

1. Understand different oil spill response objectives and strategies;
2. Understand the different environmental, sociological and economic considerations of oil spill response;
3. Learn and undertake an oil spill incident action planning process;
4. Understand how to effectively monitor and evaluate oil spill strategies; and
5. Understand jurisdictional control arrangements.

2.4.3.3 Oil Spill Response Equipment Operation

Operations and maintenance personnel at Esso's onshore facilities are familiarized with oil spill equipment operation, deployment and shoreline clean up techniques through dedicated training sessions and/or through participation in exercises. Training and exercises may be supported by AMOSC, Oil Response Company of Australia (ORCA) or another training provider. Selected personnel may also be nominated to attend IMO I - Oil Spill Response Operations.

2.4.3.4 Optional Specialist Training

Optional specialist training may be made available to specific personnel required to undertake a role in oil spill response. This training has been summarised in Table 2-5 and discussed further below.

Table 2-5 Optional specialist training

Typical Attendees	Course
Regional Response Team (RRT) members and select IMT members	ExxonMobil University of Spill Management.
Members of the AMOSC Core Group	IMO I - Oil Spill Response Operations AMOSC Core Group Workshop.
Select IMT members	IMO II - Oil Spill Response Management or IMO III - Command and Control
Aerial observers	Aerial Surveillance Course.
RRT members	ExxonMobil University of Spill Management. RRT Training Workshop.
Emergency Support Group (ESG) members and select IMT members	ESG Training.

AMOSC Core Group

Selected ExxonMobil personnel have been identified as members of the AMOSC Core Group and may be called upon to respond under the AMOSplan and National Plan arrangements. These personnel receive training through AMOSC in accordance with the AMOSC Core Group agreement. They also participate in bi-annual training, exercise or response activities in order to maintain their competency.

ExxonMobil University of Spill Management

ExxonMobil has developed an oil spill response training program which presents the fundamentals of oil spill response and provides a broad overview of response activities with a focus on the practicality and limits when responding to an oil spill. This course is aimed at personnel who fulfil a role within the IMT. The course combines theory, desktop exercises and field deployment of response equipment. The course is jointly run by ExxonMobil personnel along with specialist contractors and the local oil spill response organisation. The course is generally run over four days.
The course content covers:

- Oil spill response concepts
- Decision processes
- Corporate policies and preferences
- Fate, behaviour, tracking and surveillance
- Response options: Mechanical, In-situ burning, Dispersants, Monitor & Surveillance
- Response components
- Practical realities
- Common misconceptions
- Hands-on equipment deployment

On completion of the course participants are certified in ICS 100-200.

IMO II - Oil Spill Response Management

As an alternative to the ExxonMobil University of Spill Management, IMT personnel may attend the IMO II - Oil Spill Response Management course.

IMO III - Command and Control

Personnel identified to fulfil a Tier 2/3 Incident Commander role attend the IMO III - Command and Control course, or equivalent.

Regional Response Team
Esso, along with other ExxonMobil business units, contribute personnel to ExxonMobil's RRT. All RRT members complete University of Spill Management training (or equivalent) as base training. Selected RRT members also participate in additional role specific training. The RRT conducts annual RRT Training Workshops which are typically combined with a response exercise.

Emergency Support Group
Members of the ESG provide strategic support in event of an oil spill or other emergency event. ExxonMobil's ESG course is used to train ESG members in the ESG process as well as provide an overview of ExxonMobil's emergency response structure. This is an internally run course which combines theory and a number of simulation exercises. The course is typically run over 2.5 days. Course objectives are to:

- Increase awareness of the ExxonMobil emergency response system and the underpinning principles.
- Assist in achieving a consistent approach to the ESG response process across the Corporation
- Familiarize participants with roles and responsibilities within the ESG and the interface with other responders and stakeholders.
- Provide an opportunity for participants to practice roles.
- Improve ESG leadership and communication skills.
- Build confidence of participants in responding as a team and individually.
- Enhance ExxonMobil's commitment to a consistent approach to emergency response.

Aerial Surveillance Course
Aerial Observers complete an Aerial Surveillance Course, which is provided by AMOSC and OSRL. The course is typically run over two days and includes theory and practical activities including:

- Basic hydrocarbon theory and its relevance to aerial surveillance.
- Basic understanding of how to work in an aviation crew environment.
- How to effectively plan and coordinate an aerial surveillance flight.
- How to carry out the plotting and recording of oil spill information.
- How to present oil spill information back through the IMT in a clear and coherent manner.

2.4.3.5 Source Control Branch

All efforts are made to ensure that all personnel involved in Source Control Branch (SCB) management (i.e. Branch Director / Deputy Branch Director) have the minimum competencies and training as outlined in Table 2-4. In the event of the SCB being mobilised but it not being possible to source personnel who meet those requirements recognition of prior learning and experience may be used to determine a suitable candidate for the position. The following criteria are employed to determine the competency of alternate personnel to fill the SCB roles:

Table 2-6 SCB alternate personnel selection criteria

Criteria	Performance Standard	Detail
SCB Position	Wells Management personnel placement process	For example, a candidate acting as the Operations Superintendent must be deemed by Wells Management to be competent.
Experience in Well Operations	Filled a management / supervisory or superintendent role in offshore operations	Deemed to be sufficient to ensure candidate is well-versed in all aspects of offshore well operations.
Emergency Response Exercise Participation	Participation in SCB exercise	Deemed to be sufficient to ensure the candidate is familiar with SCB processes

2.5 Emergency Response

The process to prepare emergency preparedness and response plans, including procedures to prevent and mitigate potential environmental impacts associated with accidents and emergency situations, is addressed through OIMS System 10-2 Emergency Preparedness and Response.

Emergency planning and preparedness are essential to ensure that, in the event of an incident, all necessary actions are taken for the protection of the public, the environment, and company personnel, assets and reputation.

Responsibilities for the purposes of emergency response are outlined as follows:

- Noble is the “Operator” of the Facility and has legislative responsibilities for all operations on the JUR, including response to emergencies.
- Esso’s role in dealing with emergencies is to provide the necessary resources to support a Noble emergency response. Esso’s Wells Team will operate from the company’s Melbourne office. Additional management, technical and emergency response support will be provided from the Melbourne and, if required, Houston offices.

2.5.1 Emergency Response Documentation

A campaign specific Bridging Emergency Response Plan (ERP) will be developed to support the existing JUR emergency response documentation. It will describe the location specific arrangements for responding to emergencies including the role of helicopter and vessel support functions, extreme weather evacuation planning, medivac, regulatory liaison and reporting.

In the event of an emergency on the JUR the Noble Tom Prosser Offshore Emergency Response Manual is the primary document that details how emergencies are managed.

The Bridging ERP will addresses local responses for Esso Bass Strait operations including appropriate support linkages to Esso's Australian and corporate-wide Emergency Preparedness and Response network including in-country, regional and global Emergency Support Groups. The Bridging ERP also details how Noble and Esso will interact in the event of an emergency. A campaign specific Contacts Directory listing all contact numbers will also be developed.

2.5.2 Oil Pollution Emergency Plan

In accordance with OPGGS(E)R 14(8), 14(8AA) and 14(8A), the implementation strategy must include an Oil Pollution Emergency Plan (OPEP) and arrangements for testing the response arrangements within this plan.

Esso has in place the Bass Strait OPEP (see Volume 3) for all its offshore assets and operations in Bass Strait that outlines how Level 1, 2 and 3 spills will be managed.

For a Level 1 spill inside the 500m exclusion zone the Noble Tom Prosser Shipboard Oil Pollution Emergency Plan (SOPEP) is the primary response plan. It is supported by the Bass Strait OPEP.

For a Level 2 or 3 spill the Bass Strait OPEP is the primary document and this will outline the resources and response strategies to be implemented depending on the size and nature of the spill.

It also outlines who the lead organisations and responders are and any notification requirements.

In all cases Esso as nominated operator under the OPGGS(E)R will retain control and responsibility for managing spill response.

2.5.3 Testing of Oil Spill Response Arrangements

In accordance with OPGGS(E)R 14(8C) and requirements of OIMS System 10-2 Emergency Preparedness and Response, the response arrangements within the OPEP will be tested:

- Prior to the commencement of the activity;
- When they are significantly amended;
- Not later than 12 months after the most recent test; and
- If a new location for the activity is added to the EP after the response arrangements have been tested, and before the next test is conducted - testing the response arrangements in relation to the new location as soon as practicable after it is added to the plan.

Testing of response arrangementsl will be in accordance with the schedule outlined in Table 2-7.

Testing may be externally or internally facilitated. Tests will be documented and any corrective actions/recommendations arising from the tests will be managed in accordance with the Emergency Preparedness & Response Programs Guide. Emergency response training records will be maintained in accordance with OIMS System 10-2: Emergency Preparedness and Response.

Where changes are required to the OPEP, resulting from testing / exercise outcomes, altered contractual arrangements, corrective actions, routine information updates (e.g. contact detail change), or other items; the OIMS System 10-2 Administrator is responsible for ensuring changes are assessed against OPGGS(E)R 17 revision criteria and where necessary, the EP and / or OPEP is submitted to NOPSEMA as a formal revision, in accordance with the Management of Change (MOC) process (OIMS System 7-1 Management of Change). For changes which do not trigger a formal revision, internal revisions to the OPEP will also be in accordance with the MOC process with any change justified.

Table 2-7 Testing of oil spill response arrangements

Test	Objective	Parties Involved	Schedule
Emergency Response contact lists	To ensure that current emergency response contact details are available.	Esso and Third party agencies / service providers	6 Monthly
Incident Management Team (IMT) availability	To test the availability of personnel to staff the Esso Incident Management Team	Esso IMT	Quarterly
NEBA	To test the NEBA decision making process	Esso IMT – Environmental Unit	6 Monthly
Dispersant	To test efficacy of Esso owned dispersant stockpile	Esso AMOSC	Annual
Dispersant	To test arrangements to implement aerial dispersant application	Esso IMT AMOSC	Annual
Shoreline response	To test ability to undertake SCAT and execute Shoreline Tactical Response Plans and/or Shoreline Treatment Recommendations	Esso IMT AMOSC	Annual
Waste management	To test ability to implement waste management plans	Esso Waste Contractor	2 yearly
Oil Spill Monitoring Plan (OSMP)	To test availability of qualified personnel to implement OSMP	Esso / OSMP service provider	Annual
OSMP	To test ability to implement OSMP	Esso OSMP service provider	2 yearly

Test	Objective	Parties Involved	Schedule
Regional Response Team (RRT)	To test the integration of the ExxonMobil RRT to support a Level II IMT	Esso ExxonMobil RRT	3 yearly
OSR Equipment	To test availability of third party OSR equipment.	Esso AMOSC OSRL	Quarterly
OSR Equipment	To test readiness of Esso owned OSR equipment.	Esso	Annual
OSR Equipment	To maintain familiarity with use of OSR equipment through field equipment deployment.	Field response teams	Annual
OSR Equipment	To test field deployment of an offshore containment and recovery with a third party	Esso 3rd party	Every 3 years
Level II/III response arrangements	To test Level II/III response arrangements included within OPEPs including activation of external service providers and OSROs To test interface and communication/reporting arrangements with regulatory authorities and controlling agencies	Esso IMT & ESG State govt. agencies ExxonMobil RRT AMOSC	Every 5 years
Subsea Well Control	To assess the availability of logistical resources to mobilise the WWC/OSRL capping stack and supporting equipment to the Bass Strait	Wells Team 3rd party service providers Drill rig operator	1 month before commencement of drilling Annually* *if drilling program is occurring on subsea wells with sufficient water depth to utilise a capping stack.
Oiled Wildlife Response	To test availability of OWR resources to assist a State led oiled wildlife response	Esso AMOSC OSRL DELWP	Every 3 years
OSRO preparedness	To assess preparedness of AMOSC	Esso AMOSC APPEA	Annual
OSRO preparedness	To assess preparedness of OSRL	Esso / ExxonMobil	6 monthly

2.6 Monitoring of Performance Outcomes and Standards

In accordance with OPGGS(E)R 14(6) the implementation strategy must provide for sufficient include arrangements for monitoring, recording, audit, management of non-conformance and review of environmental performance and the implementation strategy to ensure that the environmental performance outcomes and standards in the environment plan are being met..

2.6.1 Audits, Assessments and Inspections

Environmental performance assurance of the activity will be undertaken in a number of ways. Performance assurance is undertaken to ensure that:

- Controls are implemented in accordance with EPSs to achieve the EPOs;
- Non-compliances and opportunities for improvement are identified; and
- Environmental monitoring and reporting requirements are met.

2.6.1.1 JUR / Support Vessel Activities

A due-diligence pre-activity inspection / audit of the JUR / support vessels will be carried out prior to the work commencing (and after contract award) to verify that procedures and equipment for managing routine discharges and emissions are in place (as described in pre-qualification material) to enable compliance with the EP.

A rig inspection checklist will be completed at commencement of the campaign and quarterly thereafter by the Esso Wells Operations Supervisor, in conjunction with the Noble Drilling Operations Supervisor, and issued to the Esso Environment & Regulatory Advisor for review.

Throughout the campaign a monthly EP compliance check will be conducted by onboard HSE personnel. A monthly EP compliance checklist will be completed and issued to the Esso Environment & Regulatory Advisor for review and as the basis for the monthly recordable incident report (Section 2.1.2).

2.6.1.2 EP Compliance

Independent of JUR / support vessel-based inspection / audit activities, Esso will undertake a compliance audit of the commitments contained in this EP and assess the effectiveness of the implementation strategy.

Any non-compliance with this EP will be subject to investigation and follow-up action as detailed in Section 2.6.2.

Any opportunities for improvement or non-compliances noted will be communicated to all relevant personnel at the time of the audit to ensure adequate time to implement corrective actions. The findings and recommendations of inspections and audits will be documented and distributed to relevant personnel for comments, and any actions tracked until closed out

Results from the environmental inspections and audits will be summarised in the campaign specific EP environmental performance report(s) submitted to NOPSEMA.

2.6.1.3 Contractor Performance Monitoring

In accordance with the Third Party Services Management Manual (see Section 2.2.1) for further information on OIMS System 8-1 Third Party Services) third parties performance monitoring plans will be established prior to a contractor mobilising to a work site location.

The performance evaluation and formal feedback process for contractors is scaled based on their potential SSHE impact in the work place and frequency of exposure (i.e. exposure hours). Providers of OIMS-critical services such as aviation, vessels, construction and wellwork are subject to in-field monitoring focusing on day-to-day work management activities in addition to Quarterly Performance Review and Annual Performance Assessment.

Performance reporting consists of documented reports and verbal communications appropriate to the impacts and risks involved with the services provided. Written reports can include:

- Non-conformance reports
- SSHE performance statistics, including environmental incidents
- Assessments on the adequacy of actions taken from performance gaps / incidents
- Deficiencies with SSHE requirements and recommended corrective actions

Report findings and recommendations are reviewed with contractor management and follow-up actions implemented to address deficiencies.

2.6.2 Management of Non-conformance

Investigations into environmental incidents (including EP non-compliances) are conducted in accordance with the Esso incident management system, as described in detail in OIMS System 9.1 Incident Management.
Notification, reporting and investigation of incidents:

- Ensures management, regulatory authorities and other appropriate personnel are notified of incidents and near misses on a timely basis;
- Enables sharing of learnings throughout the organisation to continuously improve health, safety and environment systems;
- Identifies corrective actions to prevent re-occurrence including (if applicable) actions to re-establish the stated control measures in the EP in order to continue to reduce impacts and risks to ALARP and an acceptable level; and
- Enables the analysis and trending of incident data to ensure appropriate focus on emerging issues.

Incidents are managed in accordance with the Incident Management Guide which describes the responsibilities and processes for all stages of incident management. Esso utilises the IMPACT incident database as the single, centralised tool for capturing data: tracking, sharing and analysing incidents, assessment findings, lessons learned and follow-up actions.

Every Esso employee and contractor is responsible for notifying their immediate supervisor of incidents, near misses and identified hazards, and for taking appropriate response as part of their regular duties. Accountability for investigation lies with business line management. The SSHE group is responsible for maintaining the reporting system, subject matter expert advice and investigation support.

The triggers and expected deliverables for investigations are based on incident severity (actual and potential) and are documented in the Incident Investigation and Sharing Guideline. The triggers for an investigation into an environmental incident are a significant spill to the environment, community complaint or regulatory reportable incident (see Table 2 2).

Corrective actions that address the root cause(s) of the incident are identified and implemented to prevent the recurrence of similar incidents. Corrective actions can be improvements to facilities, programs, processes or procedures that are identified to reduce the impact or risk, and enhance the integrity of operations. Once corrective actions have been identified from incident reports (including audit and inspection reports), the implementation process is systematically managed to completion via IMPACT. This ensures results are achieved and that the improvement is documented and sustained.

Noble will also, when relevant, undertake an investigation as per their HSE MS.

2.6.3 Environmental Performance Review

2.6.3.1 Daily Rig Calls

Daily rig calls are undertaken to keep all personnel involved up to date with the activities that are planned for the day and allows for input from the management team to assist with work planning.

2.6.3.2 Toolbox Meetings

Toolbox meetings are conducted twice daily to plan for any events that are occurring during the shift. This allows for relevant permits and risk assessments to be undertaken and to make sure that personnel completing the tasks understand all the associated safety and environmental risks.
Environmental matters will be included in daily toolbox talks as required for the specific work task being risk assessed.

Environmental issues will also be addressed in daily or weekly HSE meetings. All JUR crew will participate in these meetings with the OIM and JUR Wells Operations Supervisor in discussing HSE matters that have arisen during that day or week's operations, and upcoming issues to consider. Outcomes will be documented in HSE meeting minutes.

2.6.3.3 Completion of Activity

The Australia and PNG Wells Team conduct regular reviews of key performance indicators such as incident reports (including spills), regulatory compliance and types / volumes of waste disposed. In addition, the Australia & PNG Wells Team operations stewardship review is conducted yearly with Senior Management covering the environmental performance of recently completed drilling / P&A campaigns.

The HSE team on board the JUR meets on a monthly basis specifically to review environmental issues and initiatives. Personnel from Noble, Esso and other contractors attend where possible.

At the completion of the drilling campaign, a lessons learnt review will be conducted to determine:

- The effectiveness of control measures; and
- Improvements in procedures or processes for future campaigns.

2.6.3.4 Annual OIMS Management System Review

Formal assessment is regularly undertaken on the performance of the OIMS Systems to ensure that the Systems continue to be suitable, effective and are continuously improved. This is undertaken, at a minimum, on an annual basis in accordance with OIMS System 1-1 Management Leadership, Commitment and Accountability.

2.7 Monitoring of Emissions and Discharges

In accordance with OPGGS(E) Reg 14 (7) the implementation strategy must provide for sufficient monitoring of, and maintain a quantitative records of, emissions and discharges (whether occurring during normal operations or otherwise), such that the record can be used to assess whether the environmental performance outcomes and standards in the environment plan are being met.

For JUR / support vessel-based activities the Esso Wells Operations Supervisor is responsible for collecting emissions and discharges data and reporting to the Esso Environment & Regulatory Advisor.

A summary of these results will be reported in the EP environmental performance report submitted to NOPSEMA. Table 2-8 summarises the monitoring requirements for routine operations.

The process for managing environmental monitoring records is addressed through OIMS System 4-1 Information Management.

Table 2-8 Summary of monitoring of emissions and discharges

Aspect	Monitoring	Frequency	Reporting
Ballast water uptake / discharge	Volume Location	Per event	Annual / End of Activity Environmental performance report
Planned cement discharge	Cement additives used	Daily	Annual / End of Activity Environmental performance report
Planned discharge – drilling fluids and cuttings	Components of drilling fluids	Daily	Annual / End of Activity Environmental performance report
	Progressive average ROC (NAF sections only)	Daily	
	Actual average ROC per section (NAF sections only)	Per section	

Aspect	Monitoring	Frequency	Reporting
	Frequency of ROC measurement (NAF sections only)	Daily	
	OIW content of interface fluids / tank washings	Daily	
Planned operational discharges – surface (i.e. pickling acid, gravel pack carrier fluid and proppant, clean-up pills, clean-up / completion brine, DE material)	Components of fluids discharged at surface	Daily	Annual / End of Activity Environmental performance report
Spill to sea	Chemical / oil type Volume	By incident event	Incident report Annual / End of Activity Environmental performance report
Release of waste to sea	Waste type	By incident event	Incident report Annual / End of Activity Environmental performance report
Dropped object to sea	Object type	By incident event	Incident report Annual / End of Activity Environmental performance report

2.8 Stakeholder Consultation and Community Engagement

Stakeholder consultation contributes to Esso's understanding of the impacts and risks of the activity and is undertaken with a genuine desire to further understand the environments in which we operate.

Esso maintains a database of relevant stakeholders potentially affected by offshore production and drilling operations and records of consultation for each stakeholder. (see Appendix A - Relevant Stakeholders and Volume 2a Appendix A – Stakeholder Consultation).

2.8.1 Activity-based Consultation with Relevant Stakeholders

To consult with relevant stakeholders and assist with preparing Environment Plans, Esso provides Campaign Information Sheets to all relevant stakeholders. These information sheets include a description of the activity to be undertaken, impacts and risks and control measures to be implemented, as appropriate to the stakeholders' functions, activities or interests.

Relevant stakeholders are invited to correspond with Esso if they have concerns or require clarification. Follow up verbal discussions with relevant stakeholders occur if and when requested. All phone discussions are followed up with an email summarising the discussion and included in the SSHE consultation database.

If Esso does not receive a response to information sheets provided to relevant stakeholders, Esso attempts to contact them via direct phone calls and further emails.

2.8.2 Notice of Activity Commencement and Completion

Esso sends an update email to all relevant stakeholders to advise them of Esso activity commencement and completion.

In addition, the South East Trawl Fishing Industry Association (SETFIA) sends out text messages to all their fishing members to advise them of Esso activity commencement and completion, as and when requested by Esso.

2.8.3 Discussions with Relevant Stakeholders in the Immediate Vicinity of Esso's Activities

During times of major project activity, regular meetings with interested relevant stakeholders are considered. Esso had a monthly phone hook-up with SETFIA and Lakes Entrance Fishermen's Cooperative Society Limited (LEFCOL) throughout 2018 to discuss Esso's activities. Details of these meetings are recorded in the SSHE consultation database. These meetings are expected to continue throughout 2019.

A six-monthly meeting occurs with the fishing industry to negotiate compensation claims (Compensation Tribunal). A fisheries subject matter expert also attends the meeting together with fisheries claimants. The last tribunal meetings occurred in August 2018 and February 2019 and an overview of Esso's current projects was outlined.

2.8.4 Periodic Updates

To assist relevant stakeholders in their general understanding of the industry and Esso's overall operations, Esso provides an annual fact sheet or email to relevant stakeholders. This communication contains updates about Esso's offshore operations, including information such as environmental performance data.

Esso also works with Seafood Industry Victoria (SIV) to include a copy of Offshore Fact Sheets and Campaign Information Sheets in the SIV quarterly newsletter, PROFISH when practical.

2.8.5 Ongoing Community Engagement

Esso is committed to supporting and engaging with the communities in which we operate and consider community relationships an essential element of our business. The process for receiving, documenting and responding to relevant environmental, socioeconomic, and community health information requests from external interested parties is addressed through OIMS System 10-1 Community Awareness and Public Affairs.

2.8.5.1 Public Forums

Esso currently conducts public engagement sessions approximately every one to two years to engage with the broader community. The purpose of these sessions is to enable face-to-face discussions with relevant stakeholders and also to enable other persons and organisations to learn about Esso's activities.

The last two public engagement sessions were conducted on 17 November 2017 and 5 December 2018 and included information on Esso's offshore projects and ongoing operational activity. Invitations were sent to all Lakes Entrance local stakeholders, including fishers and both sessions were advertised in the local newspaper. The next public engagement session is planned for August 2019 in recognition of the current level of major project activity.

2.8.5.2 Esso Webpage

Esso's webpage is an information portal providing the community with access to fact sheets and EP summaries and provides an opportunity for stakeholders to make enquiries about our offshore activities and projects. Information on current major project activity can be accessed at https://www.exxonmobil.com.au/en-au/energy/natural-gas/natural-gas-operations/offshore-projects.

2.9 Environmental Legislative Compliance

2.9.1 Identification of new or amended legislative requirements

Several mechanisms are in place to identify new or amended laws and regulations that may or may not have an impact on Esso business:

- Active participation in industry organisations or cooperatives (e.g. APPEA);
- Active participation in local or international trade organisations;
- Subscriptions to specialist consultants, commercial publications and government provided subscriptions (e.g. SAI Global, Environment Essentials, COMLAW);
- Direct contact with government agencies or direct review of government publications of laws and regulations
- Participation in government-sanctioned working committees.

Changes to management arrangements for protected matters are also identified via the above mechanisms. Relevant changes to protected matter management are assessed on an periodic basis by the Esso Environmental Advisor, and incorporated into the risk assessments, control measures, EPOs and EPSs and implementation strategy in the EP where required.

2.9.2 Assessment of applicability

Once new, amended or existing regulations are identified, an assessment is made as to their applicability and possible impact on Esso operations. The initial screening of information is performed by the Esso Regulatory Advisor before being forwarded to an appropriate Subject Matter Contact (SMC) for their determination on applicability. A tracking list of emerging / amending regulation and associated current review status is maintained by the Esso SSHE Group.

2.9.3 Assessment of the impact

If an amended or new regulation is identified that is applicable to Esso operations, an interpretation of the regulation by Esso Regulatory Advisor (with Law department assistance as required) is provided to the appropriate SMC for an assessment of the new or amended regulation’s impact to Esso. The assessment will also include review of existing obligations for that regulation.

2.9.4 Compliance plan development

The SMC will then develop a Compliance Plan noting:

- Any new obligations to be met, or changes to current obligations
- Any specific or indirect impacts
- How and by whom the obligations will be met
- Any procedural or other documentary changes required as a result of the compliance plan
- A compliance timeline
- A communication / training plan
- Any ongoing compliance requirements to be entered into the regulatory obligation tracking database (Regframe), or edits to existing entries

References

DAWR, 2009. The National Biofouling Guidelines for the Petroleum Production and Exploration Industry. Department of Agriculture and Water Resources. Accessed at http://www.marinepests.gov.au/marine_pests/publications/Pages/petroleum-exportation.aspx.

DPIRD, 2019. WA Vessel Check website. Department of Primary Industries and Regional Development. Accessed at http://www.fish.wa.gov.au/Sustainability-and-Environment/Aquatic-Biosecurity/Vessels-And-Ports/Pages/Vessel-Check.aspx

Appendix A – Relevant Stakeholders

Stakeholder Consultation

Esso has undertaken stakeholder engagement in preparation of the JUR Drilling EP.

The OPGGS(E)R establish that titleholders (and those with access authority) 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.
To address this, Esso has undertaken consultation during the preparation of this EP to identify stakeholders; share sufficient information; and allow reasonable time for consideration of this information (and feedback to Esso).
Categories of relevant persons

As described in the OPSGG(E)R, there are five categories of relevant persons with whom Esso will consult:

- Each department or agency of the Commonwealth to which the activities to be carried out under the EP may be relevant.
    - This is taken to mean a Commonwealth Government department or agency that has responsibility for managing or protecting the marine environment from pollution. This may include those with responsibilities for environmental and fisheries management, oil pollution management and response, defence and communications, maritime / navigational safety, marine parks and native title.
- Each department or agency of a State or the Northern Territory to which the activities to be carried out under the EP may be relevant.
    - This is taken to mean a State or the Northern Territory Government department or agency that has responsibility for managing or protecting the marine environment from pollution. This may include those with responsibilities for environmental and fisheries management, oil pollution management and response, defence and communications, maritime / navigational safety, marine parks and native title.
- The department of the responsible State Minister or the responsible Northern Territory Minister.
    - This is taken to mean the department that has responsibilities for offshore petroleum or energy resources in the adjacent State or Northern Territory.
- Persons or organisations whose functions, interests or activities may be affected by the activities to be carried out under the EP.
    - This is taken to mean a person or organisation that may be affected by the petroleum activity.
- Any other persons or organisation that it considers relevant.
    - Any other identified stakeholders based on existing environmental knowledge, past experience, internet research, initial campaign emails, existing networks and forums, or social media.

Definition of relevant persons' functions, interests and activities

Relevant persons' functions, interests and activities have been defined in Table 1 below.

Table A1 Definitions of relevant persons' functions, interests and activities

Function	Person or organisation's power, duty, authority or responsibilities.
Activity	Thing or things that a person or group does or has done
Interest	Person or organisation's rights, advantage concern

Definition of sufficient information

Providing 'sufficient information' includes:

- Sharing information that is targeted to relevant persons' needs;

- Detailing the proposed activity and any impacts and risks that may be relevant to them;
- Putting forward information on how an impact or risk may affect that relevant person; and
- Describing the control measures proposed to manage the potential impacts to that relevant person.

Reasonable consultation period

The time required for consultation varies depending on the individual circumstances of the relevant person, the proposed activity, the extent of impact and risks on that relevant person and the level of information that has been provided.

Esso understands that some relevant persons may require longer timeframes than others, such as those that do not have resources dedicated specifically to liaise with the petroleum industry.

A reasonable consultation period will allow:

- A relevant person to assess information and provide a response detailing any 'objections or claims';
- Esso to consider responses in developing the EP; and
- Esso to reply back to the relevant person addressing any 'objections or claims' in the EP.

Addressing objections / claims

Esso will clearly identify and address each *specific* objection or claim raised by relevant persons and if applicable:

- Demonstrate that the risk or impact in question has been reduced to ALARP and will be of an acceptable level;
- Provide a statement that addresses each element of the objection or claim made by a relevant person and where control measures are implemented to resolve objections and claims, will clearly communicate this to the relevant person; and
- Provide copies of all written responses provided by a relevant person to NOPSEMA.

In the event that Esso and a relevant person are unable to reach agreement on an activity, or there is a broad objection (e.g. to resource exploitation) or differing views (e.g. on the significance of an environmental impact or risk) the consultation report will demonstrate that:

- Reasonable attempts have been made;
- Reasonably available options have been explored for resolving or mitigating the degree to which a person may be affected, particularly through control measures;
- The relevant person has been informed about how their objections or claims have been addressed; and
- The relevant person has been made aware of how their objections or claims are going to be represented to NOPSEMA.

Stakeholder Categorisation

Table A2 Category 1 Stakeholders – Commonwealth department or agency

Commonwealth Department or Agency	Relevance
Department of Agriculture and Water Resources - fisheries, biosecurity and marine pests	Responsible for the implementation of Australia's marine pest and biosecurity management requirements when bringing in diving or installation vessels, MODUs and support vessels.
Department of the Environment and Energy - Director of National Parks	Responsible for managing commonwealth reserves and conservation zones. Esso report death / injury of EPBC listed species and for oil pollution if it impacts Australian Marine Parks.

Australian Maritime Safety Authority	Commonwealth government agency responsible for maritime safety, protection of the marine environment including marine pollution and maritime aviation search and rescue.
Australian Fisheries Management Authority	Responsible for management of Commonwealth commercial fisheries from 3NM to 200NM. Esso titles and areas of operations overlap with a number of these fisheries.

Table A3 Category 2 Stakeholders – State or Northern Territory department or agency

State	State or Northern Territory Department or Agency	Relevance
VIC	Victorian Fisheries Authority	An independent statutory authority established to effectively manage Victoria's fisheries resources. Bay and inlet fishery licence holders overlap with Esso's operational areas and further fisheries could potentially be affected by an unplanned event.
VIC	Department of Environment, Land, Water and Planning	Relevant for unplanned events as a response agency for responding to wildlife impacted by marine pollution.
VIC	Department of Jobs Precincts and Regions (DJTR) - Marine Pollution (was previously DEDJTR)	Relevant for unplanned events as a control agency in Victorian state waters.
VIC	Environment Protection Authority	Relevant for unplanned events as they have jurisdiction over environmental matters in Victoria, including environmental protection and may advise on pollution and waste management in a response scenario.
VIC	Transport Safety Victoria - Maritime Safety	Relevant for unplanned events. A branch of Transport Safety Victoria, working closely with vessel operators and waterway and port managers to provide expert knowledge, education, support and direction
VIC	Parks Victoria	Relevant for unplanned events. They manage significant stretches of land along the Gippsland coastline and some maritime infrastructure in the Gippsland area (e.g. some piers, jetties, berths)
NSW	Roads and Maritime Services	Relevant for unplanned events. The control agency for marine pollution incidents impacting NSW state waters. NSW waters could potentially be affected by an extended duration unplanned event.
NSW	Department of Primary Industries	Relevant for unplanned events. Is responsible for the administration and development for agriculture, fisheries, aquaculture, forestry, and biosecurity in NSW.
NSW	Environment Protection Authority	Relevant for unplanned events. The primary environmental regulator for NSW.
TAS	Department of Primary Industries, Parks, Water and Environment	Relevant for unplanned events as the control agency for marine pollution in Tasmanian state waters.
TAS	Parks and Wildlife Service	Relevant for unplanned events. The managing authority of Tasmania's nature reserve system which could potentially be affected by an unplanned event.
TAS	Environment Protection Authority	Relevant for unplanned events. Regulates developments and activities that may impact on environmental quality and

		to promote best practice, sustainable environmental management

Table A4 Category 3 Stakeholders – Department of the responsible State Minister

Department of the responsible State Minister	Relevance
Department of Jobs Precincts and Regions - Earth Resources Regulation (VIC)	Relevant for unplanned events as a control agency in Victorian state waters.

Category 4 (and 5) Stakeholders - Persons or organisations with functions, interests or activities that could be potentially affected by the activities (sub-divided into planned activities and unplanned events) to be carried out under the EP.

During the planning of each activity Esso reviews the current list of stakeholders maintained in the SSHE database and uses a checklist to assess which stakeholders are relevant based on the definitions in Table A1.

Table A5 Category 4 & 5 Stakeholders – Other relevant persons or organisations

Stakeholder ID	Relevant stakeholders (planned activities)	Relevance
17	Lakes Entrance Fishermen's Co-operative Limited	The largest (fleet and throughput) fishing co-operative in Australia.
33	Seafood Industry Victoria	The peak body representing professional fishing, seafood processors and exporters in Victoria.
37	South East Trawl Fishing Industry Association	Represents the interests of Commonwealth-licensed trawl fishermen in the South East Trawl Fishery.
15	Gippsland Ports	Potentially affected function or activity
18	Lakes Entrance Scallop Fishing Industry Association	Potentially affected function or activity
24	Seven Group Holdings (formerly Nexus)	Potentially affected function or activity
26	Beach Energy	Potentially affected function or activity
34	Cooper Energy (Formerly Santos)	Potentially affected during activity
40	Sustainable Shark Fishing Association	Potentially affected during activity
52	Victorian Scallop Fishermans Association	Potentially affected during activity
70	Victorian Bays and Inlets Fisheries Association	Potentially affected during activity
73	Victorian Rock Lobster Association	Potentially affected during activity
76	Commonwealth Fisheries Association	Potentially affected during activity
77	Southern Shark Industry Alliance	Potentially affected during activity
79	Eastern Victorian Sea Urchin Divers Association	Potentially affected during activity
81	Australian Oceanographic Services P/L	Potentially affected during activity
83	Corner Inlet Fisheries Habitat Association	Potentially affected during activity
87	Bass Oil	Potentially affected during activity
100	CarbonNet	Potentially affected during activity
121	Australian Southern Bluefin Tuna Industry Association	Potentially affected during activity

123	Panama II Octopus fishing vessel	Potentially affected during activity
10	East Gippsland Catchment Management Authority	Potentially relevant in an unplanned event
11	East Gipplsand Shire Council	Potentially relevant in an unplanned event
29	Phillip Island Nature Park	Potentially relevant in an unplanned event
30	Port Franklin Fisherman's Association	Potentially relevant in an unplanned event
41	Tasmanian Seafood Industry Council	Potentially relevant in an unplanned event
66	Apollo Bay Fishermen’s Co-op	Potentially relevant in an unplanned event
71	Victorian Fishery Association in Research Management (VFARM)	Potentially relevant in an unplanned event
82	East Gippsland Estuarine Fishermen's Association	Potentially relevant in an unplanned event
112	Victorian Regional Channels Authority	Potentially relevant in an unplanned event